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Preparation and evaluation of SiRNA loaded polymeric nanoparticles

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For SiRNA 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 hence attempts are made here 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 resulting nanoparticles were compared with regard to their physicochemical properties including particle size, zeta potential, morphology and binding and encapsulation efficiency. Among all the formulations prepared with different cross linker 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 $+32.4\pm 0.5$ mV and high entrapment (>91%) and binding efficiency. 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 showed initial burst release followed by sustained release of SiRNA. Moreover, all the formulations showed low and concentration-dependent cytotoxicity with HeLA cell lines.

Biography

Riddhi D Trivedi has completed her PhD from Ganpat University. She is the Associate Professor at SIPS, GTU. She has published more than 25 papers in reputed journals and has various research grants from governing bodies in the field of nanotechnology.

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