

## Preparation and characterization of gemcitabine nanoparticles

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**Background and Aims:** Gemcitabine is a chemotherapeutic agent, currently used for treatment of solid tumors including colon cancer via intravenous route. Administering the drug by this route leads to various side effect. The aim of this study is to prepare an oral formulation that overcomes the challenges in cancer chemotherapy with gemcitabine.

**Methods:** Gemcitabine loaded chitosan nanoparticles (GC-CSnp) were prepared by ionic gelation method. The nanoparticles were characterized using dynamic light scattering, Fourier transform infrared spectroscopy (FTIR), Differential scanning calorimetry (DSC), scanning electron microscopy and Transmission electron microscopy. The cytotoxicity of the GC-CSnp was assayed in HT-29 colon cancer cell line. The effect of concentration of Pluronic F-127 (PF), GC and TPP on the particle size and zeta potential of nanoparticles was examined.

**Results:** The size of blank nanoparticles and GC-CSnp was within the range of 80-170 nm with positive surface charge. By increasing GC concentration the particles size were increased vice versa it were decreased by increasing in PF/CS mass ratio. The surface charge slightly decreased with increasing concentration of GC and PF. FTIR and DSC data revealed that the drug was dispersed in its amorphous form. Maximum drug encapsulation efficiency was achieved at 0.4 mg/ml GC concentration. CS and PF-CS nanoparticle had a spherical shape. *In vitro* drug release study at 37°C ± 0.5°C in PBS (pH 7.4) exhibited a sustained release profile for GC-loaded PF-CS nanoparticles. Cytotoxicity assay for GC-CSnp showed a decrease in IC<sub>50</sub>.

**Conclusions:** The results obtained suggest that the GC-loaded PF-CS nanoparticles could be evaluated for an efficient oral formulation for colon cancer treatment.

**Keywords:** Chitosan; Nanoparticles; Ionic gelation; Gemcitabine; Colon cancer