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Formulation Development and Characterization of Chitosan Multipaticulate System for Treatment of Colorectal Cancer

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In the present work, chitosan microspheres with a mean diameter between 42.32μm and 49.44μm, were produced by ionically cross linking method of chitosan, and tested for treatment of colorectal cancer. Aiming at developing a suitable colon specific strategy, Fluorouracil (Fu) was encapsulated in the microspheres, following Eudragit S-100 coating by solvent evaporation technique, exploiting the advantages of microbiological properties of chitosan and pH dependent solubility of Eudragit S-100.Different microsphere formulations were prepared varying the ratio FU:chitosan (1:2 to 1:10), stirring speed (1000–2000 rpm), and the concentration of emulsifier Sodium lauryl sulfate (0.5–1.5% (w/v)). The effect of these variables on the particle size and encapsulation parameters (production yield (PY), loading capacity (LC), encapsulation efficiency (EE)) was evaluated to develop an optimized formulation. In vitro release study of non-coated chitosan microspheres in simulated gastrointestinal (GI) fluid exhibited a burst release pattern in the first hour, whereas Eudragit S-100 coating allowed producing systems of controlled release diffusion fitting to the Higuchi model, and thus suitable for colon-specific drug delivery. DSC analysis indicated that FU was dispersed within the microspheres matrix. Scanning electron microscopy revealed that the microspheres were spherical and had a smooth surface. Chitosan biodegradability was proven by the enhanced release rate of FU in presence of rat caecal contents.

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