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Screening potential of biodegradable polymersomes for controlled drug delivery

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In recent times, copolymerization of biodegradable polymers in order to obtain novel tailored hybrid materials for modified drug delivery is on a pace. The controlled drug delivery systems are of great significance amongst the available, due to the achievement of an optimum concentration, usually for prolonged time, and the diminishing of side effects due to the reduction of high initial blood concentrations. The preference for going for polymersomes over other nanostructured carriers include enhanced mechanical stability and greater flexibility to tailor bilayer characteristics such as thickness and chemical composition, enhanced stability of labile drugs, controlled drug release and an enhanced drug bioavailability owing to the fact that particles in the nano-size range are efficient in crossing permeability barriers.

The objective of this research was to design polymer-based nanoparticulated carriers or polymersomes from block copolymers and screening polymersomes as drug delivery vehicles for controlled release mechanisms, and drug bioavailability.

Physical blends of chitosan (CS) graft copolymers were devised and its polymersomes were prepared by solvent injection method. A poorly water soluble drug was successfully loaded into these polymersomes. Maximal encapsulation efficiency exhibited by the polymersomes was 72.5%. Formation of interpenetrating network and the chemical stability of drug loaded polymersomes was confirmed by Fourier transform infrared spectroscopy (FTIR). Scanning electron microscopy confirmed spherical shapes and smooth surface morphology of the polymersomes. In vitro release study showed that these polymersomes could control drug release for more than 24h and exhibited their potential as controlled drug delivery systems.

Design and evaluation of mucoadhesive buccal drug delivery system of granisetron hydrochloride

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Granisetron hydrochloride, a 5 HT3 antagonist is a powerful antiemetic drug belongs to BCS Class III which has oral bioavailability of 60% due to hepatic first pass metabolism and has a short half-life of 3 h. To overcome the above drawback, the present study was carried out to formulate and evaluate buccal films of Granisetron hydrochloride. The films were prepared using polymers such as polyvinylalcohol, Hydroxy Propyl Methyl Cellulose (HPMC), in different ratios by solvent casting method. PEG 400 as plasticizers, mannitol employed as sweeteners and Sodium EDTA as a permeation enhancer. Satisfactory results were obtained when subjected to physico-chemical tests such as uniformity of weight, thickness, surface pH, folding endurance, uniformity of drug content, swelling index, bioadhesive strength, and tensile strength. Films were also subjected to in vitro drug release studies by using USP type II (paddle) dissolution apparatus. Ex vivo drug permeation studies were carried out using porcine membrane model. Drug permeation of 66–77% was observed through porcine mucosa within 28 min. Higher percentage of drug release was observed from films containing the high percentage of permeation enhancer. In conclusion the films of Granisteron hydrochloride is the promising formulation that could improve the bioavailability of the drug and also provide immediate relief from emesis.

Keywords: Buccal films, granisetron hydrochloride, polyvinyl alcohol, solvent casting technique.