

Analysis of mucin – polyelectrolyte interactions in aqueous solutions

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Abstract

Mucoadhesion, defined as interfacial interactions between a dosage form and a mucous membrane, has widely been used for designing drug delivery systems. It is generally recognised that specific interactions between macromolecules of a dosage form and mucins play an important role in mucoadhesion. We have studied the interactions between aqueous dispersions of porcine stomach mucin and different cationic and anionic polymers (chitosan, amphiphilic quaternary ammonium methacrylates and poly(acrylic acid)) by a number of physicochemical methods traditionally used for investigation of polymer-polymer and polymer-colloid interactions. It was demonstrated that electrostatic attraction between positively charged polymers and negatively charged mucins is the major factor responsible for mucoadhesive properties of chitosan and quaternary ammonium methacrylates. The excellent mucoadhesive ability of poly(acrylic acid) is due to the hydrogen bonding with mucins. Solution pH as well as the presence of other chemicals can affect the mucoadhesive interactions significantly. The correlation between the strength of mucin – polyelectrolyte interactions in solutions and mucoadhesive performance of polymeric dosage form in vitro has been established.