Research Paper

**In-Situ Gelling System based on Thiolated Gellan Gum as New Carrier for Nasal Administration of Dimenhydrinate**

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**ABSTRACT:** The purpose of the present study was to develop intranasal delivery system of dimenhydrinate using thiolated gellan gum and formulations were modulated so as to have gelation at physiological ion content after intranasal administration. Gelation was determined by physical appearance. The mucoadhesive force in terms of detachment stress, determined using sheep nasal mucosa, increased with increasing concentration of thiolated polymer. The results of in vitro drug permeation studies across sheep nasal mucosa indicate that effective permeation could be significantly increased by using in situ gelling formulation with thiolated polymer concentration. Finally, histopathological examination did not detect any changes during in vitro permeation studies. In conclusion the gel formulation of dimenhydrinate with in situ gelling and mucoadhesive properties with increased permeation rate is promising for prolonging nasal residence time and thereby nasal absorption.

**KEYWORDS:** Thiolated gellan gum; in situ gel; Dimenhydrinate; Mucoadhesion; Nasal

**Introduction**

Nasal administration is a non-invasive method of administration when oral administration of drug gives an undesirably slow effect, or when drug is highly metabolized or incompletely absorbed in the gastrointestinal tract. Possible pathways for a drug to permeate across the nasal mucosa are passive transportation, carrier mediated, transcytosis and transport through intercellular tight junctions. However nasal delivery system has limitations which have restricted its use to delivery of few drug molecules in general rapid clearance from nasal cavity (Illum et al., 2003).

Different delivery systems based on polymers have been developed which are able to increase the residence time of the formulation at absorption site of drugs (Illum et al., 2003). In recent years there has been an increasing interest in water soluble polymer that are able to form gels after application to delivery site. These so called in-situ gelling polymers are highly advantageous compared with other polymer because, in contrast to very strong gels, they can be easily applied in liquid form to the site of drug absorption. At, the site of drug absorption they swell to form a strong gel that is capable of prolonging the residence time of the active substance. Gellan gum is a novel ion sensitive polysaccharide polymer; it is native from extra cellular microbial polysaccharides produced by bacterium *Pseudomonas elodea* that are capable of forming gels within seconds of contact with liquid of high cation concentrations. Further improvement concerning in situ gelling of already well established polymer could possibly be achieved by immobilization of thiol group. These so called thiomers are capable for increase in viscosity, residence time (Alexander et al., 2002, Andreas et al., 2003). It is an extremely effective gelling agent, aqueous solution of which gels in the presence of mono or divalent cations present in the nasal secretions (Balasubramanyam et al., 2003).

Dimenhydrinate is one of the OTC drugs used to prevent motion sickness which has been used by oral and injectable administration. It is an antihistaminic used for the prevention and treatment of nausea, vomiting, dizziness, and vertigo associated with motion sickness.

Dimenhydrinate is rapidly absorbed orally, but extensively metabolized by the liver. It should be administered 30 min before travelling, but the orally administered antiemetic drug tends to be discharged by vomiting (Drug Facts and comparisons).

On the contrary, intravenous (IV) administration renders rapid effects to a patient, but the onset of effects is too rapid to cause undesirable effects, additionally, it results in a local pain. Practicing the IV route in journey is highly impossible. In the current scenario of globalization; travelling has become one of the most essential needs of

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