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"The effects of polysorbate surfactants on the structure of mucus Glycoproteins "

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Abstract:

A dynamic oscillatory technique was used to assess the effect of polysorbate non-ionic surfactants on mucus rheology. Adherent mucus gel was scraped from the surface mucosa of pig stomachs and purified by gel exclusion chromatography followed by ultrafiltration and gelation. Rheological measurements of this gel were carried out on a Carri-Med Controlled Stress Rheometer. Appropriate volumes of surfactant solution were added to weighed samples of mucus gel so that a final concentration of 20 mM surfactant was achieved in a gel containing 8% w/w solids content. Polysorbate 20 (PS20), polysorbate 40 (PS40), polysorbate 60 (PS60) and polysorbate 80 (PS80) all decreased both storage (elastic) modulus G' and loss (viscous) modulus G'' significantly at 10 Hz ($P<0.05$, ANOVA). The extent of rheological changes induced by the four polysorbates could be ranked as: PS80>PS20>PS60>PS40. The mechanisms by which surfactants disturb the mucus structure are not fully understood, nonetheless, they could possibly affect the mucus gel properties by causing depletion of the glycoprotein constituents such as non-mucin proteins and mucin associated lipids. This might lead to the conclusion that polysorbates, by reducing the viscoelasticity of mucus gel could alleviate its barrier properties and facilitate the diffusion of concomitantly administered drugs via mucus gel.

Keywords:

Mucus gel ، Rheology ، Surfactant ، Polysorbates ، Glycoprotein ، Mucin

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