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Effects of rabbit gastrointestinal mucins and dextran on hydrochloride diffusion in vitro

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Abstract

We compared a viscous fingering formation of hydrochloric acid (HCl) in rabbit corpus, antral and duodenal mucins and with dextran under neutral and acidic conditions with respect to relative viscosity, molecular mass, and carbohydrate composition. The effect of desialylation of duodenal mucin on the viscous fingering formation of HCl was also examined. HCl (0.1 N) was injected into 1% solutions of mucins and dextran and a subsequent viscous fingering formation was assessed based on an influx volume rate of HCl. A low influx volume rate indicates a high ability of the solutions to produce viscous fingers. The influx volume rate of HCl was lowest in duodenal mucin followed by corpus mucin, antral mucin, and dextran at pH 7. The influx volume rate of HCl was inversely correlated with the relative viscosity of the solution. Maximum molecular masses were large in the order of corpus, antral, and duodenal mucins, and they were larger than dextran T2000. Rabbit gastrointestinal mucins were very polydisperse system. Duodenal

mucin contains more sialic acid than gastric mucins; the influx volume rate of HCl increased in desialylated duodenal mucin. It is suggested that the higher ability of gastric mucins to prevent HCl diffusion than dextran were due to the differences in the molecular mass. The ability of duodenal mucin to prevent HCl diffusion was probably attributed to its high sialic acid content, which may reflect a physiological role of duodenal mucin in the duodenum that has to deal with HCl influx from the stomach.



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Keywords

Dextran; Corpus mucin; Antral mucin; Duodenal mucin; Hydrochloric acid; Lectins; Sialic acids; Viscous fingering; Viscosity

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