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Evaluation of the role of gastric digestion in overall protein assimilation by a combined ¹³C-egg white - ¹⁴C-octanoic acid breath test

¹³C, ¹⁴C-Atemtest und Magenverdauungsfunktion

The role of gastric digestion in normal protein assimilation is generally thought to be minimal. The aim of the present study was to investigate whether inhibition of gastric acid secretion affects normal protein assimilation. Ten healthy volunteers were studied using a combination of a newly developed ¹³C-leucine-egg white - and ¹⁴C-octanoic acid breath test. The test meal consisted of 22 g of ¹³C-labeled egg white protein, the yolk of one egg, doped with 74 kBq of ¹⁴C-octanoic acid, and 200 ml of water. The yolk and egg white were baked separately, but administered together. Breath samples were taken before ingestion of the meal and every 15 minutes thereafter during 6 hours, and analyzed for ¹³CO₂ and ¹⁴CO₂ enrichment. Each subject was studied in two different test situations in random order: without and after peroral administration of 40 mg of omeprazole during three days.

Gastric emptying parameters and parameters of protein assimilation were paired-wise compared with the values obtained in the control study using the Mann-Whitney-Wilcoxon test.

No difference in gastric emptying rate could be detected with or without omeprazole (half emptying time: $p = 1.00$). Major differences were demonstrated in protein assimilation kinetics. The ¹³CO₂ excretion curve was significantly flattened (¹³CO₂ peak excretion: $p < 0.01$) and the ¹³CO₂ peak-excretion time significantly delayed ($p < 0.05$) as compared with the control study.

Inhibition of gastric acid secretion has a major influence on protein assimilation kinetics which is most probably attributable to impaired gastric digestion. Simultaneous measurement of gastric emptying rate excluded altered gastric emptying rate as a possible explanation for the observed differences.