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Abstrakt:

\(\alpha\)-cyclodextrin – a weight loss agent?

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In recent years, an alarming increase in overweight, obesity and the following diseases has been observed. Unfortunately, the current pharmacological treatments lack effectiveness or display a severe side effect profile. New improved drugs against overweight and obesity are therefore desirable. In USA and Canada, \(\alpha\)-CD is marketed as a dietary fibre and used as a weight loss supplement (Mirafit FBCx™, Alpha-Fibe FBCx™). Moreover, a study has shown that adding \(\alpha\)-CD to a diet resulted in greater weight loss compared to placebo and in another study \(\alpha\)-CD prevented weight gain. The underlying mechanism for \(\alpha\)-CDs possible weight loss ability is still to be accounted for. Findings from two studies show that \(\alpha\)-CD can significantly lower the post-prandial plasma glucose response after a starch-rich meal. It is therefore hypothesized that \(\alpha\)-CD inhibits the enzymatic degradation of starch, which this study aims to investigate further.

\(\gamma\)-cyclodextrin (\(\gamma\)-CD) and a starch solution was chosen as substrates. The hydrolysis by porcine pancreatic \(\alpha\)-amylase (PPA) in the presence of \(\alpha\)-CD was monitored at 37°C, pH 6.5. The degradation reactions were followed over time by quantification of the amount of reducing ends as maltose equivalents. The hydrolysis of \(\gamma\)-CD revealed that the presence of \(\alpha\)-CD inhibited the enzymatic degradation in a dose-dependent manner. \(\alpha\)-CD in a molar ratio of 0.2:1 (\(\alpha\)-CD:\(\gamma\)-CD) was not sufficient to inhibit the degradation, whereas \(\alpha\)-CD in a molar ratio of 1:1 showed some effect since the initial degradation rate decreased (from 4.6 mM/hour for the control (no \(\alpha\)-CD present) to 4.0 mM/hour). In ratio 5:1 the degradation rate was almost 50% less (2.4 mM/hour). Lastly, the initial degradation rates in ratio 15:1 and 20:1 were only one third (1.2 mM/hour) of what was observed in the absence of \(\alpha\)-CD. These results shows that \(\alpha\)-CD is capable of inhibiting the enzymatic degradation of \(\gamma\)-CD considerably and that there might be an upper limit to the inhibitory effect.