-cyclodextrin – a weight loss agent?

Hansen, Lisbeth; Sørensen, Ditte; Ganesaratnam, Nirooshitha; Lumholdt, Ludmilla; Larsen, Kim Lambertsen

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Lisbeth Hansen, Ditte Sørensen, Nirooshitha Ganesaratnam, Ludmilla Lumholdt Riisager
and Kim Lambertsen Larsen

Section of Chemistry, Department of Biotechnology, Chemistry and Environmental Engineering, Aalborg
University, Sohngaardsholmsvej 57, DK-9000 Aalborg, Denmark

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, α-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 α-CD
to a diet resulted in greater weight loss compared to placebo and in another study α-CD prevented
weight gain. The underlying mechanism for α-CDs possible weight loss ability is still to be
accounted for. Findings from two studies show that α-CD can significantly lower the post-prandial
plasma glucose response after a starch-rich meal. It is therefore hypothesized that α-CD inhibits
the enzymatic degradation of starch, which this study aims to investigate further.

γ-cyclodextrin (γ-CD) and a starch solution was chosen as substrates. The hydrolysis by porcine
pancreatic α-amylase (PPA) in the presence of α-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 γ-CD revealed that the presence of α-CD inhibited the
enzymatic degradation in a dose-dependent manner. α-CD in a molar ratio of 0.2:1 (α-CD:γ-CD)
was not sufficient to inhibit the degradation, whereas α-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 α-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 α-CD. These results shows that α-CD is capable of inhibiting
the enzymatic degradation of γ-CD considerably and that there might be an upper limit to the
inhibitory effect.

1 Buckley, J. D., A. A. Thorp, et al. (2006). "Dose-Dependent Inhibition of the Post-Prandial Glycaemic Response to a Standard
dietary fibre." Diabetes/Metabolism Research and Reviews 23(1): 56-62.