

## PLASMA CHOLESTEROL CONCENTRATION AND ACTIVITY OF LIVER HMGCoA REDUCTASE IN RATS FED $\beta$ -CYCLODEXTRIN- A MODEL SOLUBLE FIBRE

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$\beta$ -Cyclodextrin is a cyclic oligosaccharide (seven glucose units) which is not absorbed or broken down in the small intestine. It can thus be considered as a model "soluble fibre". In addition, it has unique property of forming a strong inclusion complex with cholesterol. In this study we have compared the effects of  $\beta$ -cyclodextrin and guar gum with  $\alpha$ -cellulose (an inert and insoluble fibre) on cholesterol metabolism in the rat.

Rats (seven per group) were fed diets containing (per kg) corn starch (440g), casein (190g), sucrose (100g), corn oil (100g),  $\beta$ -cyclodextrin and/or  $\alpha$ -cellulose or guar gum (80g), mineral mix (70g), cholesterol (10g), vitamin mix (8g), and sodium cholate (2g). In addition, two groups of animals were fed cholesterol-free diets (i.e. the cholesterol and sodium cholate omitted) containing either  $\beta$ -cyclodextrin or  $\alpha$ -cellulose (80g/kg).

In the cholesterol-fed groups, plasma cholesterol concentrations were not significantly different in rats fed  $\beta$ -cyclodextrin or  $\alpha$ -cellulose, but a large reduction was seen in the animal fed guar (Table). In the absence of dietary cholesterol there was a small (but not statistically significant) reduction in plasma cholesterol in response to  $\beta$ -cyclodextrin compared with  $\alpha$ -cellulose.  $\beta$ -Cyclodextrin and guar gum ferment in the large bowel, as indicated by the enlarged caeca and lower caecal pH compared with animals fed  $\alpha$ -cellulose. In addition, they produced similar caecal concentrations of acetate and propionate.

| Diet  | Plasma cholesterol (mM) |      | Liver HMGCoA reductase activity | Caecal weight (g) | Caecal pH |
|---|-------------------------|------|---------------------------------|-------------------|-----------|
|   | total                   | HDL  |                                 |                   |           |
| $\alpha$ -Cellulose (8%)                              | 5.4                     | 0.82 | 4                               | 2.8               | 7.6       |
| $\beta$ -Cyclodextrin (8%)                            | 5.8                     | 0.65 | 9                               | 11.5              | 6.0       |
| $\alpha$ -Cellulose (4%) + $\beta$ -Cyclodextrin (4%) | 6.6                     | 0.54 | *                               | 7.6               | 6.3       |
| Guar gum (8%)   | 2.9                     | 0.81 | *                               | 9.7               | 6.8       |
| $\alpha$ -Cellulose (8%) **                           | 2.7                     | 1.60 | 34                              | 3.0               | 7.6       |
| $\beta$ -cyclodextrin (8%) **                         | 2.1                     | 0.89 | 161                             | 18.6              | 5.6       |

\* not determined

\*\* cholesterol-free diets

Although  $\beta$ -cyclodextrin mimics guar gum in its fermentation in the large bowel, in contrast to guar gum, it fails to lower plasma cholesterol and raises the activity of liver HMGCoA reductase, the rate limiting enzyme in cholesterol synthesis.

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