

DIETARY OAT BRAN INCREASES FAECAL STEROID EXCRETION IN THE RAT

R.J. ILLMAN and D.L. TOPPING

A number of water-soluble plant fibres are hypocholesterolaemic in experimental animals and man. Their mode of action is uncertain, but Chen et al. (1984) noted that many of the effective preparations are fermented by large bowel bacteria. Fermentation products include VFA and Chen et al. (1984) suggested that one of these acids, propionate, was a possible mediator of the hypocholesterolaemia. Propionate has been shown to inhibit cholesterologenesis in hepatocytes albeit at concentrations of 15-30mM ie. 50-100 fold higher than in the hepatic portal vein of rats and pigs.

Accordingly we have examined effects of dietary oat bran (a hypocholesterolaemic preparation, particularly rich in hemicelluloses) on VFA concentrations and steroid excretion in the rat. Adult male rats of the Hooded Wistar strain (240-260g of body weight) were fed diets containing 10% oat bran or cellulose. After 10 days the animals were sacrificed and hepatic portal plasma VFA and caecal and faecal bile acids and neutral sterols measured.

Plasma VFA concentrations averaged 1.22 ± 0.14 (5) $\mu\text{mol/ml}$ in oat bran-fed animals and were significantly ($P < 0.01$) higher than in the cellulose group, mean value 0.83 ± 0.10 (5) $\mu\text{mol/ml}$. Propionate concentrations were significantly ($P < 0.05$) raised by oat bran with mean values of 0.23 ± 0.05 (5) and 0.14 ± 0.04 (5) $\mu\text{mol/ml}$, respectively. However, the highest concentration found was only 0.35 $\mu\text{mol/ml}$.

Caecal bile acids were increased in the oat bran group (2.26 ± 0.43 (5) mg/g of dry matter) over the cellulose group (1.26 ± 0.17 (5) mg/g of dry matter). A similar significant ($P < 0.05$) increase was observed in neutral sterol concentrations which averaged 2.80 ± 0.37 (5) and 1.91 ± 0.17 (5) mg/g of dry matter, oat bran and cellulose, respectively. Paralleling these changes in large bowel contents, bile acid and neutral sterol concentrations in pooled faecal samples from oat bran rats were respectively 2.79 and 4.20 mg/g of dry matter. Corresponding values in the cellulose group were 0.88 and 1.95 mg/g of dry matter.

While it is not possible to generalize to all water-soluble plant fibre preparations, it seems that propionate production by large bowel fermentation is unlikely to play a significant lipid-lowering role. On the other hand, for oat bran the increased bile acid and neutral sterol excretion could account for the reported effects of oat bran on plasma cholesterol.

CHEN, W.J.L., ANDERSON, J.W. and JENNINGS, D. (1984). Proc. Soc. Exp. Biol. Med. 175:215.