CHOLESTEROL DYNAMICS IN RATS FED DIETS CONTAINING CANOLA OIL OR SUNFLOWER OIL

M.L. GARG and R.J. BLAKE

The hypothesis that canola oil, rich in monounsaturated and n-3 fatty acids lowers total body cholesterol, unlike sunflower oil rich in n-6 fatty acids which merely redistributes the exchangeable body cholesterol pools, was tested. Male weanling Sprague-Dawley rats, weighing between 40-50g were fed a semi-synthetic, isocaloric, nutritionally adequate diet containing 20% (w/w) fat in the form of either canola oil (CO diet) or sunflower oil (SAF diet). A third diet, designated as the CONTROL diet, containing 20% fat primarily in the form of beef tallow but containing sufficient amount of linoleic acid to prevent essential fatty acid deficiency was also fed. The effect of these diets on serum cholesterol, HDL-cholesterol, serum triglyceride and liver cholesterol was tested. To study the exchangeable body cholesterol pools, the rats were intubated with 3 μCi of ^{14}C-cholesterol (dissolved in 0.5 ml of the respective fat already being fed) and radioactivity incorporated into serum, liver, heart, spleen and kidney at various time intervals was determined.

There was a significant reduction in the HDL-cholesterol concentration following the feeding of SAF diet whereas CO feeding had no effect. The cholesterol content in the hepatic tissue was increased by SAF diet while the CO had no significant effect as compared to the BT diet. Triacylglycerol concentration in the serum was lowered by both the SAF and CO diets to the same extent when compared to the BT diet. The level of triacylglycerol in the liver was not significantly altered by any of the diet treatments. Feeding safflower oil containing diet to the rats resulted in higher incorporation of ^{14}C-cholesterol in various pools examined in comparison to the group fed the canola oil (Figure). Excretion of ^{14}C-cholesterol and its metabolites was highest in the animals fed the canola oil containing diets (Figure).

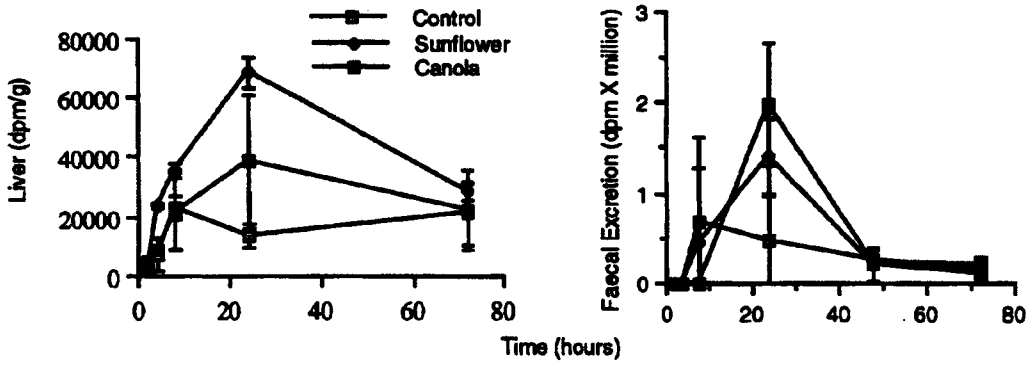

Figure. ^{14}C-cholesterol incorporation in the liver (left) and faecal extretion (right) in response to diet.

These data suggest that the liver accumulation of cholesterol following the feeding of a diet rich in sunflower oil containing high levels of n-6 fatty acids may be due to rapid absorption of cholesterol from the gut into the blood followed by rapid uptake by liver and other tissues as well as reduced excretion of cholesterol and its metabolites in the faeces.

Discipline of Nutrition and Dietetics, Faculty of Medicine and Health Sciences, The University of Newcastle, Callaghan, New South Wales 2308