

INFLUENCE OF DIETARY MINERALS ON LIPOPROTEIN METABOLISM IN RABBITS FED CHOLESTEROL-FREE ATHEROGENIC DIETS.

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Rabbits fed low fat cholesterol-free diets with casein as the source of protein have elevated plasma cholesterol concentrations. A reduction in the amount of dietary minerals results in a further rise in plasma cholesterol. The aim of this study was to elucidate the mechanism by which minerals influence cholesterol homeostasis.

Male New Zealand White rabbits were fed casein-containing diets with the amount of minerals set at 4% or 2.5% (w/w) for 6 weeks. Plasma lipoproteins were isolated to determine the distribution of cholesterol. In addition, the metabolism of apo-B containing lipoproteins was examined by assessing the in vivo kinetic behaviour of VLDL and LDL. The faecal excretion of bile acids and cholesterol was determined.

The rise in plasma cholesterol in animals fed the lower amount of minerals was due to an increase in the IDL and LDL fractions. VLDL and HDL were similar in the 2 groups (Table). The increase in IDL cholesterol may be explained by kinetic parameters showing an increase ($P < 0.01$) in the synthesis of IDL-apo B from sources other than VLDL, from 5% in the group fed the higher level to 55% in those fed the lower level of mineral mixture. The kinetic parameters of VLDL- and LDL-apo B metabolism and the faecal excretion of bile acids and cholesterol were not different between the 2 groups.

Diet	Plasma cholesterol (mg/100ml) (n=8)					Faecal excretion (n=4)	
	Total	VLDL	IDL	LDL	HDL	Cholesterol (mg/d)	Total bile acids (μ mol/d)
4%	195 (22)	23.2 (2.0)	27.9 (5.1)	116.2 (16.1)	27.2 (4.0)	3.7 (0.6)	30.8 (3.9)
2.5%	316 (23)	32.5 (4.6)	43.2 (4.3)	201.4 (22.2)	32.5 (3.3)	7.2 (2.9)	43.1 (16.1)
P value	<0.01	NS	<0.05	<0.01	NS	NS	NS

Values are the means with (SE). Statistical significance determined using Student's t test.

The results of this study suggest that minerals affect cholesterol metabolism in endogenously hypercholesterolaemic animals by increasing the hepatic production of IDL-apo B. Our data are not consistent with the notion that reducing the amount of minerals interferes with cholesterol homeostasis by hindering the excretion of bile acids and cholesterol. The reduction in one or more components of the dietary mineral mix, which includes trace elements, may exacerbate the down-regulation of apo B receptors thereby increasing further the concentration of apo B containing lipoproteins in casein-fed rabbits. Supported by the Ontario Heart and Stroke Foundation.