

EFFECTS OF VITAMIN C AND DIETARY FAT ON PLASMA
CHOLESTEROL IN THE MARMOSET

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Increased consumption of vitamin C may protect against atherosclerosis, possibly by lowering plasma cholesterol (Spittle 1972). This hypothesis has been supported by Ginter (1978) who showed that vitamin C deficiency in the guinea pig promotes hypercholesterolaemia, although the species is of questionable relevance to humans by virtue of its radically different lipoprotein profile (Mills and Taylaur 1971). The marmoset (*Callithrix jacchus*) would appear to be a better model for man to evaluate effects of vitamin C deficiency because of its similarity both nutritionally and in its plasma lipoproteins profile (Chapman *et al.* 1979).

In non-fasting adult male marmosets a 17.5% increase ($P < 0.05$) was observed in plasma cholesterol within 1 month of feeding a low-fat, low-cholesterol diet which was deficient in vitamin C. In a similar experiment where the diet contained cholesterol (1%) and lard (15%) a very large (7-9 fold) increase was observed in plasma cholesterol (Table 1) in fasting male marmosets.

TABLE 1. Concentrations of plasma cholesterol ($\mu\text{mol/ml}$) in marmosets on a high-fat, high-cholesterol diet

Vitamin C added to diet	Time of feeding (weeks)					
	0		3		6	
	Total	Free	Total	Free	Total	Free
+	5.24	3.06	49.60	26.52	45.88	6.45
	± 2.59	± 1.66	± 18.28	± 10.65	± 13.40	± 2.02
-	5.49	3.59	50.08	24.09	38.95	4.72
	± 1.74	± 2.00	± 5.00	± 15.03	± 6.74	± 1.43

Mean \pm S.D. of 4 observations in each group.

Despite claims to the contrary (Dreizen *et al.* 1973) it is clear that these short-term observations show that plasma cholesterol in the marmoset is extremely sensitive to dietary fat and cholesterol. It is also apparent that the hypercholesterolaemia was largely unaffected by dietary vitamin C. Ultracentrifugal analysis showed that most of the cholesterol accumulated in the very low density ($d < 1.006$) and intermediate density ($d = 1.006-1.019$) lipoproteins and that this was also unaffected by the marginal vitamin C deficiency. However, short-term vitamin C deficiency would appear to have more pronounced effects when a low-fat diet approximating that of normal marmoset diet is fed.

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