THE EFFECT OF DIETARY CHOLESTEROL ON PLASMA CHOLESTEROL. INTERACTION WITH DIFFERENT DIETARY FATS.

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Although it is now generally accepted that high plasma cholesterol levels increase the risk of occlusive vascular disease, the precise way in which cholesterol in the diet influences the level of cholesterol in the plasma is not yet fully understood.The aim of this study was to examine the interaction between dietary cholesterol in the form of eggs and different types of fat (saturated, monounsaturated and polyunsaturated), on plasma lipoprotein levels. Normocholesterolemic weight-stable subjects participated in a 5-week study. In the first week, the subjects consumed their usual diet; in weeks 2 and 3 they adhered to a very low fat (10% fat) vegetarian diet and consumed 1 egg per day. During weeks 4 & 5 subjects continued to consume the egg and added either butter, olive oil or safflower oil in a stepwise fashion (10%, 20% energy).

Changes in Plasma Cholesterol during Different Dietary Periods. (mmol/l)

	Week 1 baseline	Week 2 low fat, 1 egg diet	Week 3	Week 4 Fat-supplemented	Week 5 1 egg diet
Total Cholesterol					
Butter	5.12±0.75	4.58±0.50‡	4.48±0.62‡	4.87±0.65¶	5.36±1.04¶
Olive Oil	5.23±1.04	4.45±0.86§	4.42±1.09§	4.63±1.04	4.37±0.94§
Safflower Oil	4.84±0.69	4.44±0.69§	4.38±0.80	4.49±0.75	4.08±0.61‡
LDL-Cholesterol					
Butter	3.47±1.02	3.08±0.69	3.03±0.83§	3.39±0.85∏	3.91±1.08§¶
Olive Oil	3.73±0.77	3.18±0.51§	3.10±0.73	3.25±0.75	2.82±0.52§#
Safflower Oil	3.02±0.64	2.70±0.52†	2.84±0.69	2.93±0.64	2.61±0.55§∏
HDL-Cholesterol					
Butter	1.45±0.50	1.19±0.37§	1.08±0.38‡	1.23±0.30	1.20±0.31
Olive Oil	1.34±0.44	1.0±0.41†	0.95±0.41‡	1.08±0.30§	1.24±0.43#¶
Safflower Oil	1.68±0.33	1.36±0.31†	1.29±0.24‡	1.38±0.26‡	1.32±0.20‡

* mean ± SD; Butter and Safflower Oil $n = 10$; Olive Oil $n = 8$
† ‡ § Significantly different from week 1: † $P < 0.001$; ‡ $P < 0.01$; § $P < 0.05$
∫ ¶ ∏ Significantly different from week 3: ∫ $P < 0.001$; ¶ $P < 0.01$; ∏ $P < 0.05$

The results of these studies have shown that the low fat diets containing one egg per day resulted in a 12% fall in plasma cholesterol, a 12% fall in the LDL-cholesterol and a 24% fall in the HDL-cholesterol. When butter was added back to the diet, the total and LDL-cholesterol rose above the baseline values and the HDL-cholesterol returned to the baseline value. In contrast,adding either olive oil or safflower oil resulted in no change in the total cholesterol,i.e. it remained low compared with baseline.The HDL-cholesterol rose following the addition of olive oil. The LDL/HDL cholesterol ratio was significantly improved on both the olive oil and safflower oil diets by comparison with the butter diet.

The results of these studies suggest that in normocholesterolemic subjects, the consumption of 1 egg daily is quite compatible with cholesterol-lowering, provided the background diet is low in saturated fat. This was evident both in the low-fat diet and when olive oil and safflower oil were added back to the diet to raise the fat from 10% to almost 30%energy. However, in contrast these beneficial effects were completely negated when butter was added at a relatively low level (10%energy).

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