

Lack of Effect of a High Fat Intake on Serum Lipid Levels

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THE EVIDENCE indicates that the cholesterol intake of human subjects when within the limits of conventional intake, does not appreciably influence the serum lipids.^{1,2} The dietary levels of total fat and total calories appear to be more pertinent to this problem. Many studies have revealed that a reduction of dietary fat will often reduce the serum level of cholesterol, especially if this is originally elevated.³ We have shown that limitation of calories inducing weight loss will reduce serum lipids if these are initially elevated.⁴ Conversely, we showed that a caloric plethora, even in the absence of fat, would increase the cholesterol and lipoprotein levels of young adult subjects.⁴ The corollary to the latter experiment is that of increasing the total fat intake while maintaining the caloric intake at a constant level. This experiment has been done in two young males using Pemmican as the principle source of food.

METHODS

The subjects were two healthy young males, "G" age 29 and "B" age 25 years, with initial relative weights of 0.96 and 1.15, respectively. These subjects were in weight equilibrium and

were accustomed to diets supplying approximately 105 and 120 gm of fat daily, as estimated by a recall type of diet history.

The experimental diet plan is shown in Table I, with the gross composition as determined by calculation using standard food tables. The subjects were instructed to vary *only* the Pemmican* content of this diet in order to maintain their weights at the starting level. Subject B found this diet as outlined almost precisely sufficient, and subject G needed to make only a minor and temporary increase. Neither subject lost more than two pounds during the experiment.

Two control samples of venous blood were obtained from each subject at a three- or four-day interval before commencing the diet. The subjects were then instructed to begin the experimental diet and successive blood samples were taken on days 2, 4, 7, 11, and 15 thereafter. The subjects were then returned to their conventional diet and were bled again several weeks later.

The blood serum obtained was analyzed for total cholesterol by the method of Abell *et al.*⁵ and for lipoproteins of the S_f 0-12, 12-20, 21-35, and 35-100 classes by the method of Gofman *et al.*⁶

RESULTS AND DISCUSSION

The serum data obtained are plotted for the two subjects in Figures 1 and 2. The S_f 0-11 class of lipoprotein showed no change and was not plotted.

Because there was but little evidence of trends of these data, the mean levels of the five observations during the Pemmican treat-

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TABLE I
The Daily Food Intake of Two Experimental Subjects

Food	Amount	Fat	Protein	Carbohydrate	Calories
Pemmican	300 gm	141	150	—	1869
Fruit					
oranges	3	—	—	50	200
Soda crackers	8	5	4	36	205
	(50 gm)				
Milk	500 ml	20	18	25	352
Total gm		166	172	111	
Total cal		1494	688	444	2626
Per cent of total cal		57	26	17	100

ment were compared with the mean control (two observations) levels by the application of "t" tests. These procedures revealed no evidence that subject B had influenced his serum lipid levels by this high fat intake. The cholesterol and S_f 12-20 levels of subject G indicated only suggestive evidence ($0.10 > p > 0.05$) that they had been increased by the treatment. We interpret this to mean that

under the conditions of this study the fat content of the diet was not a critical factor in controlling serum lipid levels.

The increase of the proportion of fat calories from about 40 per cent of the total to 57 per cent of the total was the limit of physiological tolerance of these subjects. Previous attempts of subject G to consume Pemmican solely were repeatedly unsuccessful. These

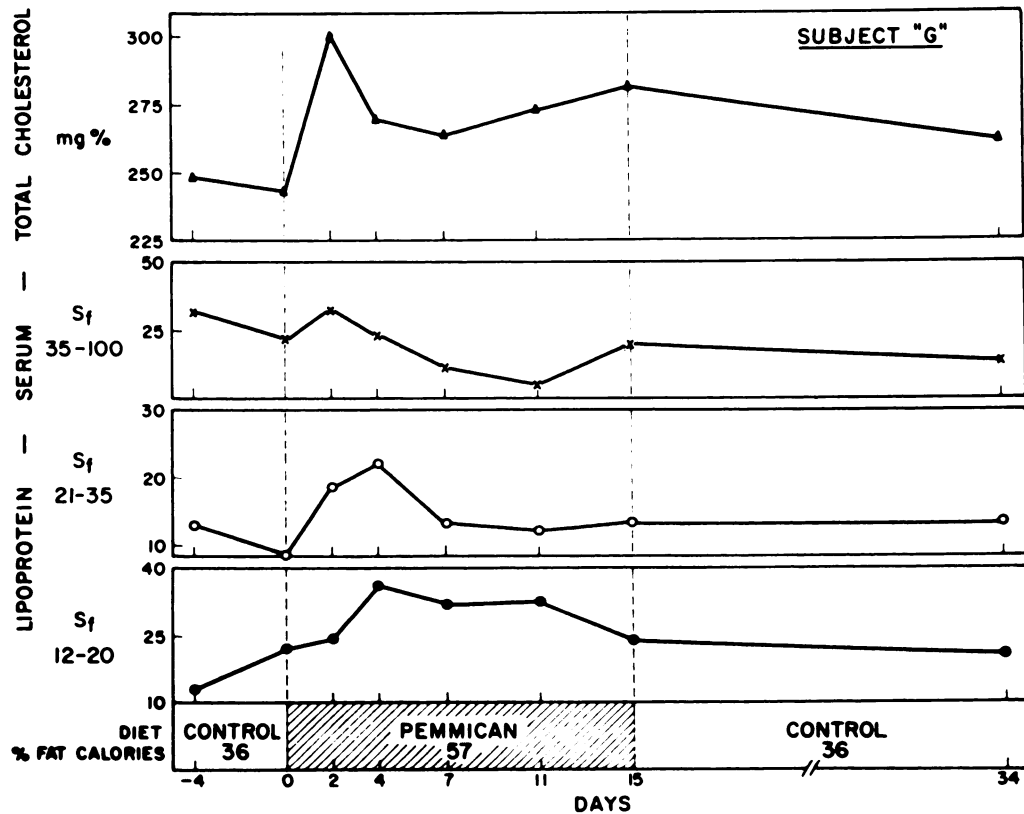


Fig. 1. The serum cholesterol and beta-lipoprotein levels in a young male subject maintained in weight balance for two weeks on a Pemmican diet supplying 57 per cent of the total calories as fat.

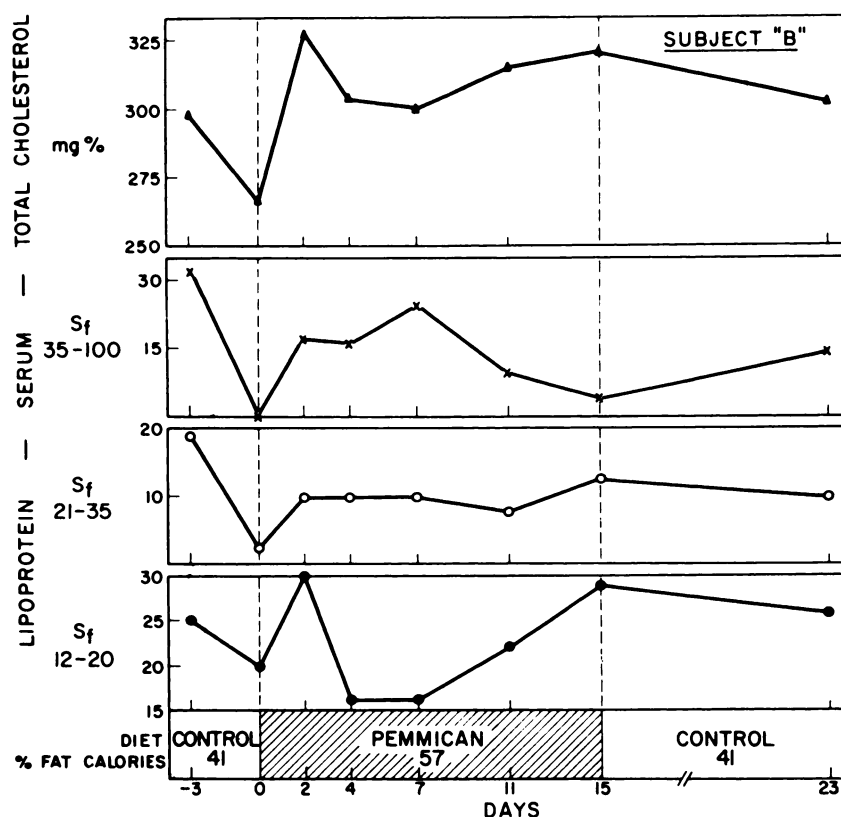


Fig. 2. The effects of a high fat diet composed largely of Pemmican on the serum lipids of a normal young male.

attempts failed because of anorexia and weakness and were associated with ketonuria and dehydration. The subject was engaged in a sedentary occupation requiring between 2500-3000 calories per day. He was strongly motivated by personal convictions in these dietary trials. This experience with high fat oral diets conforms with that of Kark *et al.*⁷ and Consolazio *et al.*⁸ There appears to be an upper limit of tolerance of fat in the metabolic mixture supplied by the diet.

In 1949, Sinclair *et al.*⁹ reported studies on serum lipids in 161 Eskimos, and they have since supplemented this material with dietary evaluations and feeding experiments.¹⁰ It should be emphasized that Brown doubts the validity of measurements of Eskimos' food consumption, and, in view of his experience with this problem and the complexities which have been introduced into the cultural characteristics of Eskimos by the opening of the North to white men, this skepticism deserves

attention. Brown found that the cholesterol levels of adult Eskimos consuming a diet which was estimated to contribute 75 per cent of the calories as fat were lower than would be found in United States adults. Four of these Eskimos who by preliminary measurements were found to be consuming a diet with 55 per cent of fat calories were fed a Pemmican diet which supplied 75 per cent of calories as fat. During a six-day trial, the cholesterol, total fatty acid, and phospholipid content of the subjects' blood sera appeared to be increased. Those findings suggested to us that it would be difficult to establish that the increases observed were greater than could be attributed to random fluctuation. It will also be important to learn whether the body weights of these subjects were changed during the trials, for that factor will influence the serum cholesterol levels. Brown's data, as well as those presented here, suggest that there is an influence of the Pemmican diet upon the serum

cholesterol level especially, but that the increase demonstrated is too small to be irrefutable. More extensive studies of this phenomenon are indicated.

SUMMARY

Two young men did not show a significant increase of serum cholesterol or various beta-lipoprotein fractions during 15 days on a diet of which 57 per cent of the calories came from fat as provided in Pemmican.

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