difference in mice that received 300 r at 14.5 days of gestation and as a reduction of the lethality following 700-r x-rays at 17.5 days' gestation. It is postulated that related –SH compounds with demonstrable protective value in adults might lead to a similar conclusion if they are applied to the fetus.

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4. This paper is based on work performed under contract AT-30-1-GEN-70 for the U.S. Atomic Energy Commission.
5. Cysteinamine was obtained from Harvey Blank of the E. R. Squibb Company and was known as Becaptan hydrochloride.

22 July 1955

Serum Cholesterol in Men in Basal and Nonbasal States

In comparative studies of serum cholesterol concentrations in population samples (*1*), it is difficult to assure that the conditions under which blood is drawn are exactly the same in different investigations. But what difference does it actually make if bloods are not drawn under basal, fasting conditions?

Over a period of 2 months, we drew blood on 4 to 7 mornings from each of 16 men on the staff of this laboratory (*2*). The basal fasting state was represented by several blood samples from each man; the other samples were drawn in midmorning when the men could be interrupted from their customary laboratory and desk work. The nonbasal serum in this series averaged 3.8 mg of cholesterol per 100 ml higher than the amount in the basal serum (*3*). This difference amounted to 1.9 percent of the mean basal value.

Another comparison was made with samples from male students of the University of Minnesota, 100 of whom were studied in the basal, fasting state while 300 others came in between classes several hours after a normal breakfast. On the average, the values for the nonbasal men were 3 percent higher than the values for the basal men.

Results of a more systematic study on clinically healthy men are summarized in Table 1. Cholesterol was measured in duplicate in serum from each man in the basal, fasting state and again 2 hours after a breakfast consisting of fruit, cereal with cream and sugar, two slices of toast with butter and jam, and coffee with cream and sugar. In one series of experiments (series A), 10 g of pure cholesterol were emulsified in scrambled eggs, and these "fortified" eggs were substituted for the cereal; thus the total cholesterol intake in the meal averaged 10.8 g.

In both series A and B, in which the men were relatively inactive after breakfast, the serum total cholesterol tended to rise. The mean increase at 2 hours was 2.41 percent of the basal value in series A and 1.83 percent of the basal value in series B. These changes are highly significant statistically. However, in series C, when breakfast was followed by moderately vigorous physical work (walking on the treadmill or working in the garden), the postbreakfast rise did not occur; instead, the mean value tended to fall from the basal level. The difference between the exercise and nonexercise responses is highly significant, the mean difference being 8.28 mg percent with a standard error of ± 2.25 mg percent.

To examine the effect of exercise on the response to cholesterol added to the meal, 3 experiments were performed on each of 4 healthy young men. Blood was sampled in the basal state and at 2, 3, 4 and 7 hours after breakfast in each case. In series D, the meal was the aforementioned ordinary breakfast, but in the other two sets of experiments, 10 g of cholesterol were added to scrambled eggs, which were substituted for the cereal. The subjects were sedentary in series D and E, but in series F they walked on the treadmill for 45 out of every 60 minutes. Under all conditions in the experiments of series D, E, and F, the serum cholesterol concentration tended to be higher after the meal than before; it was highest when the subjects were sedentary after they had received the 10-g cholesterol load. The data are summarized in Table 2.

The cause of the rise after breakfast when sedentary conditions were maintained cannot be ascribed to the cholesterol in the meal. In series A and D, the total increase of cholesterol in the blood was greater than the total cholesterol in the meal. The explanation for these phenomena would seem to illustrate the essential role of cholesterol in fat transport. In the sedentary state, the serum cholesterol rise must reflect a rise in lipoproteins, meeting the demand for transport of the newly absorbed fats. However, when there is physical activity during this absorption period, the enhanced rate of circulation, plus nutrient withdrawal from the blood to meet the increased metabolic needs, results in a lower serum concentration of lipoproteins and hence of cholesterol.

Table 1. Mean differences (mg/100 ml) nonbasal minus basal cholesterol values in clinically healthy men. All nonbasal bloods drawn 2 hours after breakfast. In series A and B, the subjects were sedentary between samples, but in series C they did physical work. In series B, breakfast included 10 g of added cholesterol.

Series	N	Mean (Δ)	S.D. (Δ)	S.E. (Δ)
A	51	4.92	± 11.72	± 1.66
B	73	3.95	± 11.74	± 1.37
C	15	− 3.93	± 12.95	± 3.34

Table 2. Average increases of serum total cholesterol (mg/100 ml) in 4 men after breakfast. In series D and E, the men were sedentary, while in series F they were physically active. In series E and F the breakfast contained 10 g of added cholesterol.

Time (hr)	Series D	Series E	Series F
2	4.2	9.3	7.3
3	3.2	11.5	7.8
4	3.0	13.5	4.3
7	3.7	15.0	9.3

Clearly, the difference in cholesterol concentration between basal and nonbasal blood drawn in the morning is so small that it may be negelected in most comparative studies, particularly if the nonbasal subjects are engaged in physical work. In addition to settling this point, the results cited suggest a reason for part of the difference in susceptibility to coronary heart disease that is reported in comparisons between active and inactive men (*4*).

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5 August 1955