

# PATHOLOGICAL PHYSIOLOGY AND GENERAL PATHOLOGY

## EFFECT OF HYPODYNAMIA ON TOTAL CHOLESTEROL AND LIPOPROTEIN CONCENTRATIONS IN THE BLOOD

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UDC 612.766.2 : [612.123 + 612.124]

Ten days after the beginning of hypodynamia a decrease in the blood cholesterol level (from  $81 \pm 1.43$  to  $63 \pm 7.7$  mg%) was found in rabbits, but after 30 days there was a marked increase (to  $176 \pm 15.08$  mg%). Two weeks after hypodynamia the  $\alpha$ -lipoprotein concentration was reduced by almost two-thirds (from  $19.97 \pm 2.48$  to  $6.97 \pm 0.82\%$ ), but the concentration of  $\beta$ -lipoproteins was increased (from  $46.23 \pm 1.45$  to  $56.99 \pm 0.5\%$ ).

The total cholesterol and lipoprotein concentrations in the blood were investigated in rabbits whose mobility was severely restricted, i.e., the animals were kept under conditions in which atherosclerosis with coronary insufficiency was reproduced in them without administration of exogenous cholesterol [2, 3].

### EXPERIMENTAL METHOD

The total cholesterol concentration in the blood was determined by Levchenko's method [1]. The serum lipoproteins were determined by electrophoresis on paper in an ÉFA-1 apparatus. The serum was first stained with Sudan black and then applied to paper strips 3.5 cm wide and 26 cm long, in a volume of 0.04 ml. Electrophoresis was carried out for 4 h using a current of 0.5 mA per cm width of strip and a voltage of 200 V. The fractions were determined quantitatively by a photocolormetric method after elution of the lipoproteins stains with 20% acetic acid solution in 80% alcohol [4].

### EXPERIMENTAL RESULTS

The total blood cholesterol was determined in 48 rabbits, 32 experimental and 16 control. Immediately before hypodynamia the serum cholesterol concentration of the rabbits was  $81 \pm 1.43$  mg%. The cholesterol concentration 24 h after the beginning of hypodynamia was  $75 \pm 8.85$  mg% ( $P > 0.2$ ), 5 days later it was  $89 \pm 9.6$  mg% ( $P > 0.2$ ), 10 days later  $63 \pm 7.7$  mg% ( $P < 0.015$ ), 15 days later  $82 \pm 9.6$  mg%, 30 days later  $176 \pm 15.08$  mg% ( $P < 0.001$ ), and 140 days later  $161 \pm 27.3$  mg% ( $P < 0.015$ ). Consequently, 10 days after the beginning of hypodynamia, the blood cholesterol concentration was reduced, but after 30 days it was considerably increased.

Changes in the mean serum cholesterol level during the first two weeks of hypodynamia were noteworthy. These fluctuations are even more conspicuous if the cholesterol concentration of each experimental animal is considered separately. In most rabbits, before the fall in the cholesterol level, a phase of increase was observed, most frequently 1-5 days after the beginning of hypodynamia. In some rabbits the decrease in blood cholesterol occurred without a preliminary phase of increase.

The serum lipoprotein concentration was investigated at intervals in 17 experimental rabbits.

The results given in Table 1 show that the concentration of  $\alpha$ -lipoproteins in the blood of the experimental animals was reduced by almost two-thirds, while the concentration of  $\beta$ -lipoproteins was consider-

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TABLE 1. Dynamics of Serum Lipoprotein Concentration (in %) in Rabbits during Hypodynamia (M±m)

Index	Before hypo- dynamia	7 days after be- ginning of hypo- dynamia	P	14 days after be- ginning of hypo- dynamia	P
$\alpha$ -Lipoproteins	19.97±2.48	8.21±0.76	< 0.001	6.97±0.82	< 0.001
$\beta$ -Lipoproteins	46.23±1.45	56.99±0.5	< 0.001	53.82±1.75	< 0.004
Lipid residue	33.79±1.87	34.79±1.5	> 0.3	39.21±1.9	< 0.03

ably increased. A statistically significant increase in the lipid residue was observed only 14 days after the beginning of hypodynamia.

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