

EFFECT OF ETHYL LINOLEATE ON REGRESSION OF EXPERIMENTAL ATHEROSCLEROSIS IN RABBITS

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In rabbits with experimental atherosclerosis the content of total lipids in the aortic wall was reduced after a course of injections of ethyl linoleate. The lipolytic activity of the liver tissue of these rabbits was higher than that of untreated control animals.

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During recent years the effect of unsaturated fatty acids on the course of atherosclerosis has been widely investigated. Some workers consider that the hypocholesteremic action of these acids is associated with the formation of cholesterol esters with reduced atherogenicity [6, 7]. It has also been postulated that unsaturated fatty acids activate the bile-forming function of the liver and promote excretion of cholesterol with the bile [5, 7, 8].

The object of the present investigation was to study the effect of ethyl linoleate on certain indices of lipid metabolism in experimental atherosclerosis after discontinuing administration of cholesterol.

EXPERIMENTAL METHOD

For 4 months cholesterol was given to 24 male rabbits weighing 2.5-3 kg in a dose of 1 g (5 ml of 20% cholesterol emulsion in sunflower oil) on alternate days. Cholesterol feeding was then stopped and the animals were divided into two groups: the animals of group 1 (12 rabbits) received subcutaneous injections of ethyl linoleate in a dose of 0.25 g 3 times a week for 4 months; the 12 rabbits of group 2 served as control. Once a month in all the rabbits the total serum cholesterol and phospholipids were determined as described in [1], while the aortic wall was analyzed to determine the content of total lipids by the method of Buck and Rossiter [4] as modified by N. G. Stroikova and co-workers [3] and the cholesterol content. The cholesterol content in the liver and adrenal tissues was investigated by Bloor's method. The lipolytic activity of the organs was determined by Zemlenyi's method [9] as modified by S. M. Leites and Chou Su [2], based on the breakdown of Tween-60. The method was modified slightly by V. B. Isachenko. Instead of Sørensen's solution, a 0.02% aqueous solution of CaCl_2 was used to dilute the Tween-60. All the numerical results were analyzed by statistical methods.

EXPERIMENTAL RESULTS

The content of total lipids in the aortic wall of the experimental rabbits (3.05 ± 0.39 mg) was much lower than in the control (4.66 ± 0.71 mg; $P < 0.05$). The cholesterol content of the aorta also was slightly lower in the experimental animals (Fig. 1, I). With respect to the other indices of lipid metabolism no significant differences were found between the two groups (Fig. 1, II, III). Higher lipolytic activity of the liver tissue, but not of the other organs, was found in the experimental rabbits (Fig. 2). Hence, under the influence of ethyl linoleate lipids are removed from the aortic wall more rapidly. The results are in agreement with those obtained by other authors [9] who observed a therapeutic effect of linoleate in rats with accumulation of lipids in their tissues caused by a special diet. Analysis of the results shows that the faster excretion of lipids from the body at a time when the intake of cholesterol has ceased is connected with stimulation of their metabolism in the liver, evidence of which is provided by the increased lipolytic activity of the organs.

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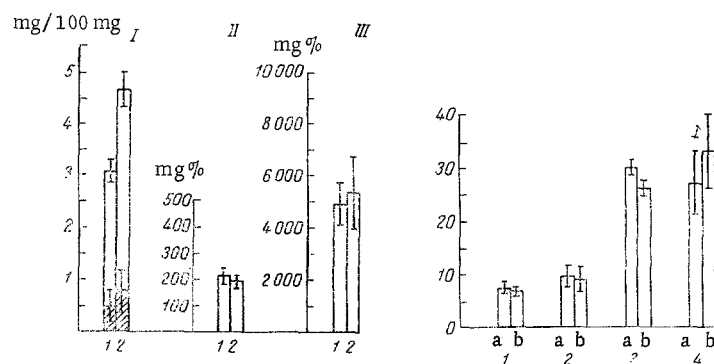


Fig. 1

Fig. 2

Fig. 1. Content of total lipids and cholesterol in aortas and cholesterol in liver and adrenal tissues during treatment of experimental atherosclerosis with ethyl linoleate: I) Mean content (mg/100 mg fresh aortic tissue) of total lipids in aortas (shaded part represents content of cholesterol); II) content (in mg %) of cholesterol in liver tissue; III) content (in mg %) of cholesterol in adrenal tissue; 1) rabbits treated with ethyl linoleate; 2) control rabbits.

Fig. 2. Lipolytic activity (in meq/ml/g tissue) of organs during treatment of experimental atherosclerosis with ethyl linoleate: 1) Heart; 2) pulmonary artery; 3) liver; 4) adrenals; a) group of treated rabbits; b) control group.

LITERATURE CITED

1. S. D. Balakhovskii and I. S. Balakhovskii, *Methods of Chemical Analysis of the Blood* [in Russian], Moscow (1953).
2. S. M. Leites and Chou Su, *Vopr. Med. Khimii*, No. 3, 289 (1962).
3. N. G. Stroikova, L. V. Ivanova, and G. P. Fedorova, in: *Annual Report of the Institute of Experimental Medicine, Academy of Medical Sciences of the USSR for 1959* [in Russian], Leningrad (1960), p. 444.
4. R. Buck and R. Rossiter, *Arch. Path.*, **51**, 224 (1951).
5. H. Gordon, B. Lewis, et al., *Lancet*, **2**, 1299 (1957).
6. L. Kinsell et al., *Lancet*, **1**, 334 (1958).
7. U. Misra, *Ind. J. Exp. Biol.*, **1**, 87 (1963).
8. J. Wilson, *J. Lipid Res.*, **2**, 350 (1961).
9. T. Zemlenyi, Z. Lojda, and D. Grafnetter, *Circulat. Res.*, **7**, 286 (1959).