

CHANGES IN PARAMETERS OF THE BLOOD CLOTTING SYSTEM IN EXPERIMENTAL ATHEROSCLEROSIS

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UDC 616.13-004.6-092.9-
07: 616.151.5-07

The dynamics of changes in parameters of the blood clotting system was studied in rabbits on the 30th, 60th, 120th, and 180th days of cholesterol administration. In the early periods of the experiment the plasma heparin tolerance was lowered, while the fibrinogen concentration and fibrinolytic activity were increased; in the late periods fibrinolytic activity was lowered, the plasma heparin tolerance and the degree of the thrombin test are increased, while the recalcification time is reduced, and the values of R, K, and S on the thromboelastogram are shortened, and MA is widened.

Besides disturbances of lipid, protein, and other types of metabolism, changes in the clotting properties of the blood are of considerable importance in the pathogenesis of atherosclerosis.

EXPERIMENTAL METHOD

Experiments were carried out on 57 chinchilla rabbits of both sexes weighing 2.8-3.2 kg, divided into five groups. The animals of one group acted as the control; the rest received pure cholesterol, mixed with grated carrot, in a dose of 500 mg/kg body weight daily for 30, 60, 120, and 180 days, respectively. The state of function of the blood clotting system was assessed by determining the recalcification time, the fibrinogen concentration, the plasma heparin tolerance, the fibrinolytic activity of whole blood, the degree of the thrombin test, and the constants of the thromboelastogram (R, K, S, C.i.) recorded on a type ISK-64 thromboelastograph during coagulation of whole blood.

EXPERIMENTAL RESULTS

In the early period (30 and 60 days) of development of experimental cholesterol atherosclerosis the fibrinolytic activity of the rabbits was increased and their plasma heparin tolerance lowered, while there was no change in the recalcification time or the degree of the thrombin test (Table 1). In the late stages (120 and 180 days) the recalcification time and fibrinolytic activity of the blood were reduced while the plasma heparin tolerance and the degree of the thrombin test were increased. The fibrinogen concentration was considerably increased after 30 days, falling a little later on, but at the end of the experiment it was still higher than in the control animals.

Second Therapeutic Department and Department of Pathological Anatomy, Leningrad Postgraduate Medical Institute. (Presented by Academician of the Academy of Medical Sciences of the USSR V. G. Baranov.) Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 76, No. 8, pp. 32-34, August, 1973. Original article submitted January 21, 1972.

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TABLE 1. Results of Coagulation Tests and Thromboelastography of Rabbits Receiving Cholesterol by Mouth ($M \pm m$)

Group of animals	Cholesterol atherosclerosis development (days)	No. and sex of animals	Recalcification time (in sec)	Fibrinogen (in mg %)	Plasma heparin tolerance (in sec)	Thrombin test (degree)	Fibrinolytic activity (in %)	Constants of thromboelastogram (in mm)					C. i.
								R	K	S	MA		
Control		8♂ 7♀	93.0±3.2 96.3±2.1	272±8.4 278±10.5	181±6.9 186±7.4	4.3±0.12 4.1±0.10	6.8±0.62 7.3±0.46	16.7±2.5 15.9±3.7	11.2±1.8 12.6±1.1	38.8±3.6 40.2±4.2	44.0±4.7 41.2±5.2	2.1±0.12 2.4±0.46	
Rabbits receiving cholesterol	30	5♂ 5♀	92.1±4.1 94.6±3.4	385±6.3 401±10.2	218±7.3 247±5.4	4.1±0.18 4.4±0.15	7.5±0.56 8.7±0.13	12.7±1.3 10.2±0.7	8.0±0.4 8.4±0.5	40.4±4.2 42.6±5.4	42.6±2.2 39.4±3.9	3.0±0.20 3.4±0.10	
	60	9♂ 9♀	96.4±3.8 97.2±2.6	306±8.6 331±9.3	201±3.4 214±6.5	5.0±0.11 5.5±0.17	6.5±0.48 7.5±0.35	9.5±0.8 7.9±0.9	5.1±0.6 4.6±0.5	30.8±1.3 25.1±1.2	44.5±3.6 40.1±4.4	3.8±0.18 4.2±0.21	
	120	6♂ 6♀	75.2±2.5 72.1±1.2	342±7.4 364±10.1	198±5.3 165±6.2	6.0±0.13 5.8±0.12	3.1±0.30 2.2±0.26	6.5±0.3 5.6±0.5	5.1±0.8 5.2±0.4	25.8±2.5 19.0±0.9	49.5±1.8 44.0±3.8	4.5±0.21 4.9±0.30	
	180	7♂ 8♀	60.1±4.1 56.5±1.8	374±4.8 392±7.7	193±6.6 132±5.8	6.4±0.18 6.5±0.15	2.3±0.42 1.2±0.37	7.1±0.5 4.2±0.4	6.0±0.7 5.4±0.5	28.0±3.4 21.0±1.6	48.1±2.5 42.1±5.5	4.9±0.34 5.4±0.22	

At all periods of the experiment the changes in the fibrinogen level, the plasma heparin tolerance, and the fibrinolytic activity of the blood were more marked in males than in females. The changes in the recalcification time and the degree of the thrombin test were independent of the animals' sex.

Changes in the thromboelastogram (shortening of R, K, and S, widening of MA, and the increase in the coagulation index C. i.) rose as the experiment proceeded.

Conditions favoring intravascular thrombosis are thus created in the blood of rabbits during the development of experimental cholesterol atherosclerosis.