ROLE OF LEUKOCYTE ADHESION IN FILTERABILITY OF A BLOOD CELL SUSPENSION

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The marked effect of leukocytes on the capillary blood flow and on filterability of blood can be explained mainly by the large size and low level of deformability of the leukocytes [6]. The role of adhesion of these cells in the blood filtration process has received much less attention.

The aim of this investigation was to study the effect of leukocytic adhesion on filterability of a suspension of blood cells in plasma.

EXPERIMENTAL METHOD

Venous blood from 16 blood donors was used for the tests. Heparin in a concentration of 10 IU/ml blood and EDTA were used as anticoagulants (cells are known to retain their adhesiveness in heparinized blood [1], and it may actually be intensified [4], whereas EDTA inhibits it sharply [2]). One part of the blood was centrifuged for 15 min at 150 g to obtain plasma containing monocytes and platelets, and virtually free from erythrocytes and polymorphs (suspension 1). Free sedimentation of the erythrocytes took place in the other part of the blood, and the plasma supernatant thus formed contained monocytes and polymorphs (suspension 0). The difference in the content of erythrocytes and platelets of suspension 1 compared with suspension 0 was trivial. By mixing suspension 1 and suspension 0 in the ratio (v/v) of 9:1, suspension 2 was obtained. Filterability of four suspensions was studied: heparinized suspension 1 (HS1), heparinized suspension 2 (HS2), EDTA suspension 1 (EDTA-S1) and EDTA suspension 2 (EDTA-S2). The suspensions were filtered through filters with an internal pore diameter of 5 μ, under constant pressure of 10^5 dynes/cm^2 for 2 min. Adhesion of leukocytes and platelets to nylon was studied [3, 5]. An adhesion index was used as the parameter, and expressed the number of adherent cells as a percentage of the total number of cells in the suspension.

EXPERIMENTAL RESULTS

The filterability of HS2 was significantly lower than that of HS1 (the volume of the filter was 5.2 times smaller, see Fig. 1). In this case the suspensions differed in the cell composition only in the number of polymorphs; numbers of monocytes, erythrocytes, and platelets were the same (Table 1). The decrease in filterability on addition of suspension 0 was due to the appearance of a significant number of polymorphs in the suspension to be filtered. However, the appearance of the same number of polymorphs in the EDTA suspensions did not lead to any significant change in filterability (Fig. 1). In heparin, unlike EDTA, the calcium-dependent nonspecific adhesiveness of the polymorphs is preserved. In our experiments the adhesion index of polymorphs in heparin was 41.3%, but in EDTA it was only 6.8% (in suspension 2) (Table 2). This difference in the adhesive state of the polymorphs was evidently the reason for the different filterability of polymorph-containing suspensions (1.83 ± 0.34 ml for HS2, 10.02 ± 0.63

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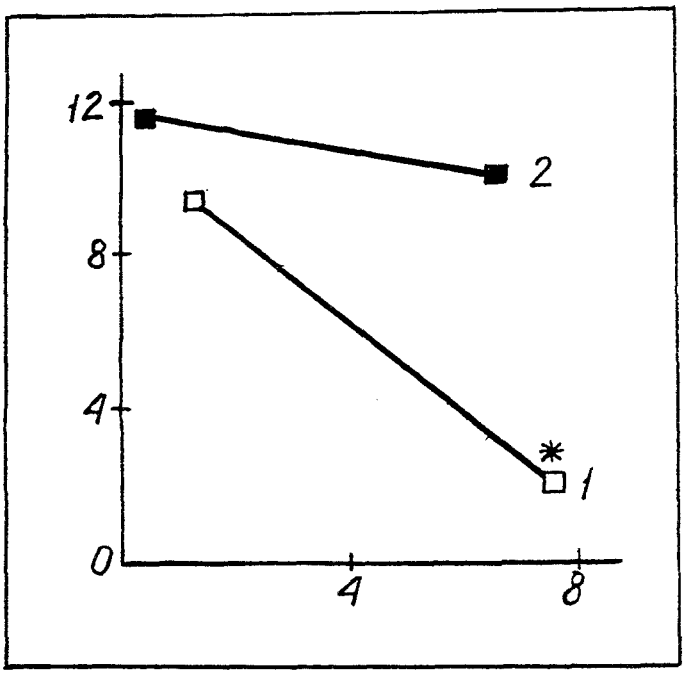

Fig. 1. Filterability of heparinized (1) and EDTA (2) suspensions depending on their content of polymorphs. Abscissa, number of polymorphs ($\cdot 10^9$/liter); ordinate, filterability (in ml). Asterisk indicates significance of difference in filterability.

TABLE 1. Cell Composition of Suspensions

Cells	HS1	HS2
Erythrocytes, 10^{12}/liter	0,036±0,004	0,027±0,002
Platelets, 10^{11}/liter	430±36	405±37
Leukocytes, 10^9/liter	2,26±0,30	3,16±0,37*
Monocytes, 10^9/liter	2,11±0,27	2,40±0,27
Polymorphs, 10^9/liter	0,14±0,03	0,76±0,11*
	EDTA-S1	EDTA-S2
Erythrocytes, 10^{12}/liter	0,032±0,003	0,035±0,003
Platelets, 10^{11}/liter	333±51	448±40
Leukocytes, 10^9/liter	2,04±0,22	2,95±0,32*
Monocytes, 10^9/liter	2,01±0,18	2,26±0,26
Polymorphs, 10^9/liter	0,03±0,01	0,69±0,09*

Legend. Asterisk indicates significance of difference in parameter from corresponding value in suspension 1.

TABLE 2. Adhesion Index of Polymorphs, Monocytes, and Platelets in Suspensions

Index	HS1	HS2	EDTA-S1	EDTA-S2
AI of platelets, %	51,0±39	56,4±3,4	3,6±0,9*	5,0±0,4*
AI of monocytes, %	23,3±4,6	27,0±5,0	11,3±2,0*	9,6±1,6*
AI of polymorphs, %	—	41,3±6,4	—	6,8±0,4*

Legend. AI) Adhesion index; asterisk indicates significance of difference compared with corresponding heparinized suspension.

ml for EDTA-S1, $p < 0.001$). Meanwhile, preservation of the adhesiveness of the monocytes and platelets did not cause any significant impairment of the filterability of the suspensions: that of HS1 was only 21% below that of EDTA-S1 (9.47 ± 0.78 ml and 11.46 ± 0.82 ml respectively, $p > 0.05$), whereas the adhesion index of monocytes and, in particular, of platelets in HS1 was significantly higher than in EDTA-S1 (Table 2). In the presence of polymorphs (suspension 2), however, filterability of the heparinized suspension was 5.5 times less than that of the EDTA suspension. The presence of adhesive activity evidently sharply increases the ability of polymorphs to jam the capillaries of the filter and makes their role in this process without doubt of supreme importance among other cells.

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EFFECT OF PAGINOL S-2000 ON RESPIRATION AND OXIDATIVE PHOSPHORYLATION OF LIVER MITOCHONDRIA OF RATS POISONED WITH BUTYLCAPTAX

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The massive use of pesticides in agriculture necessitates the study of their effect on structural, functional, and biochemical processes in man and animals. The study of the effect of pesticides on cell metabolism is an important aspect of the study of the mechanism of the toxic action of these compounds and the creation of new methods of protection and correction of the pathological processes for which they are responsible, on this basis.

Despite the availability of a wide range of substances and methods of treatment, the search for effective ways of correcting structural and functional disturbances of the liver in diseases of chemical etiology still continues. The search for new therapeutic substances is aimed primarily at the search for and use of new inhibitors of free-radical reactions in biomembranes. Besides natural antioxidants, an important place is occupied by the synthesis and use of new compounds which possess these properties [3, 7]. The writers showed previously that if butylcaptax is given to animals, free-radical lipid peroxidation (LPO) in rat liver mitochondrial membranes is intensified [6].

It was accordingly decided to study the effect of paginol S-2000 on respiration and oxidative phosphorylation of liver mitochondrial membranes of rats poisoned with butylcaptax.

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