

THE INFLUENCE OF SUBPHLOGOGENIC THERMAL FACTORS
ON THE DEVELOPMENT OF NONINFECTIOUS INFLAMMATION
IN THE PERITONEUM

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At the present time it is possible to delay the development of a pathological process with specific and non-specific factors [5,6]. Thus, the factor of high temperature increases the resistance to subsequent overheating [4,7] and activates immunologic processes [2,3], while the local thermal factor increases resistance to subsequent burns [10, 13, 14]. The aim of the present work was to study the nonspecific influence of preliminary subphlogogenic factors on the development of acute peritoneal inflammation produced by chemical stimuli.

EXPERIMENTAL

The experiments were performed on 40 rabbits. In the first group (10 animals) were healthy animals in which the ascorbic acid content of the adrenal glands was determined; in the second (control) group (15 animals), peritonitis was produced by intraperitoneal injection of a 10% solution of peptone in a dose of 6 ml/kg; in the third group (15 animals) the rabbits were given daily for 6 days, before peritonitis, intraperitoneal injection of 0.9% solution of NaCl heated to 48° C.

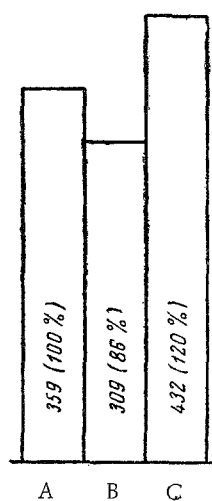


Fig. 1. Ascorbic acid content of adrenals (in mg %). A) First group of rabbits; B) second group; C) group.

In animals with peritonitis the rectal temperature was measured, and, in the blood, the number of and phagocytic activity of the leukocytes and their catalase activity were determined. One day after peptone injection, the leukocyte count, protein, and pH of the exudate were determined. The ascorbic acid content of the adrenals was also measured after one day. Temperature was measured with an electrothermometer, catalase activity by the method of Bakh and Zubkova [1], phagocytic activity by relation to phagocytosis of a culture of *Staphylococcus aureus*. The pH of the exudate was measured with an LP-5 potentiometer with glass electrodes, the protein by refractometer, the ascorbic acid content of the adrenals according to Lapin and Vladimirov as modified by Limareva [8]. The fluid was tested colorimetrically in an FÉK-M apparatus with a red light-filter. The numerical data were assessed for significance at $P < 0.05$.

RESULTS

The results of the investigation are shown in Tables 1 and 2 and in Fig. 1. From Table 1 it is seen that the sixfold injection into the peritoneal cavity of fluid heated to 48° provoked some elevation in body temperature and in the phagocytic

TABLE 1. Indices of Inflammation in Experimental and Control Rabbits (mean data)

Group	Time of measurement	Body temperature	Blood					Catalase index
			leukocytes (in thousands/mm ³)		phagocytosis			
			total	polymorphonuclear	mononuclear	phagocytic number	% phagocytes	
2nd	Initial	38,1 ± 0,01	11,0 ± 0,6	4,5 ± 0,3	6,5 ± 0,3	1,26 ± 0,10	28 ± 1,9	2,3 ± 0,07
	After injection of peptone	39,9 ± 0,07	31,0 ± 4,4	21,1 ± 3,8	9,9 ± 1,0	2,54 ± 0,22	42 ± 1,8	2,1 ± 0,05
	Change	+ 1,8	+ 20,0	+ 16,6	+ 3,4	+ 1,28	+ 14	— 0,2
3rd	Initial	38,1 ± 0,05	9,9 ± 0,6	3,8 ± 0,3	6,1 ± 0,4	1,27 ± 0,11	26 ± 1,6	2,3 ± 0,05
	After thermal factor	38,3 ± 0,05	11,2 ± 0,6	4,4 ± 0,3	6,8 ± 0,4	2,01 ± 0,10	36 ± 1,4	2,3 ± 0,05
		+ 0,2	+ 1,3	+ 0,6	+ 0,7	+ 0,74	+ 10	0
		$P < 0,01$				$P < 0,001$	$P < 0,001$	
	After peptone injection	39,2 ± 0,08	16,1 ± 1,0	8,8 ± 0,8	7,3 ± 0,5	3,81 ± 0,35	50 ± 1,3	2,0 ± 0,05
	Change	+ 1,1	+ 6,2	+ 5,0	+ 1,2	+ 2,54	+ 24	— 0,3
	Difference in change	— 0,7	— 13,8	— 11,6	— 2,2	— 1,26	+ 10	— 0,1
	in 3rd and 2nd group	$P < 0,001$	$P < 0,01$	$P < 0,01$	$P < 0,05$	$P < 0,01$	$P < 0,01$	$P < 0,1$

TABLE 2. Composition of Exudate in Experimental and Control Rabbits (mean date)

Group	Leukocytes (in thousands/mm ³)			pH	Protein (in g %)
	total	polymorpho-nuclear	mononuclear		
2-я	61,6 ± 2,9	49,5 ± 2,1	12,1 ± 0,9	7,28 ± 0,04	5,53 ± 0,03
3-я	30,6 ± 2,3	25,0 ± 1,8	5,6 ± 0,8	7,55 ± 0,03	4,65 ± 0,06
P	< 0,001	< 0,001	< 0,001	< 0,001	< 0,001

activity of leukocytes in the blood. With the development of peritonitis the rise in body temperature and leukocytes in the blood (mainly polymorphonuclears) was less marked in the third group of rabbits than in the controls; the leukocytic phagocytic activity was higher.

No essential difference in the changes in catalase activity was noted in the second and third groups. In rabbits from group 3 the reaction of the exudate was more alkaline while the protein and leukocyte (particularly polymorphonuclear) contents in that group were less than in the controls (see Table 2.)

Thus, preliminary subphlogogenic thermal factors acting on the peritoneum diminish the inflammation, which thus occurs with a less marked febrile and leukocytes reaction, but with greater phagocytic activity. The acidity, number of leukocytes, and amount of protein in the exudate of the experimental rabbits also were less than in controls. As seen from Fig. 1. the ascorbic acid level in the adrenals of experimental animals was higher and in the controls, lower, than in the healthy animals of the first group ($P < 0.05$).

It is known that upon the action of strong, noxious factors the ascorbic acid content of the adrenals decreases [9, 15] as the result of an increase in hormone synthesis and a decrease in ascorbic acid synthesis [11]. With the action of weak, even frequent or repetitive irritation, the ascorbic acid content of the adrenals increases as a result of an increase tissue requirement for it and augmented synthesis. The development of this status is accompanied by increased resistance [11, 12]. This suggests that repeated subphlogogenic thermal factors stimulate the biosynthesis of ascorbic acid, which enhances the processes that create increased resistance to inflammatory irritation.

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