

CHANGES IN SOME PLASMA FACTORS OF NATURAL DEFENSE IN DOGS UNDER THE INFLUENCE OF BACTERIAL LIPOPOLYSACCHARIDE

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Despite the extensive literature, there is no general agreement regarding the role of properdin in the bactericidal properties of the blood or the relationship between the individual factors responsible for these properties.

According to several authors [5,8,10,14,16,18,19], there is no parallel between the changes in the bactericidal properties of the blood, the titers of properdin and complement, and the lysozyme content. Other investigators [6, 9,13,20], however, consider that the changes in these factors of natural immunity are similar.

Bearing in mind the importance of the bactericidal properties of the blood and the activity of its various components for the vital functions of the organism, it is interesting to investigate the possibility of strengthening the natural defenses of the organism by means of biologically active lipopolysaccharides [1-3,11,12,14,15,17].

The object of the present investigation was to study the possibility of stimulating the activity of the properdin system and of lysozyme in dogs by administration of a lipopolysaccharide (LPS) obtained from *Bacillus paracoli* to the animals and to establish the relationships between these various factors.

EXPERIMENTAL METHOD

Experiments were carried out on 21 noninbred healthy dogs weighing from 7 to 10 kg (14 males and 7 females). The animals received a single intravenous injection of LPS in doses of between 0.3 and 1.4 $\mu\text{g/kg}$ body weight.

The properdin activity was determined by the hemolytic method [4,7], and the lysozyme titer by its action on a standard suspension of *Micrococcus lysodeikticus*. The properdin titer was investigated in all the dogs before administration of LPS, and in 16 dogs 5 h and 1, 3, 5, and 7 days after its administration. In 10 of the 16 animals the lysozyme activity was investigated along with the properdin titer.

EXPERIMENTAL RESULTS

The general condition of the dogs remained absolutely satisfactory after the injection of LPS, and 2-4 h after the injection, a transient temperature reaction was observed, during which the mean elevation of the body temperature was 1.4°. The results of these experiments are given in Tables 1 and 2.

The limits of normal variations of the investigated factors were taken to be $M \pm 2\sigma$, which in the case of the properdin titer was 58.8-121.2 conventional units, and for lysozyme from 1:90 to 1:530 dilutions of serum.

TABLE 1. Changes in Titers of Properdin and Lysozyme in Dogs after Administration of LPS

Statistical index	Properdin titer							Lysozyme titer	
	Initial	After 5 h	After 1 day	After 3 days	After 5 days	After 7 days	Maximal increase	Initial	Maximal increase
n	21	10	16	14	13	10	15	10	6
M	90	122	130	115	130	96	73	310	583
m	3.61	5.8	14	4.9	11.3	9	8	35	154
P	—	<0.01	<0.03	<0.02	<0.02	>0.1	<0.01	—	<0.05

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TABLE 2. Distribution of Animals Depending on Character of Changes in Properdin and Lysozyme Titers

Time after injection of LPS	Properdin				Lysozyme				Simultaneous parallel changes in titers of properdin and lysozyme			Absence of parallel changes in titers of properdin and lysozyme	Total
	No change compared with initial titer	Increase	Decrease	Total	No change compared with initial titer	Increase	Decrease	Total	No change compared with initial titer	Increase	Decrease		
5 h	6	4	1	11	2	2	2	6	—	2	1	3	6
1 day	7	9	—	16	6	3	1	10	—	4	2	4	10
3 days	5	8	1	14	6	3	—	9	2	1	—	6	9
5 "	4	8	1	13	6	2	—	8	—	4	1	3	8
7 "	6	2	2	10	7	1	—	8	—	1	1	4	6

As Table 1 shows, in 15 of the 16 dogs at various times after administration of LPS, a considerable increase was observed in the activity of the properdin system, and in the largest number of animals this took place 1-5 days after injection of LPS, with a return to normal titer 7 days after the injection. The changes in the lysozyme titer in the animals were less clear: in 6 of 10 animals at different times after injection of LPS the lysozyme titer rose (Table 1). It is interesting that in 5 of the 10 dogs a parallel increase was found in the activity of properdin and lysozyme.

These investigations show that LPS from *B. paracoli* may stimulate the activity of the properdin system in dogs. The LPS has a less marked action in this direction on the lysozyme activity. Under the influence of LPS, the increase in the activity of lysozyme and properdin does not always take place simultaneously.

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