

Changes in the properdin level in different types of lymph and in the blood were studied in dogs after burns of the hind limbs (group 1) and after head injury (group 2). The properdin level in the lymph of the cervical duct and the efferent lymph flow of the popliteal lymph node were increased in dogs of both groups. The properdin level in the afferent lymph of the popliteal lymph node, thoracic duct, and blood fell after burns and rose after head injury. The total protein concentration in the afferent and efferent lymph of the popliteal lymph node and the cervical and thoracic ducts increased whereas in the blood it decreased.

KEY WORDS: traumatic stress; properdin formation; lymph.

The origin of the plasma protein properdin, its function, and its ability to affect the resistance of the body to injury have so far received little study. Only indirect data on properdin formation in the lymph nodes are available [2].

In the investigation described below properdin formation was studied by comparing changes in its level simultaneously in the afferent and efferent lymph of the popliteal lymph node, the cervical and thoracic lymphatic ducts, and the blood before and during the course of burns or head injuries. The dependence of the course of the disease on changes in the properdin level also was investigated.

EXPERIMENTAL METHOD

Experiments were carried out on 35 mongrel dogs of both sexes, in 25 of which a first- or second-degree burn of the hind limbs was produced by immersing them in hot water (90°C) for 30 sec (group 1), whereas a head injury was inflicted on the other 10 dogs (group 2). Before injury blood was taken from the lesser saphenous vein, and the afferent and efferent lymph of the popliteal lymph node and lymph from the thoracic and cervical lymphatic ducts were collected. Lymph was obtained by means of polyvinyl cannulas. Blood and lymph were again taken 3 h after injury. Blood and lymph also were obtained in the same way from seven control animals, which remained uninjured. The properdin level was determined by adsorption on inulin followed by mineralization and isometric distillation in Conway dishes. Total protein was determined refractometrically.

EXPERIMENTAL RESULTS

The properdin level in the lymph of the cervical duct and the efferent vessel of the popliteal lymph node showed a significant increase in both groups of dogs (Table 1). The total protein content in the cervical and efferent lymph did not rise sufficiently to enable the increase in the properdin level to be explained by an increase of permeability for protein in general. The increase in the properdin level must probably be attributed to stress-induced lysis of plasma cells and lymphocytes in the submandibular, cervical, and popliteal lymph nodes, which are rich in mature plasma cells, in which properdin is probably formed [3].

The properdin level in the blood and in the afferent lymph of the popliteal lymph node and lymph of the thoracic duct changed in different ways in the dogs of the two groups: it fell after burns but rose after head injury. The decrease in the properdin level can be explained by its binding with products of mucopolysaccharide nature [1, 2], which are formed in large quantities during burns. The concentration of mucopolysaccharides after head injury, on the other hand, was evidently too low to bind appreciable quantities of properdin, and the discharge of properdin by the lymph nodes determined its blood level.

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TABLE 1. Dynamics of Properdin and Total Protein Level in Blood and Lymph of Dogs After Burns and Head Injury

Material studied	Time of taking material (before or after injury)	Burns		Head injury	
		properdin, $\mu\text{g/ml}$	total protein, g%	properdin, $\mu\text{g/ml}$	Total protein, g%
Lymph:					
cervical	Before	3.2 ± 0.61	2.53 ± 0.19	6.2 ± 2.3	2.9 ± 0.272
	After	6.87 ± 1.29	2.66 ± 0.13	10.13 ± 3.42	3.40 ± 0.17
P		< 0.01	> 0.10	< 0.05	< 0.1
from thoracic duct	Before	1.9 ± 1.14	3.3 ± 0.51	—	—
	After	7.48 ± 0.69	3.7 ± 0.57	—	—
P		< 0.05	> 0.10		
efferent	Before	—	—	1.68 ± 0.58	1.78 ± 0.28
	After	—	—	3.80 ± 0.50	2.75 ± 0.28
P		—	—	< 0.05	< 0.001
afferent	Before	5.5 ± 1.07	1.7 ± 0.09	3.3 ± 0.319	1.55 ± 0.29
	After	4.66 ± 0.74	4.80 ± 0.254	4.8 ± 0.56	2.40 ± 0.25
P		> 0.05	< 0.001	< 0.10	< 0.02
blood	Before	16.44 ± 2.55	7.10 ± 0.22	13.8 ± 1.24	6.6 ± 0.41
	After	12.83 ± 1.61	6.7 ± 0.18	18.0 ± 1.34	6.4 ± 0.32
P		> 0.05	< 0.001	< 0.001	> 0.1

In some cases, after infliction of head injury on the dog no increase in the properdin level was found in the cervical or efferent lymph, and in these cases there was no increase likewise in its blood concentration. The course of the postoperative period in these dogs was the severest of all, and it often ended in death of the animal on the second to the fourth day. This can be attributed to depression of nonspecific mechanisms of resistance.

The results thus indicate that properdin is formed in the lymph nodes. The lower survival rate of the animals in the absence of a response of the properdin system is a fact of very great importance. It may be evidence both of the connection between the resistance of the animal to head injuries and activity of the properdin system and of the secondary inhibition of this system as a result of trauma. It would be interesting to study the possibility of stimulating properdin production pharmacologically and its relationship to healing.

LITERATURE CITED

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