

# PROPERDIN CONCENTRATION AND PROTEIN COMPOSITION OF THE LYMPH AND BLOOD IN STRESS

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After fractures of the tibia and fibula in rabbits the properdin concentration in the lymph draining from the injured limb is reduced, while the total protein concentration is increased. The properdin, total protein, and albumin levels in the blood are lowered under these circumstances.

The object of this investigation was to determine the concentration of properdin and proteins in the lymph and blood after fractures of the tibia and fibula in rabbits.

## EXPERIMENTAL METHOD

Experiments were carried out on 15 rabbits of both sexes weighing 3-4 kg. A closed fracture of the right tibia and fibula was produced in 10 rabbits and another five rabbits acted as the control. Before injury a blood sample was taken, and lymph was obtained from the efferent vessel of the left popliteal lymph gland. Further samples of blood and lymph were obtained 12-18 h after the fracture, but this time lymph was taken from the right popliteal gland, draining the site of injury. Blood and lymph were obtained from the five control rabbits in the same way as from the experimental animals, but their bones were not fractured. Properdin was determined by the method of Kögler and Scheiffart [5], total protein with the IRF-22 refractometer, and the protein composition by electrophoresis on paper.

## EXPERIMENTAL RESULTS

The properdin concentration in the blood serum and lymph was reduced 12-18 h after the fracture ( $P < 0.01$ , Table 1). The total protein concentration was reduced in the blood ( $P < 0.05$ ) but increased in the lymph ( $P < 0.01$ ), indicating increased permeability of the capillaries and loss of protein from the blood, as well as increased lymphogenous resorption in the tissues. The fact that the properdin level in the lymph was not increased to correspond to the increase in total protein concentration, while the properdin level in the blood was reduced, is direct evidence of binding of properdin in the tissues of the injured limb.

The absolute concentration of the albumin fraction in the blood serum was reduced ( $P < 0.01$ ), leading to a decrease in the total protein concentration. The absolute concentration of the remaining fractions were unchanged ( $P > 0.05$ ). The decrease in the albumin fraction indicates an increase in capillary permeability of such a nature that more albumin leaves the blood to enter the tissue fluid than under normal conditions. Since the increase in the total protein concentration in the lymph under these conditions was accounted for by globulins, and not by albumins (by 0.49 g%), this suggests that the excess of albumins leaving the blood to enter the tissues of the injured limb (1.31 g%) is not reabsorbed into the lymph but retained in the tissues. No changes in the protein composition or properdin concentration in the lymph and blood were found in the control rabbits. In three of them the lymph properdin level was actually raised, and taken in conjunction

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TABLE 1. Properdin Concentration and Protein Composition of Lymph and Blood of Rabbits before and 12-18 h after Fracture

Material examined	Time of investigation	Properdin (in $\mu\text{g/ml}$ )	Total protein (in g%)	Albumin (in g%)
Blood	Before fracture	$28.47 \pm 2.12$	$6.69 \pm 0.52$	$3.15 \pm 0.31$
	After fracture	$22.20 \pm 2.61$	$5.38 \pm 0.12$	$2.21 \pm 0.21$
	P	$< 0.01$	$< 0.05$	$< 0.01$
Lymph	Before fracture	$6.28 \pm 1.32$	$2.20 \pm 0.25$	$1.22 \pm 0.14$
	After fracture	$4.34 \pm 1.21$	$2.69 \pm 0.16$	$1.36 \pm 0.20$
	P	$< 0.01$	$< 0.01$	$> 0.05$

(Continuation)

Material examined	Time of investigation	Globulins (in g%)		
		$\alpha$	$\beta$	$\gamma$
Blood	Before fracture	$1.28 \pm 0.06$	$1.06 \pm 0.08$	$1.16 \pm 0.06$
	After fracture	$1.26 \pm 0.07$	$1.15 \pm 0.07$	$1.04 \pm 0.05$
	P	$> 0.1$	$> 0.1$	$> 0.05$
Lymph	Before fracture	$0.43 \pm 0.03$	$0.26 \pm 0.02$	$0.29 \pm 0.02$
	After fracture	$0.40 \pm 0.03$	$0.38 \pm 0.03$	$0.39 \pm 0.04$
	P	$> 0.1$	$> 0.05$	$> 0.05$

with the unchanged total protein level, this may indicate that properdin is formed in the gland and excreted by it into the lymph.

The retention of properdin in the tissues demonstrated by these experiments is probably due to its binding by decomposition products of glycoproteins, the content of which in the tissues is increased after injury [3, 4]. The increase in the total protein concentration in the lymph can be explained by a general increase in the glucocorticoid level in the body, associated with increased lymphogenous resorption [2]. The discovery of properdin in the lymph is itself of fundamental importance, because some workers have claimed that properdin is absent from the lymph [1].

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