FIXATION OF SHEEP'S RED CELLS BY THE LYMPHATIC GLANDS
OF CATS AND DOGS

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From information in the literature, all substances with a molecular weight over 20,000-30,000 are ab-
sorbed exclusively through the lymphatic vessels [10]. Antigens which pass through the lymphatic glands become
fixed there. The degree of fixation depends on the dispersion of the substances.

There is indirect evidence that foreign proteins are held up with difficulty by lymphatic glands [15, 17].
The smallpox virus passes freely through the lymphatic barrier into the blood stream [16].

There is no unanimity on the fixation of bacteria. Some authors [6, 7] regard the lymphatic system and,
therefore, the lymphatic glands as conductors of infection. The majority of workers hold the opposite opinion.

Large particles are retained with particular intensity in the lymphatic glands. During perfusion of the
popliteal lymphatic glands of the dog with a suspension of isogenous red cells, 99% of them were held up [11].

The mechanism of fixation of large corpuscular antigens is one of mechanical holding up of the antigen
by the reticular tissue of the sinuses of the lymphatic glands and of subsequent phagocytosis.

Bearing in mind the role of the lymphatic glands in the process of antibody formation, it may be assumed
that they take part in the process of fixation of a specific component — in the reaction of combination of anti-
gen and antibodies within the lymphatic gland itself [8, 9, 12, 13, 14].

The barrier properties of lymphatic glands depend on various conditions: on the reactive state of the
body, on the pressure of the lymph entering the gland, on the quantity of antigen reaching it, and so on. In
response to immunization there is a significant increase in the barrier function of the lymphatic glands [1, 2, 3, 5].

In the present research we studied the barrier function of the lymphatic glands in relation to the fixation
of foreign red cells.

EXPERIMENTAL METHOD

In this investigation we used the method of perfusion of the lymphatic vessels [4] of the popliteal lymph-
atric glands of dogs and cats with an antigen solution. Estimation of the antigen content of the original fluid and
of the fluid after passing through the lymphatic glands enabled the barrier function of the lymphatic glands to
be judged with accuracy.

As anesthetic we used a 10% solution of evipan, which was injected into the cats in a dose of 1 ml/kg
intramuscularly, and into the dogs in a dose of 0.25 ml/kg intravenously. Furthermore the dogs were given a
preliminary injection of a 1% solution of morphine hydrochloride in a dose of 1 ml/kg, 15-20 minutes beforehand.
Fig. 1. Diagram of the apparatus for perfusion of a lymphatic gland. 1) Graduated test tube; 2) needles inserted into the lymphatic vessels; 3) lymphatic gland; 4) bath (temperature 38-39°); 5) water manometer; 6) measuring cylinder; 7) Marriott's bottle.

A suspension of sheep's red cells (50,000-60,000/mm³) in Tyrode solution was used for the perfusion. In order to prevent sedimentation of the red cells, a glass tube, through which air was blown, was introduced into the closed vessel containing the fluid, preventing sedimentation of the red cells and maintaining a constant perfusion pressure (see diagram in Fig. 1).

The pressure of the perfusate was 20, 25 and 30 mm of water. At a lower pressure the percentage fixation of the sheep's red cells was very high. Corresponding to the three levels of pressure, three samples of perfusate were obtained, each of which was collected for 15 minutes. The lymphatic glands on both sides were examined.

After the experiment a solution of Chinese ink was injected through the afferent vessel into the lymphatic gland in order to reveal any possible anastomoses between the afferent and efferent lymphatic vessels.

The number of red cells in the original fluid and in the perfusate was determined by counting in a Goryaev chamber. The barrier function of the lymphatic glands was calculated as the percentage retention of sheep's red cells.

Immunization of the animals was carried out by means of five injections, every 5 days, of a 5% suspension of sheep's red cells in a dose of 1 ml/kg for the cats and 0,3 ml/kg for the dogs. In one group of animals the red cell suspension was injected subcutaneously into the lower part of the calf, and in the other group -- into the lateral surface of the body. Investigation of the barrier function of the lymphatic glands was carried out on the 2nd-16th day after completion of immunization.

Altogether 35 cats and 10 dogs were used in the experiments. The number of lymphatic glands perfused was 72 (56 in cats and 16 in dogs).

**Experimental Results**

The results obtained from perfusion of the lymphatic glands of the cats and dogs were of the same type.

The percentage fixation of sheep's red cells by the lymphatic glands of the unimmunized animals at a perfusion pressure of 20 cm of water varied between limits of 53.8-95.5%, at a pressure of 25 cm between 48.3-94.5%, and at a pressure of 30 cm between 36.0-93.1% (Fig. 2).

The variations in the percentage fixation of sheep's red cells by the lymphatic glands of the immunized cats, injected with the suspension in the region of the calf, were as follows: at a perfusion pressure of 20 cm water 93.1-100%, at a pressure of 25 cm 88.7-100% and at a pressure of 30 cm 78.7-100%.