PLASMA CELL RESPONSE IN VARIOUS LYMPH GLANDS OF RABBITS*

L. D. Kolesnikova

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The number of plasma cells in lymph glands of intact rabbits varies with their localization: They are more numerous in the cervical, less numerous in the popliteal, and least numerous in the mesenteric glands in which, on the other hand, there are numerous blast cells.

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Structural differences have been described in lymph glands in different parts of the body [1, 3-6, 9-12]. The first description of regional differences in thickness of the medullary cords was given by the present author [8]. With the introduction of Brachet's staining method into histological practice, the reason for these differences became apparent; the medullary cords in lymph glands in different parts of the body contain different numbers of plasma cells. Very recently reports have been published of variations in the level of the plasma-cell response in the inguinal and cervical lymph glands of rats and mice [2, 7], and details have been given of the number of various cells in mouse lymph glands in different parts of the body [13].

In the present investigation a quantitative analysis was made of the plasma-cell response in the popliteal, cervical, and mesenteric lymph glands of animals living under natural conditions.

EXPERIMENTAL METHOD

Experiments were performed on 13 sexually mature rabbits of both sexes. The material was fixed in 12% formalin and sections cut to a thickness of 5 μ were stained with methyl green-pyronine. Cells of the plasma-cell series were counted in 50 fields of vision under oil immersion with a square window 2.5 mm in size inserted into the 10× ocular.

The absolute number of plasma cells was counted in their zone of distribution (i.e., throughout the width of the medulla and the adjacent border of the cortex). The stages of cell differentiation in the plasma-cell series followed in nomenclature now generally adopted (plasmablast, immature and mature plasma cells). The final analysis was confined to the total of immature and mature plasma cells, because it was not always possible to distinguish between the various blast cells (lymphoblasts, plasmablasts).

EXPERIMENTAL RESULTS

As Table 1 shows, cells of the plasma-cell series were most numerous in the cervical glands, with substantially fewer in the popliteal glands and only a small number in the mesenteric glands.

A noteworthy discovery was the considerable scatter in the number of plasma cells in lymph glands of the same part of the body in different rabbits (see Table 1), presumably attributable to individual differ-

TABLE 1. Content of Plasma Cells in Rabbit Lymph Glands in Different Parts of the Body

Lymph glands	No. of observations	M	±σ	±m		C_{var} (in %)
				abs	% of M	
Popliteal	13	277	88.6	24.6	8.9	32.0
Cervical	12	556	107.2	31.0	5.6	19.5
Mesenteric	12	54	22.5	7.33	13.6	47.0

* The student A. Soldatenko assisted with this investigation.

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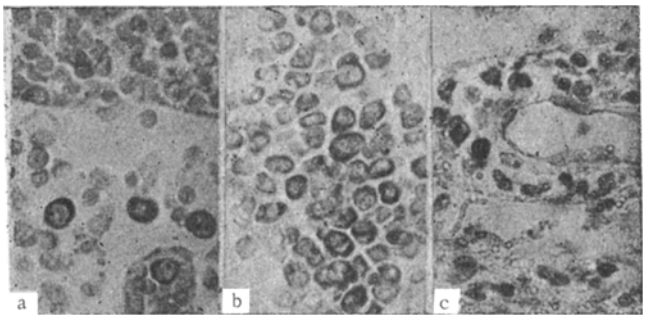

Fig. 1. Parts of the medulla from lymph glands. a) Mesenteric; b) cervical; c) popliteal. Different numbers of plasma cells are seen in the medullary cords. Methyl green-pyronine. Objective 90, ocular 10.

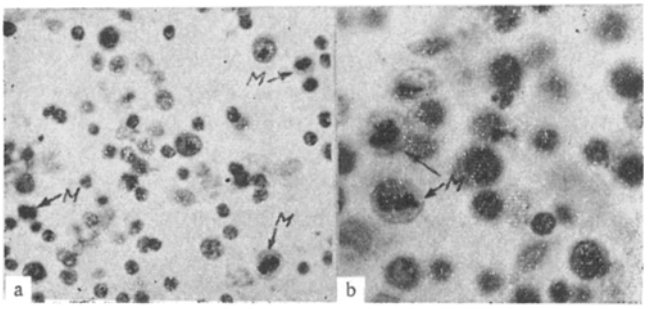

Fig. 2. Parts of medullary sinuses of mesenteric glands. Large, medium-sized, and small lymphocytes are visible. Many large lymphocytes are in various stages of mitosis (M). Hematoxylin-eosin. a) Objective 40, ocular 10; b) objective 90, ocular 15.

ences between the animals. However, statistical analysis showed that the more numerous the plasma cells in the lymph glands, the relatively less marked the individual variations. The coefficient of variation (Cvar), for instance, was lowest in the cervical lymph glands and highest in the mesenteric.

Cells morphologically corresponding to blast cells were numerous in the mesenteric glands. These cells were found both in the medullary cords and in the sinuses (Fig. 1), where they remained capable of mitotic division (Fig. 2). The localization and morphology of these cells, the high mitotic activity in the intact animals, together with the discovery of medium-sized lymphocytes near to them suggest that they were lymphoblasts (or large lymphocytes) but not plasmablasts, which were usually found in the medullary cords. In one report [13], the statement is made that large lymphocytes are most numerous in the mesenteric glands, which contain only a few plasma cells. Consequently, lymphoblasts outnumber plasmablasts in the mesenteric glands. This is consistent with the lower numbers of other cells of the plasma-cell series in these glands.

When interpreting the regional differences in the state of the plasma-cell response of lymph glands in intact animals we can accept the view of those investigators [2] who relate the high plasma-cell response to the number and strength of antigenic stimuli reaching the glands. However, it is a different matter with the mesenteric glands. In these a high plasma-cell response should be expected because of the numerous stimuli reaching them by the lymphatics from the intestine. The results of the present investigation showed the opposite.

The weak plasma-cell response from the mesenteric glands of the intact animals must be attributed to their "preoccupation" with other processes and, in particular, with their intensive role in the assimilation of food substances (lipids, for example) reaching them, and possibly to their state of tolerance.

It thus seems that the level of the plasma-cell response in intact animals is influenced not only by stimuli arriving at the lymph glands, but also by the state of the organs themselves, determined by their permanent functions.

The results now obtained demonstrate that lymph glands in different parts of the body play different roles in protective responses under natural conditions of existence. At the same time, they provide primary evidence for estimating the dynamics of the immunologic function of lymph glands in different parts of the body in the course of an infection and after artificial immunization, and also for the study of the response of lymph glands to other factors modifying homeostasis (cold stress, irradiation, etc.).

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