

MORPHOLOGICAL CHARACTERISTICS OF CHANGES IN THE LYMPHOID TISSUE AFTER ALLOGRAFTING

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UDC 616.34-089.843-07:616.42-091-07

The results of histological, histochemical, and immunomorphological investigations of lymphoid tissue from different parts of rabbits are described. They differ in their participation in transplantation immunity, which was most marked in the regional lymph glands. High globulin-producing activity of the lymphoid structures of the mesentery, vermiform appendix, and diverticulum of the colon revealed by the investigation is regarded as a manifestation of the nonspecific immune reaction to intestinal antigens.

The general morphological changes arising after allografting in the regional lymph glands and spleen have been studied in some detail [2, 3, 5, 6, 8-10]. Changes in other parts of the immunocompetent system have received less study and for that reason in the present series of experiments not only the regional lymph glands and spleen, but also the lymphoid tissue of the mesenteric complex, colonic diverticulum, vermiform appendix, and thymus also was studied.

EXPERIMENTAL METHOD

A full-thickness skin graft measuring 7-12 cm² was allografted on the dorsum of 36 rabbits. The animals were killed at various times after the grafting. Lymphoid tissue from 4 intact rabbits was used as the control. Paraffin sections were stained with hematoxylin-eosin, azure-eosin, and methyl green-pyronine, alkaline phosphatase activity was determined by Gomori's method in sections from tissues fixed in alcohol. Small pieces were fixed and embedded in paraffin wax by Sainte-Marie's method. Sections were treated with labeled serum against rabbit globulins prepared by the N. F. Gamaleya Institute of Epidemiology and Microbiology, and by the direct Coons' method with appropriate control.

EXPERIMENTAL RESULTS

Macroscopic changes in the lymphoid tissue consisted of the enlargement of the regional lymph glands, which attained their greatest size after 10-12 days. Microscopic examination showed that after 4-5 days reactive centers appeared in the glands, the number of small and medium-sized lymphocytes increased in the interfollicular zones, and large cells with pyroninophilic cytoplasm appeared. After the 6th-8th day the number of plasma cells and other pyroninophilic cells in the interfollicular zones and medullary cords increased to 100 per field of vision (objective 90×), compared with 50 in the control animals. Globulins, determined by the immunoluminescence method, were not found in all pyroninophilic cells. The strongest luminescence was observed in mature plasma cells. Fluorescence also was found in the cytoplasm of cells in the germinal centers, as has been observed in the literature [11, 13]. Weak luminescence was found in the cytoplasm of solitary small lymphocytes, which were scattered throughout the tissue of the gland. The total number of luminescent cells on the 10th day after transplantation was 7.3 per field of vision, compared with 3.01 in the control rabbits. Enlargement of the follicles and the appearance of reactive centers in them were accompanied by an increase in alkaline phosphatase activity, characteristic of immune activity, in the lymphocytic mantle [1, 7]. The changes in the spleen were similar but were not observed

Department of Pathological Anatomy, S. M. Kirov Military Medical Academy, Leningrad. (Presented by Academician of the Academy of Medical Sciences of the USSR, P. N. Veselkin.) Translated from *Byulleten' Eksperimental'noi Biologii i Meditsiny*, Vol. 77, No. 5, pp. 114-116, May, 1974. Original article submitted May 21, 1973.

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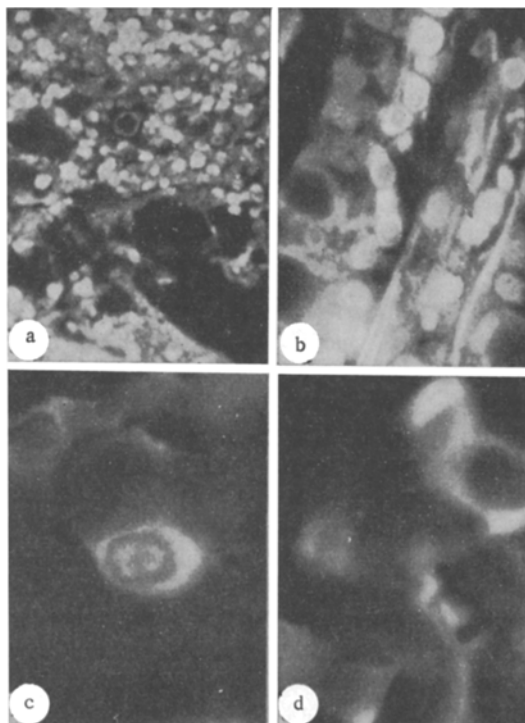


Fig. 1. Globulin-producing cells. Luminescence: a) in the mesenteric lymphoid complex of a control animal (120 \times); b) in the tunica propria of the mucous membrane of an experimental animal (270 \times); c) lymphocyte inside epithelial cell in a diverticulum of the colon of a control animal (270 \times); d) epithelial cells of colonic diverticulum of an experimental animal (270 \times).

of transplantation immunity. The high immune activity of the lymphoid structures of the mesenteric complex, diverticulum, and appendix, which is independent of grafting, is evidently a response to intestinal antigens [4]. The immunoglobulins produced in this case, as is confirmed by data in the literature, are eliminated into the lumen of the intestine by the epithelial cells [12, 14, 15]. Migration of globulin-containing lymphocytes through the epithelial cells was observed to be a fact.

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until the 10th day after transplantation, and they were less marked. For instance, the number of pyroninophilic cells did not exceed 18.7 per field of vision. In the distant lymph glands these changes were less marked still, they appeared later, and they were inconstant. After the middle of the second week regression of these changes was observed.

Unlike in the regional lymph glands and spleen, in the mesenteric lymphoid complex and the lymphoid tissue of the appendix and colonic diverticulum, morphological evidence of high immunological activity appeared, as reflected by general hyperplasia of the lymphoid tissue with the presence of reactive centers, and an increase in the number of pyroninophilic and globulin-producing cells. High alkaline phosphatase activity in the mantle was observed not only in the experimental animals, but also in the controls and the severity of the changes was independent of the time elapsing after grafting. On luminescence-microscopic investigation luminescence in the experimental and control animals was observed not only in the plasma cells of the medullary cords and cells of the reactive centers (Fig. 1a), but also in the plasma cells of the tunica propria of the mucous membrane (Fig. 1b), in individual lymphocytes lying within the epithelial cells (Fig. 1c), and in the cytoplasm of some epithelial cells (Fig. 1d).

Regardless of the time elapsing after transplantation, no changes were found in the thymus.

This investigation confirmed data in the literature that the changes arising after transplantation in the regional lymph glands and spleen are a reflection