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Differences in the Distribution of Antigen Reactive Cells in the Lymphoid Tissues of the Rat and Mouse (33550)

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Although many investigators studied the distribution of antibody producing cells in the lymphoid tissues of rodents during the primary antibody response (1-5), few studied the distribution of antigen reactive cells (6-8). Recent reports showed that the distribution of the latter cells in unimmunized animals varies within the same species depending upon the antigen-antibody system studied. For instance, studies of the primary antibody response of rats to sheep erythrocytes (SRBC) show that the concentration of antigen reactive cells in the thoracic duct lymph is greater than that in the spleen (6). On the other hand, studies of the primary response of rats to alum precipitated tetanus toxoid (TTAP) show that the relative concentrations are reversed (7).

The object of the present investigation was to compare the distribution of antigen reactive cells in the lymphoid tissues of the rat and mouse using a single antigen-antibody system. In particular, we compared the ability of syngeneic thoracic duct cells and spleen cells to restore the primary antibody re-

sponse of sublethally irradiated rats and mice to TTAP. The experimental results show that there are considerable differences in the distribution of antigen reactive cells in the two rodent species.

Materials and Methods. Experimental animals. Inbred Lewis rats obtained from Microbiological Associates, Inc., Walkersville, Md. and (C57BL/Ka × C3HF/Lw)F₁ mice maintained in the Laboratory of Biology, National Cancer Institute, Bethesda, Md. were used.

Immunization and antibody titration. Immunization of rats to TTAP (Eli Lilly Co., Indianapolis, Indiana) was achieved by a single intraperitoneal (0.5 ml, 7.5 Lf) and subcutaneous (0.5 ml, 7.5 Lf) injection of 15 Lf toxoid. Mice were similarly immunized with 7.5 Lf (total) toxoid. Antibody titrations were performed in microtiter agglutination plates (Cooke Engineering Co., Alexandria, Va.) using a previously described modification (7) of the tanned red cell hemagglutination technique of Stavitsky (9).

Irradiation. Whole body X-irradiation was performed with two Westinghouse Quadrocondex units (15 mA; 200 kV, 54 cm SAD; 0.25 mm Cu + 0.55 Al Filtration; dose rate

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demonstrable antibody titer at 17 days.

Discussion. The experimental results obtained using rats show that the concentration of tetanus toxoid reactive cells in the spleen is greater than that in the thoracic duct lymph. Previous studies show that the reactive cells are probably noncirculating lymphocytes (7). The results obtained using mice show that the relative concentrations of tetanus toxoid reactive cells in the spleen and thoracic duct lymph are reversed. In the rat, an inoculum of 1×10^8 spleen cells was able to restore the primary antibody response of sublethally irradiated recipients to TTAP, but an inoculum of 2.5×10^8 thoracic duct cells was not. On the other hand, in the mouse, an inoculum of 1×10^7 thoracic duct cells or spleen cells was able to restore the antibody response. Spleen cells were less effective than thoracic duct cells. The latter finding may reflect the smaller proportion of circulating lymphocytes in the spleen of the mouse (which contains hematopoietic cells) as compared to thoracic duct lymph. Taken together, the experimental results using both rats and mice show that the distribution of antigen reactive cells can vary between species for a single antigen-antibody system.

The explanation of the different distributions of reactive cells in the two species is not clear. One possibility is that there is a single but different type of TTAP reactive cell present in each species. However, it is also possible that there are several types of TTAP reactive cells present in each species and that differences in antigen processing select out different reactive cell types. Evidence for the presence of more than one type of antigen reactive cell in the lymphoid tissues of a given species has already been reported in

studies of the secondary antibody response to SRBC in the rat (13).

Summary. The concentration of tetanus toxoid reactive cells in the spleen is greater than that in thoracic duct lymph in the rat. The relative concentrations of reactive cells are reversed in the mouse. One explanation of these results is that a single reactive cell type is different in the two species. An alternative explanation is that several reactive cell types are present in either species and that differences in antigen processing select out different reactive cell types.

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