CONTACT INTERACTION BETWEEN MAST CELLS AND LYMPHOCYTES IN ONTOGENETIC ANTIGEN-INDUCED DIFFERENTIATION AND MALIGNANT TRANSFORMATION OF LYMPHOID CELLS

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On account of biologically active degranulation products, mast cells are known to be capable of significantly modulating the functions of lymphocytes from a distance [3, 5].

The writers have shown that under certain conditions *in vitro* mast cells can join firmly and, what is particularly important, selectively, with lymphoid cells to form mast-lymphocyte rosettes (MLR) [1].

This paper gives the results of a further study of the ability of lymphoid cells and mast cells to interact by contact in various processes of differentiation.

EXPERIMENTAL METHOD

The reaction of MLR formation was carried out by the method described in [1]. The ratio of rat mast cells to lymphoid cells was 1:50 in all experiments. Lymphocytes were obtained from intact noninbred mice of different ages and also from AKR mice (normal and with trans-

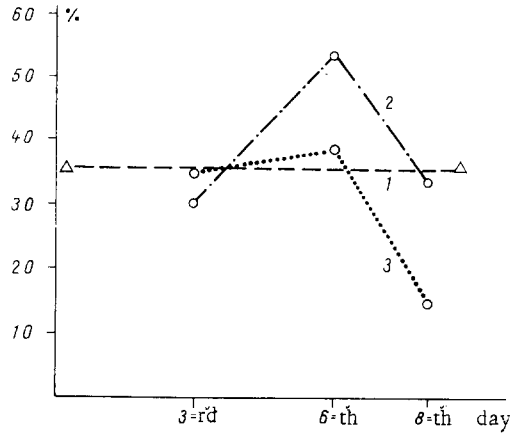

Fig. 1. Effect of subcutaneous and intraperitoneal methods of immunization on ability of mast cells to form MLR. Mast cells of: 1) intact rats, 2) rats immunized by intraperitoneal injection of 2×10^8 sheep's red blood cells, 3) rats immunized by subcutaneous injection of 2×10^9 sheep's red blood cells. Abscissa, period after immunization; ordinate, percentage of MLR.

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TABLE 1. Number of MLR Formed by Thymus and Spleen Cells of Noninbred Mice at Different Times after Intraperitoneal Immunization with Sheep's Red Blood Cells

Statistical index	Unimmunized mice		Months after immunization							
			3		6		9		15	
	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC
M	15,8	8,5	9,1	5,7	18,7	7,2	28,7	8,7	25,6	10,1
$\pm m$	1,9	0,9	2,2	0,5	3,1	1,0	4,2	—	4,3	—
n	20	19	4	4	5	5	8	8	5	5
P	—	—	<0,05	<0,02	<0,5	<0,2	<0,01	—	<0,05	—

Legend. TC) Thymus cells; SC) spleen cells

TABLE 2. Number of MLR Formed by Cells of Normal AKR Mice and of Mice with Leukemia

Statistical index	Normal mice		Mice with leukemia	
	source of cells			
	thymus	spleen	thymus	spleen
M	11,2	5,5	5,1	10,8
$\pm m$	1,0	1,6	1,7	1,0
n	5	4	5	5
P	—	—	<0,02	<0,05

planted lymphoma NK/Ly). Lymphoid cells of unimmunized noninbred mice and mast cells from Wistar rats aged 3-4 months also were used. The animals were immunized by a single intraperitoneal or subcutaneous injection of sheep's red blood cells.

The numerical results were subjected to statistical analysis [2].

EXPERIMENTAL RESULTS

Thymocytes from noninbred mice aged 3 months formed 15.8 ± 1.9% of MLR whereas thymus cells of newborn mice under the same conditions formed only 0.7 ± 0.3% of MLR.

Meanwhile mast cells of newborn rats formed MLR just as effectively as cells from adult animals.

When thymocytes from 3-month-old mice were heated to 45°C for 1 h, leading to removal of receptor structures from the surface of the cells [4], they lost their ability to form MLR.

The ability of lymphoid cells from the thymus and spleen to form MLR varied significantly in the course of immunization of the animals (Table 1). As this table shows, on the 3rd day after immunization the ability of thymocytes to form MLR was reduced compared with cells of normal animals, by the 6th day it was restored, and by the 9th-15th day it was significantly increased. The ability of splenocytes to form MLR was significantly altered only on the 3rd day of immunization. Lymph-node and bone-marrow cells of immunized animals formed the same number of MLR as cells of normal mice (4-6%).

In one series of experiments the effect of intraperitoneal and subcutaneous methods of immunization on the ability of mast cells to form rosettes with intact thymocytes was compared (Fig. 1). After intraperitoneal injection of the antigen the number of rosette-forming mast cells was found to be increased, especially 6 days after immunization, and it was significantly reduced compared with the control (mast cells of unimmunized rats) after subcutaneous injection of the same dose of sheep's red blood cells.

Lymphoid cells from 3-month-old AKR mice formed rather fewer MLR than the corresponding cells of noninbred animals. However, their thymocytes, like thymocytes of noninbred mice, formed about twice as many MLR as splenocytes. These values were reversed for mice with

leukemia both on account of reduced ability of the thymocytes to form MLR and on account of increased ability of the splenocytes in this respect (Table 2). The ability of bone marrow, lymph node, and peritoneal exudate cells to form MLR was unchanged in mice with leukemia.

The results described above suggest that MLR are formed because of the presence of complementary receptors on the plasma membrane of lymphocytes and mast cells; these receptors appear on mast cells actually during embryogenesis, whereas on lymphocytes they are synthesized during postnatal development.

The fact that immunization significantly affects the ability of mast cells and lymphocytes to form MLR suggests that the process of contact interaction between these cells is directly related to cooperation between cells participating in regulation of the immune response. Very probably during direct contact between mast cells and lymphoid cells the most effective modulation of function of the latter is achieved, even in cases when biologically active degranulation products have not yet accumulated in the intercellular space.

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