ANTIBODY-FORMING ABILITY OF SPLEEN CELLS OF PARTIALLY HEPATECTOMIZED MICE AT VARIOUS TIMES OF REGENERATION OF THE LIVER

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UDC 612.411.017.1-06:[612.359+612.359+612.35:612.6.0

The antibody-forming capacity of the spleen cells of partially hepatectomized mice was investigated at various times after resection of the liver. The number of antibody-forming cells in the spleen of recipients of lymphocytes from donors sacrificed 4, 17-18.5, and 19-21 h after hepatectomy was significantly higher than in recipients of lymphocytes from the spleen of intact donors. The antibody-forming capacity of the spleen cells 50-51 h after the operation was the same as in the control. The increase in antibody-forming capacity of the spleen cells of partially hepatectomized mice coincides in time with the appearance in these animals of the ability to induce proliferation in the liver of intact animals.

Splenic lymphocytes of partially hepatectomized mice at certain periods of regeneration of the liver (4-26 h) have the ability to stimulate proliferation in the liver of intact syngeneic recipients [1, 2]. The acquisition of these properties by lymphocytes has been shown not to depend directly on the number of stem cells in the spleen of the hepatectomized mice [3].

The level of antibody production in partially hepatectomized animals is higher than in intact animals [4, 6, 10, 12]. This makes it interesting to study to what extent the activity of spleen cells in stimulating proliferation is related to changes in the antibody-forming ability of the spleen. The present investigation was carried out to study antibody-forming capacity of the spleen cells of partially hepatectomized mice at times when they are, on the one hand, most capable and, on the other hand, only slightly capable of stimulating cell proliferation.

EXPERIMENTAL METHOD

Experiments were carried out on 128 male (CBA × C57BL/6) F_1 mice weighing 20-22 g from the Stolbovaya nursery, Academy of Medical Sciences of the USSR.

Two-thirds of the liver was removed from some mice [7]. The animals were killed, 5, 17-18.5, 19-21, and 50-51 h after the operation. A cell suspension was prepared from the spleens of 5-7 animals. The spleen cells were injected intravenously into lethally irradiated recipients. Spleen cells from intact animals were injected into control irradiated recipients. Simultaneously with transplantation of the cells into the recipients, 200 million sheep's red cells were injected into them intravenously. On the 8th day after transplantation of the cells and immunization the number of plaque-forming cells in the spleen of the recipients was determined by Jerne's method [8]. The significance of the numerical indices was determined by the Fisher–Student method.

Laboratory of Experimental Genetics, Institute of Medical Genetics, Academy of Medical Sciences of the USSR, Moscow. Laboratory of Growth and Development, Institute of Human Morphology, Academy of Medical Sciences of the USSR, Moscow. (Presented by Academician of the Academy of Medical Sciences of the USSR A. P. Avtsyn.) Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 76, No. 12, pp. 51-53, December, 1973. Original article submitted February 13, 1973.

TABLE 1. Number of Plaque-Forming Cells in Spleen of Irradiated Mice Receiving Injections of Spleen Cells of Partially Hepatectomized Mice

Time after partial hepatectomy (in h)	Group of recipients	Number of recipients	Number of PFU (M ± m)	P
4	Control	3	2000±360	0,034
	Experimental	15	4100±421	
17—18½	Control	9	2113±544	0,002
	Experimental	9	5452±747	
19—21	Control	6	1956±344	0,000
	Experimental	12	6899±716	
50—51	Control	7	2168±270	0,1
	Experimental	20	1888±394	

EXPERIMENTAL RESULTS

The results are given in Table 1. The number of antibody-forming cells accumulating in the spleen of recipients receiving spleen cells of partially hepatectomized donors and killed 4 h after the operation was twice as great as in the control (P = 0.034).

The antibody-forming capacity of the splenic lymphocytes at rather later periods of regeneration, i.e., 17-18.5 and 19-21 h after the beginning of regeneration of the liver, was increased still further. The number of antibody-forming cells in the spleen of recipients of splenic lymphocytes from mice with a regenerating liver 17-18.5 and 19-21 h after the operation was 2.6-3.5 times greater than in the control recipients (P = 0.002 and 0.001).

Splenic lymphocytes of hepatectomized mice 4-21 h after the operation were most capable of stimulating proliferation in the liver of intact recipients [1, 2].

Transplantation of spleen cells 50-51 h after the operation, when the splenic lymphocytes of hepatectomized mice had lost their ability to stimulate proliferation in the liver of the intact animals, led to the accumulation of approximately the same number of antibody-forming cells in the recipients's spleen as after transplantation of spleen cells from intact animals.

Comparison of the results of this investigation of the change in number of antibody-forming cells in the spleen of hepatectomized mice with those of the previous investigation of the change in colony-forming activity of the spleen cells [3] suggests that there is no strict correlation between these parameters.

Other workers have reached the same conclusion [5]. Nevertheless, such a verdict is merely relative in importance, for the manifestation of maximal production of antibody-forming cells [5] requires optimal proportions at least of cells of bone-marrow origin (B-cells) and of thymus-dependent cells (T-cells) [9-11].

The acquisition of the ability to stimulate proliferation in the liver of intact recipients by the splenic lymphoid tissue of hepatectomized mice coincides in time with an increase in the antibody-forming function of the spleen in the hepatectomized animals. These results indicate indirectly that the transmission of proliferative information [1, 2] may be connected with immune mechanisms.

It is an important fact that the antibody-forming capacity of the spleen cells of hepatectomized mice does not remain constant over the relatively short period of liver regeneration but varies shortly in the course of the first 48 h after the operation.

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