3. A. A. Mikhailova, R. V. Petrov, and L. V. Zakharova, Dokl. Akad. Nauk SSSR, 197, No. 1, 209 (1971).
4. R. V. Petrov, R. M. Khaitov, and R. I. Ataullakhanov, Dokl. Akad. Nauk SSSR, 197, No. 7, 56 (1971).
5. R. V. Petrov, R. M. Khaitov, and R. I. Ataullakhanov, Zh. Obshch. Biol., 39, No. 4, 572 (1978).
6. R. V. Petrov, R. M. Khaitov, and A. A. Batyrbekov, Zh. Obshch. Biol., 226, No. 6, 1146 (1976).
7. R. V. Petrov, R. M. Khaitov, and B. B. Fuks, Zh. Mikrobiol., No. 4, 6 (1978).
8. A. K. Duwe and S. K. Singhal, in: Immune Reactivity of Lymphocytes, New York (1976), p. 607.
9. A. K. Duwe and S. K. Singhal, Cell. Immunol., 43, 362 (1979).
10. R. A. Fox and K. Rajaraman, Cell. Immunol., 47, 69 (1979).
11. M. George and J. Vaughan, Proc. Soc. Exp. Biol. (N.Y.), 111, 514 (1962).

CHANGES IN PARAMETERS OF IMMUNITY IN INTACT AND PARTIALLY HEPATECTOMIZED MICE AFTER TRANSPLANATION OF SPLEEN CELLS FROM HYPOKINETIC DONORS

S. E. Li, T. A. Ivanets, and G. V. Turchenko

UDC 616.45-001.1/3 + 612.917.11/12

KEY WORDS: stress; immunity; hypokinesia.

Spleen cells are known to transfer "regeneration information" from animals undergoing operations to intact recipients [1-3].

The writers have studied the state of the immunocompetent system in hypokinetic mice and have studied whether features of a stress state can be transferred from an animal exposed to hypokinesia [5] to recipients by the aid of splenic lymphocytes.

EXPERIMENTAL METHOD

Male (CBA × C57BL/6)F_1 hybrid mice weighing 20-22 g were used. The donors of spleen cells were kept in hypokinetic cages [4] for 17 h. A suspension of lymphocytes was prepared from the spleen in medium 199 and injected intravenously in a dose of 5×10^7 cells per mouse. Intact mice and animals from which two-thirds of the liver was resected under ether anesthesia [9] served as recipients. Splenocytes were injected into the hepatectomized mica 1 h after the operation. Intact and partially hepatectomized mice (PHM) receiving splenocytes from intact donors (SID), and intact and hepatectomized mice not subjected to any other procedure were used as the control. The animals were killed 1 and 7 days after transplantation of splenocytes at 8-10 a.m. by cervical dislocation. Altogether 120 donors were used and 158 recipients tested. In each group, consisting of 6-9 animals, the thymus and spleen were weighed. The state of the immunocompetent system was assessed by the number of spontaneous rosettes in the animals' blood in the E- and EAC-rosette-formation (E-RFC and EAC-RFC) tests [8]. The results were subjected to statistical analysis by the Fisher—Student method.

EXPERIMENTAL RESULTS

Hypokinesia for 17 h caused a decrease in weight of the spleen compared with the control by 1.6 times and of the thymus by 2.5 times. A tendency for the weight of the spleen to recover was observed 24 h after hypokinesia, but the weight of the thymus remained smaller as before. The weight of both organs returned to normal at the 7th day of the recovery period.

Department of Physiology and Pharmacology, Institute of Marine Biology, Far Eastern Center, Academy of Sciences of the USSR, Vladivostok. (Presented by Academician of the Academy of Medical Sciences of the USSR A. P. Avtsyn.) Translated from Byulleten' Éksperimental'noi Biologii i Meditsiny, Vol. 99, No. 4, pp. 464-465, April, 1985. Original article submitted July 6, 1984.

TABLE 1. Number (in %) of Spontaneous Rosettes in Blood of Mice at Different Times after Hypokinesia for 17 h

Experimental conditions	E-RFC	EAC-RFC
Hypokinesia for 17 h	34,2±5,41	14,1±3,81
	37,3±8,98	15,5±4,79
Recovery period:		
1st day	26,4±6,03	4,81±0,43
	15,7±3,48	5,33±0,67
7th day	37,0±6,03	6,91±0,92
	17,8±2,49	6,91±1,18
Intact recipients		
1st day		
Intact animals	37,3±1,74	11,9±2,61
Recipients of SID	11,8±1,85	14,8±1,66
» SHD	39,3±6,77	11,7±1,41
7 th day		
Intact animals	39,1±4,25	18,2±3,14
Recipients of SID	35,7±3,65	19,9±2,02
» SHD	22,7±4,04	9,6±2,29
PHM recipients		
1st day		
PHM	25,3±2,99	1,7±0,82
PHM recipients of SID	19,4±2,16	4,3±0,56
PHM recipients of SHD	31,3±4,41	6,1±0,85
7 th day		
PHM	29,2±4,04	9,4±1,96
PHM recipients of SID	28,4±2,16	8,4±1,81
PHM recipients of SHD	18,1±2,53	3,8±0,78

Legend. Above the line — control, below the line — experiment.

The weight of the spleen at this time, however, was significantly higher than in the control (Fig. 1).

Transfer of splenocytes of hypokinetic donors (SHD) into intact recipients led to a significant decrease in the weight of the spleen and thymus in the latter on the 1st day after transplantation. After 7 days the experimental parameters were indistinguishable from the control.

Immobilization of the animals also was reflected in the spleen cell population. Meanwhile there was no change in the number of EAC-RFC. Consequently, hypokinesia led to involution of the lymphoid organs and to a shift of the immune status of the animal.

Investigation of responses of immunocompetent cells of intact recipients showed that their number in the blood depended on the times of transplantation of the spleen cells and the type of donors. For instance, on the 1st day after transfer of SID a fall in the number of E-RFC was observed, but later it returned to normal. SHD initially did not change the number of E-RFC and EAC-RFC, but on the 7th day there was a considerable decrease in the number of spontaneous rosettes of both types.

A decrease in the number of E-RFC and EAC-RFC also was produced in PHM recipients of SHD on the 7th day after transplantation. However, unlike intact recipients, they did not show any significant increase in the number of immune cells in the initial stage after transfer of splenocytes. These results agree with data in the literature [6] on an increase in the lymphocyte count in the early stages of stress, followed by a decrease. Partial hepatectomy itself significantly reduced the number of EAC-RFC in the peripheral blood. This is further information demonstrating the important role of the liver in the animal's immune status [10-12].

The present experiments were undertaken on syngeneic animals, so that the changes discovered are not a reflection of transplantation immunity [7]. Since similar fluctuations in

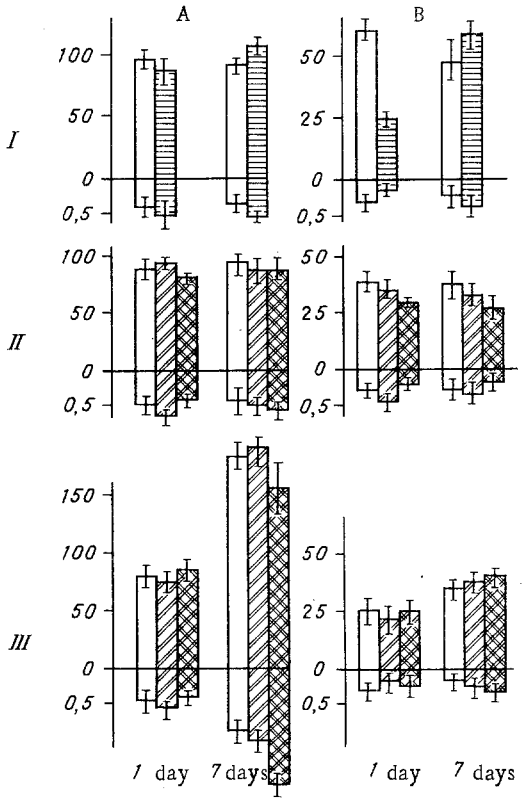

Fig. 1. Weight of spleen (A) and thymus (B) of mice of different groups. I) After hypokinesia for 17 h; II) intact recipients of SHD; III) PHM receiving SHD. Vertical axis: above abscissa, absolute weight of organ (in mg); below abscissa, relative weight (in %). Horizontal axis: times (in days): unshaded columns — control; horizontally shaded — after hypokinesia; obliquely shaded — recipients of SID; cross-hatched — recipients of SHD.

the weight of the lymphoid organs and the number of immunocompetent cells took place not only in recipients of SHD, but also in the hypokinetic mice themselves, these reactions can explain the ability of spleen cells of stressed mice to transfer "information on the state of the body" in the same way as splenocytes of partially hepatectomized donors transfer "regeneration information" to nonhepatectomized or irradiated recipients [1-3].

LITERATURE CITED

1. A. G. Babaeva, Immunologic Mechanisms of Regulation of Repair Processes [in Russian], Moscow (1972).
2. A. G. Babaeva, N. A. Kraskina, and L. D. Liozner, Byull. Éksp. Biol. Med., No. 7, 91 (1969).
3. A. G. Babaeva, N. A. Kraskina, and L. D. Liozner, Tsitologiya, 11, No. 12, 1511 (1969).
4. V. A. Ermol'ev and L. V. Tindare, Arkh. Anat., 76, No. 2, 24 (1979).
5. O. I. Kirilov, Cellular Mechanisms of Stress [in Russian], Vladivostok (1973).
6. A. D. Makaricheva, Immunologic Processes and Pregnancy [in Russian], Novosibirsk (1979).
7. R. V. Petrov, Immunology [in Russian], Moscow (1982).
8. K. B. Yudin, in: New Methods of Research in Clinical and Experimental Medicine [in Russian], Novosibirsk (1980), p. 104.
9. G. M. Higgins and R. M. Anderson, Arch. Pathol., 12, 186 (1931).
10. T. Umiel, Adv. Exp. Med. Biol., 66, 565 (1976).
11. T. Umiel and N. Trainin, Cell. Immunol., 23, 232 (1976).
12. D. Vuitton, C. Trepo, and R. Eloy, Gastroent. Clin. Biol., 1, 799 (1977).