

EXPERIMENTAL GENETICS

EFFECT OF THYMUS CELLS ON PROLIFERATION OF HEMATOPOIETIC STEM CELLS OF MICE OF THE PARENTAL LINE IN THE SPLEEN OF FIRST-GENERATION HYBRID RECIPIENTS

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Bone-marrow cells of C57BL mice were injected either separately or together with thymus cells of F_1 mice or of C57BL mice of various ages (10 days, 3-12 months) into $(CBA \times C57BL)F_1$ mice irradiated in a dose of 850 R. The number of exogenous splenic colonies of hematopoietic cells formed by the hematopoietic stem cells after combined transplantation with syngeneic thymus cells was considerably increased by comparison with values obtained when bone-marrow cells alone or bone-marrow cells and thymus cells of $(CBA \times C57BL)F_1$ mice were injected. The degree of increase in the number of splenic colonies was found to be independent of the age of the C57BL mice used as donors of the thymus cells.

Combined injection of bone marrow cells and thymus cells of the parental line of mice into F_1 hybrids has been shown to cause a more substantial increase in the number of splenic colonies of hematopoietic cells formed by the stem cells of the donor's bone marrow than after transplantation of bone-marrow cells alone [2].

This paper describes a study of the effect of thymus cells from C57BL mice of different ages on proliferation of the polypotent hematopoietic bone-marrow stem cells of animals of the same line in the spleen of lethally irradiated $(CBA \times C57BL)F_1$ mice.

EXPERIMENTAL METHOD

C57BL and $(CBA \times C57BL)F_1$ mice obtained from the "Stolbovaya" nursery of laboratory animals, Academy of Medical Sciences of the USSR, were used. The number of polypotent hematopoietic stem cells was estimated from the number of exogenous splenic colonies of hematopoietic cells by the method of Till and McCulloch [3], for which purpose $0.16 \cdot 10^6$ bone-marrow cells of C57BL mice were injected into 3-month-old $(CBA \times C57BL)F_1$ recipients 4 h after these animals had been irradiated in a dose of 850 R; in some experiments these cells were injected separately, but in others together with $20 \cdot 10^6$ thymus cells obtained from C57BL mice aged 10 days or 3 and 12 months and from $(CBA \times C57BL)F_1$ mice aged 3 months. On the ninth day after irradiation the recipients were killed, the spleens removed, fixed in a mixture of acetic acid and ethyl alcohol (1:3), after which the number of exogenous colonies was counted. The animals were irradiated on the RUD-200-20-3 apparatus: dose rate 50 R/min, voltage 180 kV, filter 3 mm Al. The significance of the results was assessed by Student's method. The experiments were repeated.

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TABLE 1. Number of Colonies of Hematopoietic Cells in the Spleen of Lethally Irradiated (CBA \times C57BL) F_1 Mice Receiving Injection of Bone-Marrow Cells of C57BL Mice either Separately or Together with $20 \cdot 10^6$ Thymus Cells of C57BL Mice of Different Ages or from (CBA \times C57BL) F_1 Mice

Cells Injected	Number of Animals	Number of exogenous splenic colonies of hematopoietic cells calculated per 0.16×10^6 injected bone-marrow cells
Bone-marrow cells of C57BL mice	24	12.3 (8.7-15.9)
The same +thymus cells of F_1 mice	21	13.8 (11.1-16.5)
The same +thymus cells of 10-day C57BL mice	18	23.3 (19.4-27.2)
The same +thymus cells of 3-month C57BL mice	10	22.3 (19.0-25.5)
The same +thymus cells of 12-month C57BL mice	19	19.3 (16.1-22.5)

Note. Confidence limits shown in parentheses.

EXPERIMENTAL RESULTS

As Table 1 shows, thymus cells of (CBA \times C57BL) F_1 mice did not affect the number of colonies formed by the bone-marrow cells of C57BL mice when transplanted together into lethally irradiated (CBA \times C57BL) F_1 mice. At the same time, the combined injection of bone-marrow and thymus cells of C57BL mice led to a large increase in the number of exogenous splenic colonies compared with the number obtained after injection of bone-marrow cells only. The increase in the number of colonies was found to be approximately the same regardless of the age of the mice donating the thymus cells.

The results thus indicate that the combined transplantation of thymus and bone-marrow cells of C57BL mice into lethally irradiated (CBA \times C57BL) F_1 mice leads to an increase in the number of splenic colonies of hematopoietic cells formed by the hematopoietic stem cells of the bone marrow of C57BL mice.

It can be postulated on the basis of these results that cells of the medulla of the thymus possess the property of increasing the number of colonies, for we know that the ratio of the number of cortical cells to the number of medullary cells in the thymus decreases in old animals [1], and it follows from the results of the present investigation that the thymus cells of old and young mice are equally effective in increasing the number of splenic colonies.

LITERATURE CITED

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