CYTOTOXIC ACTION OF SPLEEN CELLS OF UNIRRADIATED AND IRRADIATED RABBITS

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Spleen cells of rabbits irradiated with Co^{60} γ-rays (800 R), taken between the 3rd and 12th days after irradiation, when injected into the skin of the ear of intact rabbits, caused a marked and prolonged local inflammatory response. A similar, but weaker action is given by spleen cells of rabbits with homografted skin. Spleen cells of normal rabbits do not possess this effect.

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Changes in reactivity of the irradiated animal are shown by the formation of autoantibodies [1, 3, 4] and by the development of a hyperergic response to the disintegration products of the animal's own cells [2].

In the present investigation the direct effect of living lymphoid cells of an irradiated animal on the skin of unirradiated animals of the same species was studied by the method of Brent, and Medawar [5, 6].

EXPERIMENTAL METHOD

Experiments were performed on 42 male rabbits weighing 3-3.5 kg during the winter. The spleen cell donors were animals irradiated with Co^{60} γ-rays (ÉGO-2 apparatus, dose rate 160-180 R/min) in a dose of 800 R, used in the experiment 3-12 days (group 2) and 3 months (group 3) after irradiation, and animals with skin homografts (group 4). The controls were unirradiated rabbits (group 1). A freshly prepared suspension of spleen cells (5-12 million) in physiological saline was washed once and then injected into the skin of the ear (into the right ear of the experimental donors and the left ear of the controls).

The dynamics of the local reaction was studied for 6-8 h and again during the subsequent 3-5 days.

TABLE 1. Area* of Maximal Local Reaction (in cm^2) After Injection of Spleen Cells from Various Donors Irradiated with Co^{60} γ-Rays into Healthy Rabbits

Group	Rabbits from which spleen cells obtained	No. of recipient rabbits	Area of reaction	
			M±m	P
1	Healthy, unirradiated	14	1,1±0,1	—
2	Irradiated in dose of 800 R, 3-12 days before experi	12	5,3±0,1	0,01
3	Irradiated in dose of 800 R, 3-12 days before experiment	5	2,1±0,2	>0,5
4	With skin homografting 3 months before experiments	5	4,8±0,06	<0,01

*To calculate the area the product of two mutually perpendicular diameters of the reaction zone was obtained.

Fig. 1. External appearance of skin reaction on the ear of a healthy unirradiated rabbit after injection of a suspension of spleen cells of an irradiated rabbit (right ear) and an unirradiated rabbit (left ear) with number plate.

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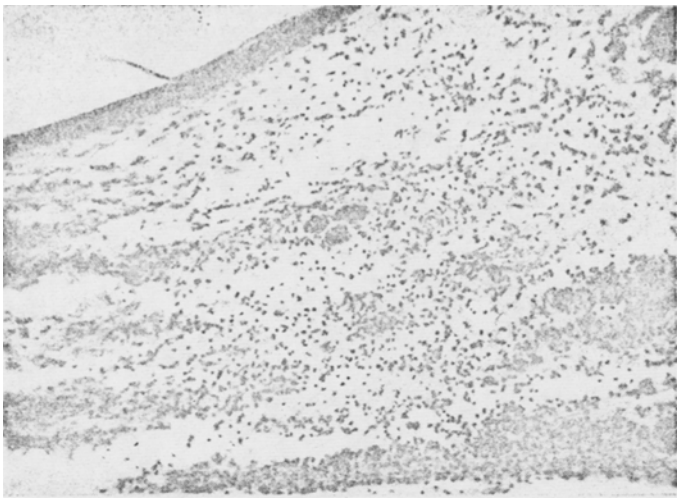

Fig. 2. Preparation from site of injection of spleen cells on an unirradiated rabbit. Moderate leucocytic infiltration, slight edema and hyperemia. Hematoxylin-eosin, 800 ×.

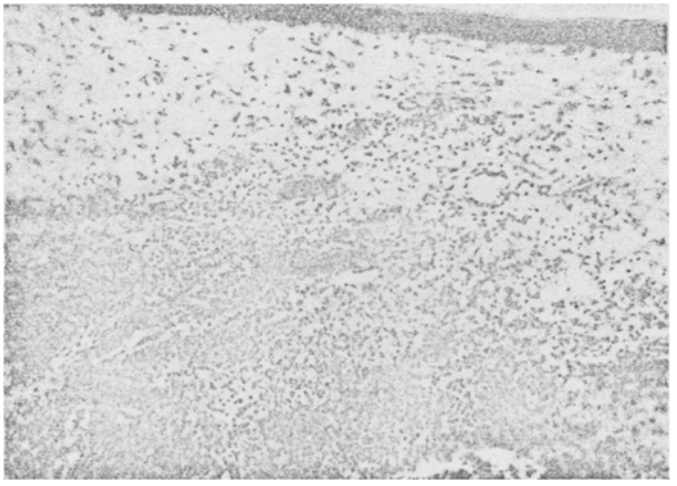

Fig. 3. Preparation from site of injection of spleen cells of an irradiated rabbit. Marked hyperemia, hemorrhage, abundant leucocytic infiltration, foci of necrosis, and considerable tissue edema, 800 ×.

EXPERIMENTAL RESULTS

As Table 1 shows, the severest local reaction was observed after injection of spleen cells taken between the 3rd and 12th days after irradiation (Fig. 1). The hyperemia and edema reached their maximum 4-5 h after injection. At the center of the inflammatory focus, hemorrhages appeared. Regression took place in the course of 2-3 days. Injection of the serum of the same donors (0.1 ml), as also of the serum of unirradiated animals, caused the development of only slight hyperemia, disappearing 8-12 h later. In histological preparations moderate leucocytic infiltration, hyperemia, and slight edema were observed at the site of injection of cells from unirradiated rabbits (Fig. 2). At the site of injection of spleen cells of irradiated animals marked edema and hyperemia were found, together with foci of necrosis and accumulation of nemerous leukocytes (Fig. 3).

This method (the transfer reaction) was suggested by Brent and co-workers to detect cytotoxic antibodies fixed on cells. The immunologic character of the studied response is confirmed by its presence in animals with grafted skin. However, participation of toxic products arising in the cells of the irradiated animal in this phenomenon may also be postulated.

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