

HALF-ELIMINATION PERIOD OF HEMAGGLUTININS IN INTACT AND IRRADIATED CBA MICE

I. V. Petrova

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Considerable experimental evidence has now been obtained to show that passive immunity suffers less disturbance than active as a result of the action of ionizing radiation on the body [1-3].

It has been shown that the duration of circulation of antibodies, injected into irradiated animals, is basically the same as in normal conditions [2, 4]. However, the author knows of no experiments in which accurate calculations have been made and the half-elimination periods of antibodies compared in normal and irradiated animals in the conditions of an isologous system (donor of immune globulins - recipient). The experiments cited above were carried out on noninbred animals, i.e., in conditions in which the fate of the injected γ -globulins depended largely on the presence or absence of an immune reaction against nonisologous proteins in the investigated animals.

The object of this investigation was to study the rate of elimination of hemagglutinins from animals with radiation sickness of varied degrees of severity in conditions when the γ -globulins of the donor corresponded to those of the recipient.

EXPERIMENTAL METHOD

Experiments were carried out on female CBA mice weighing 18-19 g. Altogether 45 animals, divided into four groups, took part in the experiments. The animals of three groups were irradiated with γ rays from Co^{60} on a Gammacell-200 apparatus (dose rate 100 R/sec): the mice of group 1 (10) in a dose of 160 R, group 2 (10) in a dose of 330 R, and group 3 (because of the possible death of these animals, this group contained 15 mice) in a dose of 660 R. The controls were ten intact animals of the same line. Immediately after irradiation all the mice received an injection of 0.5 ml of isologous immune serum with a titer of hemagglutinins against sheep's erythrocytes of 1:40,000. The serum was obtained by double intraperitoneal immunization of CBA mice with a 3% suspension of sheep's erythrocytes at an interval of 1.5 months. Every 2-3 days after injection of the isologous serum, 0.1-0.15 ml of blood was taken from each animal by puncture of the retroorbital sinus. The serum obtained by centrifugation was kept at -25° until needed for the investigation. The titers of hemagglutinins were determined individually in each animal in the direct hemagglutination reaction by the usual method [5]. The reaction was assessed by a four-point system, and for analysis of the results, logarithms were taken of the values of the antibody titers and expressed as whole logarithms to base 2.

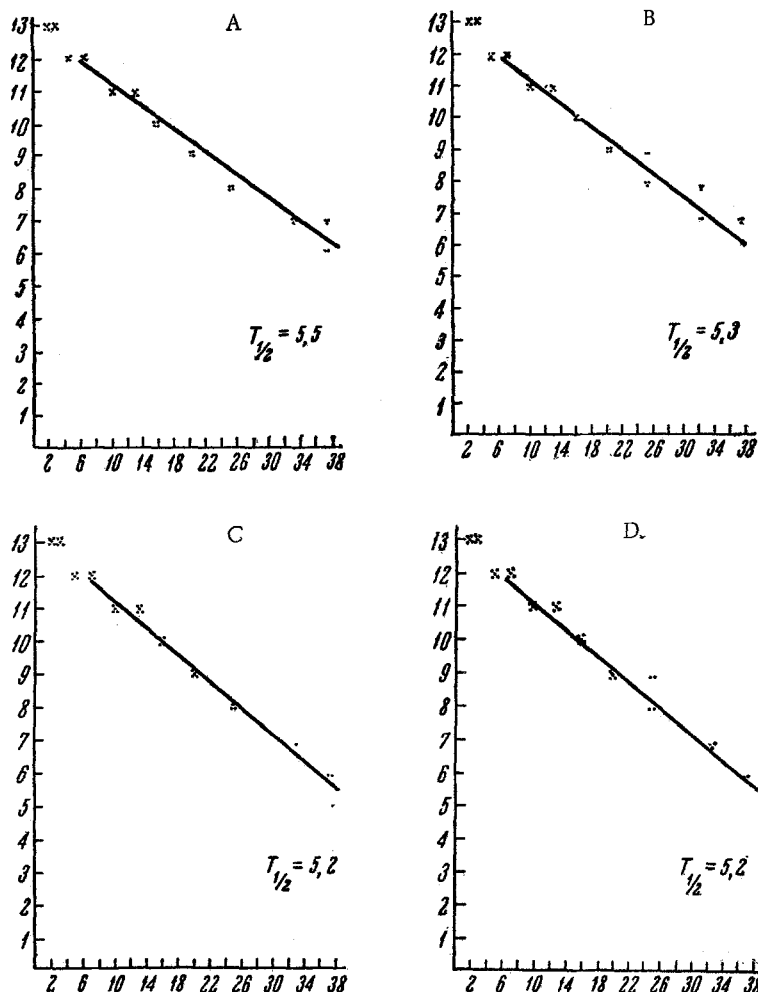
EXPERIMENTAL RESULTS

The changes in the titer of passively injected hemagglutinins were studied for 37 days. The results showed that the intraperitoneal injection of 0.5 ml of hyperimmune serum into the animals led to the circulation of hemagglutinins in the blood which were active on the 2nd day after injection in serum diluted 1:8000. From the 7th to the 37th day the titer of antibodies in the blood fell in a straight line (see figure, A). The half-elimination period of antibodies in the intact CBA mice in the same period was 5.5 days in these experiments, confirming the experimental observations of Davies and co-workers [6].

Death of the irradiated animals was observed only after a dose of 660 R; 3 of the 15 mice died on the 7th-9th days.

Irradiation had no significant effect on the rate of elimination of the immune γ -globulins. The curve of elimination of antibodies from the irradiated animals practically coincided with that in the control series

Laboratory of Radiation Immunology, Department of General Radiobiology and Radiation Genetics, Institute of Medical Radiology, Academy of Medical Sciences of the USSR, Obninsk (Presented by Active Member of the Academy of Medical Sciences of the USSR G. A. Zedgenidze). Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 63, No. 4, pp. 74-76, April, 1967. Original article submitted July 25, 1965.



Elimination of isologous hemagglutinins in intact and irradiated CBA mice. A) Intact mice; B-D) mice irradiated in doses of 160, 330, and 660 R respectively. Along the axis of ordinates — logarithm of titer of antibodies to base 2; along the axis of abscissas — days of investigation.

(see figure B-D). The half-elimination period of the antibodies from the animals irradiated in doses of 160, 330, and 660 R was 5.3, 5.2, and 5.2 days respectively.

The results of these experiments showed that irradiation in the doses mentioned does not affect the rate of elimination of immune γ -globulins. This is particularly interesting because irradiation is accompanied by a decrease in the concentration of serum proteins [7], associated in the later stages also with a decrease in the concentration of γ -globulins. As the present experiments show, this latter phenomenon was evidently caused by depression of the synthesis of γ -globulins against the background of a practically unchanged catabolism of these substances.

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