Our own observations, revealing a decrease in the number of proerythroblasts and basophilic erythroblasts 24 h after injection of the MMW fraction suggest that it acts on the ESC. These data are in agreement with the results of studies of the effect of uremic serum on erythropoiesis in polycythemic mice [1]. Those investigations showed that on the 1st day after injection of erythropoietin the number of erythroblasts in the bone marrow was increased by 100%, but when uremic serum was injected together with erythropoietin there was no stimulation.

The results of investigations on intact mice thus demonstrated the specificity of action of the MMW fraction isolated from the serum of patients with CRF on erythropoiesis. Its effect is exhibited on the early stage of the erythron, for inhibition of cells of the erythroid series was observed 24 h after injection, with a maximal decrease on the 2nd day. The results of this investigation indicate an important role of substances with MMW in the pathogenesis of nephrogenic anemia.

LITERATURE CITED

1. V. I. Gudim, P. Sigalla, G. P. Moskaleva, et al., Patol. Fiziol., No. 5, 61 (1979).
2. V. I. Gudim, P. Sigalla, V. S. Ivanova, et al., Byull. Éksp. Biol. Med., No. 5, 592 (1980).
3. N. A. Moiseeva, The Kidneys and Erythropoiesis [in Russian], Leningrad (1970).
4. N. A. Tomilova, T. I. Koretskaya, V. I. Gudim, et al., Patol. Fiziol., No. 1, 54 (1978).
5. E. Filmanowicz and C. W. Gurney, J. Lab. Clin. Med., 57, 65 (1961).
6. L. G. Lajtha, B. J. Haematol., 29, 529 (1975).
7. J. Moriyama and J. W. Fisher, Blood, 45, 659 (1975).

EFFECT OF IMMOBILIZATION OF MICE DIFFERING IN RADIOSENSITIVITY AND OF SCREENING PART OF THEIR BONE MARROW ON SURVIVAL RATE AND SPLENIC COLONY FORMATION AFTER IRRADIATION

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KEY WORDS: bone marrow; screening; immobilization; colony formation in spleen; irradiation.

Counting colonies in the spleen is regularly used to judge recovery of hematopoiesis in mice after irradiation. It is considered that direct correlation exists between the survival rate of the animals and the number of colonies formed in the spleen (within the dose range inducing a hematopoietic syndrome) [6, 7]. However, investigations have shown that changes in survival rate under the influence of protective agents are not accompanied by any corresponding increase (or decrease) in the number of developing splenic endocolonies [1, 8]. The characteristics of correlation between survival and colony formation have been described when age changes in survival rate in mice were compared with colony development after irradiation, and also when colony formation was compared in mice of radioresistant and radiosensitive lines [3, 5]. Restoration of hematopoiesis in radioresistant mice, in which a low level of colony formation was observed, was explained by the authors cited as a result of the greater regenerative activity of the stem cells [4].

To determine the more exact limits to the use of splenic colony counting as a test of survival of mice and to reveal the effects of various factors increasing survival of irradiated mice, the investigation described below was carried out to study dependence of survival rate and splenic endocolony formation on dose in relatively radiosensitive noninbred albino mice and in mice of the radioresistant (CBA × C57BL)F_1 line when their survival was increased by two different methods: by restricting the animals' mobility (immobilization) by tying them to a frame during irradiation, and by screening part of the bone marrow (one leg).

EXPERIMENTAL METHOD

Male noninbred albino mice (700 animals) and (CBA × C57BL)F_1 hybrids (1000 mice) aged 3 months were used in the investigation. Irradiation was given on the RUM-17 apparatus in doses of 4.1-11.4 Gr (dose rate 1.0 Gr/min; voltage

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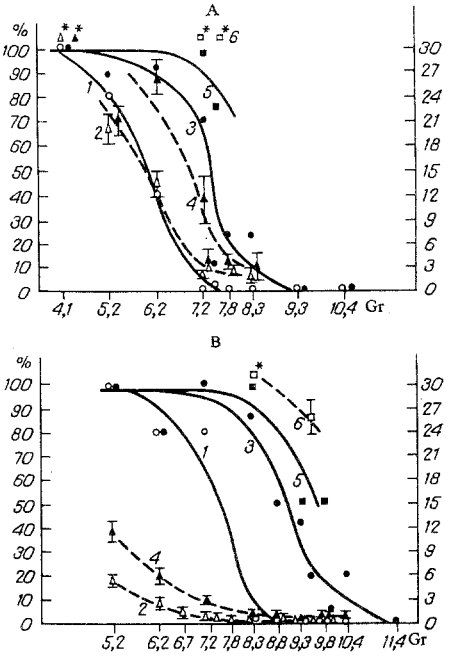

Fig. 1. Dose dependence of survival during 30 days and number of endocolonies (M ± m) in spleen of noninbred mice (A) and (CBA X C56BL)F_1 hybrid mice (B) after total and subtotal irradiation. 1) Survival rate, 2) number of colonies in mice irradiated without immobilization; 3) survival rate, 4) number of colonies in irradiated, immobilized mice; 5) survival rate, 6) number of colonies in screened, immobilized mice. Abscissa: dose of irradiation (in Gr); ordinate: on left – survival rate during 30 days (in percent), on right – mean number of splenic endocolonies. Points correspond to mean values obtained in experiments on 10-50 animals to study survival and on 5-25 mice to study colony formation. Asterisk denotes number of colonies greater than 30 (confluent growth).

200 kV, current 16 mA, filters 1.5 Cu + 1.0 Al, focus-skin distance 60 cm). Mortality among the mice was counted during 30 days after irradiation. Endocolony formation in the spleen was recorded on the 8th day after irradiation. Macroscopically visible colonies were counted in spleens fixed in Bouin's solution. In experiments with screening of the limb, one leg of the animal was placed during irradiation in a lead sleeve, the walls of which were 4 mm thick. Mice were immobilized by tying them to a frame during irradiation. Animals irradiated without immobilization were kept in Plexiglass boxes. Survival rate and number of colonies were determined in several repeated experiments using the same dose of irradiation.

EXPERIMENTAL RESULTS

Survival of the radiosensitive noninbred mice (Fig. 1A) and the radioresistant hybrids (Fig. 1B) differed significantly. The value of $LD_{50/30}$ for the former was 5.9 Gr and for the latter 7.7 Gr. These figures were obtained when the animals were irradiated without immobilization. As might be expected [2], immobilization of the animals during irradiation considerably increased their resistance. It is important to note that the increase in survival rate was about equal in the two groups: It was increased by approximately 24% ($LD_{50/30}$ was 7.4 and 9.1 Gr, respectively). Curves of survival and colony formation in noninbred mice (Fig. 1A), irradiated with or without immobilization, followed a parallel course throughout their length. In the inbred mice (Fig. 1B) different relationships between survival and colony formation were found. In doses only just causing death (4.7-6.2 Gr without immobilization, 5.2-5.7 Gr with immobilization) 3-7 times fewer splenic colonies were formed than in noninbred mice with the same survival rate. With an increase in dose the number of colonies fell, reaching almost zero, whereas the survival rate still remained high (80-90%), unlike the noninbred mice.

The number of colonies in noninbred mice thus correlated with the dose of irradiation, whether the animals were irradiated with or without immobilization, whereas in inbred mice, whether immobilized or not during irradiation, if given sublethal doses relatively few splenic colonies were formed. (When the number of colonies fell practically to zero, the survival rate of the inbred mice still remained high.)

Screening one leg caused a considerable increase in survival rate in the mice of both groups. The question arises: Does the level of colony formation remain relatively low with an increase in survival in the radioresistant mice in accordance with their nature, or do the relations between survival rate and colony formation change under these conditions?

The experiments showed that the number of colonies reached high values not only in noninbred mice (Fig. 1A), but also in the inbred mice (Fig. 1B), in which a substantial gap was observed under other conditions between survival and colony formation. In the inbred radioresistant mice, protected by screening, correlation between survival and splenic colony formation was thus just the same as in noninbred radiosensitive mice.

These results are evidence that colony formation does not always correspond to the survival rate of mice and that the relation between these phenomena may depend on different causes and, in particular, on specific features of the change in resistance.

LITERATURE CITED

1. N. L. Aizina, V. G. Ovakimov, and S. P. Yaromenko, Radiobiologiya, No. 6, 929 (1973).
2. N. F. Gronskaya and G. S. Strelin, Radiobiologiya, No. 2, 259 (1980).
3. A. G. Konoplyannikov, in: Radiation and the Organism [in Russian], Obninsk (1973), p. 12.
4. A. G. Konoplyannikov and R. L. Maslennikova, Radiobiologiya, No. 4, 515 (1977).
5. O. A. Konoplyannikova and A. G. Konoplyannikov, Radiobiologiya, No. 1, 35 (1980).
6. R. V. Petrov and R. M. Khaitov, Radiobiologiya, No. 1, 69 (1972).
7. J. E. Till and E. A. McCulloch, Ann. N. Y. Acad. Sci., 114, 115 (1964).
8. G. E. Hanks and E. J. Ainsworth, Radiat. Res., 32, 367 (1964).

MORPHOLOGICAL CHARACTERISTICS OF STEROID-PRODUCING GLANDS IN ALIMENTARY OBESITY

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KEY WORDS: obesity; adrenocorticocytes; glandulocytes; enzyme histology.

Alimentary obesity is frequently the cause of a decrease or total loss of working capacity during productive years, and it may also lead to shortening of the life span [5]. The powers of adaptation of obese patients are depressed, and this is particularly clear in stress situations when all the defensive mechanisms of the body are mobilized.

Effectiveness of prophylaxis and treatment of obesity depends primarily on knowledge of the pathogenesis of the disease. Although hormonal and metabolic changes during prolonged excessive intake of energy-producing substances have been studied sufficiently well by biochemical methods of investigation, the morphological features of organs controlling metabolism have virtually not been studied at all in obesity. This applies in particular to the endocrine glands producing steroid hormones, the essential role of which in the pathogenesis of disease has frequently been demonstrated [3, 7-10].

In the investigation described below morphological criteria were used to study the character of function of steroid-producing structures of the adrenal glands and ovaries in animals with alimentary obesity.

EXPERIMENTAL METHOD

The model developed by a team of workers directed by Academician of the Academy of Medical Sciences of the USSR V. G. Baranov [2] was suitable for the purposes of the investigation.

The experiments were carried out in the spring and summer on 60 male Wistar albino rats weighing initially 60-70 g. Control animals were kept on the ordinary laboratory diet. The experiment lasted 5 months. Material was taken every 4 days 1.5 months after the beginning of feeding, so that the effect of the increase in body weight on the morphological and functional state of the test organs, depending on the duration of the disease, was being taken into account.

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