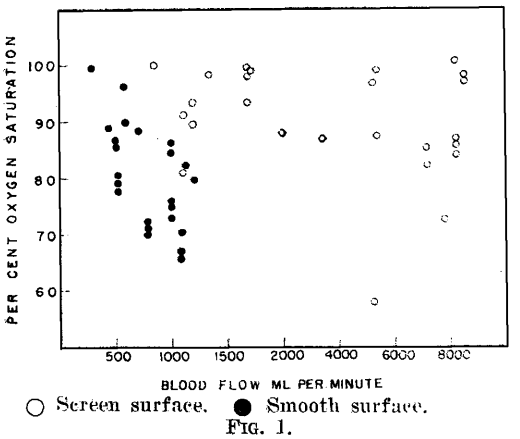
could be added to the blood with the original apparatus was 71.3 cc per minute, with a change in oxygen saturation from 40.6% to 70.8% (Observation No. 3, Table I), at a blood flow rate of 1080 ml per minute. Since the addition of a screen, a maximum of 543 cc of oxygen per minute has been added to the blood with an increase in saturation from 47.4% to 86.2% at a blood flow rate of 8,200 ml per minute. With nearly identical venous oxygen saturations, 48.2 and 47.7%, the attainment of closely similar arterial saturations, 87.0 and 86.2% respectively, occurred at a flow rate of 510 ml per minute without the screen and at 8,200 ml per minute with the screen (Observations No. 5 and 6, Table I).



○ Screen surface. ● Smooth surface.

FIG. 1.

The % of oxygen saturation attained after single passage over screened and smooth oxygenating surfaces. Oxygen saturation before passage was approximately the same.

Prior to the introduction of the screen, as the blood flow rate was progressively increased above 1 liter per minute, the blood oxygen saturation progressively decreased. With the screen however, the flow rate can be increased 8 times this amount, with satisfactory blood oxygenation. This remarkable difference between the 2 methods in the flow rate at which blood can be adequately saturated with oxygen is illustrated in Fig. 1.

The efficiency of the vertical revolving cylinder for the oxygenation of blood has been increased 700 to 1000% by the addition of a screen. This modified apparatus has been used to supplant the cardiorespiratory function of 2 dogs for 25 and 37 minutes, followed by survival to date, 3 and 5 months respectively, without organic damage.

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Failure of Cortisone or ACTH to Reduce Mortality in Irradiated Mice. (17733)

WILLIE W. SMITH, FALCONER SMITH, AND E. C. THOMPSON.

From the Laboratory of Physical Biology, Experimental Biology and Medicine Institute, National Institutes of Health, Bethesda, Md.

The role of the adrenal cortex in the syndrome of irradiation illness is not well established(1). It seemed conceivable that cortisone (17-hydroxy-11-dehydrocorticosterone), or ACTH (adrenocorticotropic hormone), might reduce mortality in acutely irradiated animals. A group of experiments was designed to test this possibility. Because of the great current interest in the effect of these compounds in a variety of disease states a report of their failure to protect mice given a lethal amount of whole-body X-radiation appears to be appropriate.

Male mice of N.I.H. stock, kept on a diet of Purina chow, were caged 10 together from weaning to the time of irradiation when they were about 7 weeks old. They were then separated into comparable groups by litter and treated as shown in Fig. 1 and Table I. Ten mice were irradiated simultaneously, 5 each from the irradiated control and corresponding irradiated treated groups. Animals received 600 r whole-body radiation in the cortisone experiments, 500 r in the ACTH experiments,

1. Patt, H. M., Swift, M. N., Tyree, E. B., and John, E. S., *Am. J. Physiol.*, 1947, v150, 480.

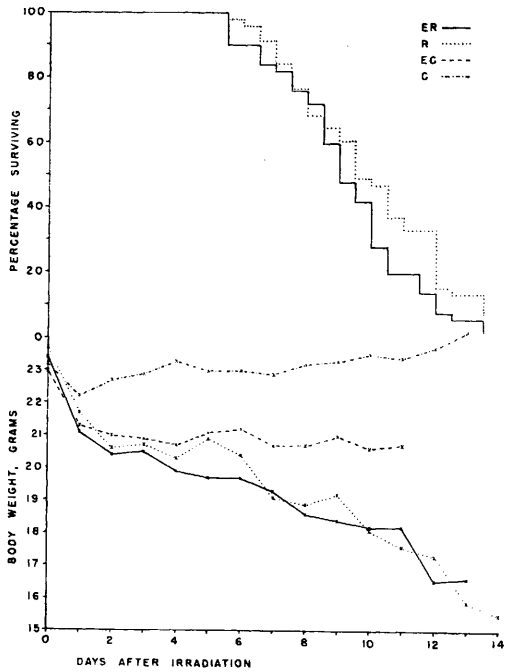

FIG. 1.

Death rate and weight changes in 50 mice given daily i.p. injections of 0.2 mg cortisone for 10 days, beginning 4 hr after irradiation with 600 r (ER) and in an equal number of irradiated littermate controls (R); weight changes in 15 injected controls (EC) and in controls not injected or irradiated (C).

with the following radiation factors: 170 Kv., 20 ma., 0.55 mm aluminum and 0.25 mm copper added filtration, 50 cm focal distance and rate 58 r per minute. After irradiation the mice were kept individually in suspended wire mesh cages.

Daily intraperitoneal injection of 0.2 mg of cortisone, begun a few hours after irradiation and continued for 10 days, was ineffectual in preventing death, increasing survival time, or reducing the severity of radiation effects on erythrocyte count, hemoglobin, reticulocytes, leucocyte count, or body weight. Death rate and weight changes are shown in Fig. 1. Untreated controls (C) show a transitory weight loss when transferred to individual cages. Cortisone controls (EC) lost about 2 g which they failed to recover by the 11th day. Cortisone controls, between the 7th and 11th day after beginning injections, showed a mean reduction in erythrocyte count of 1.4 million per mm^3, in hemoglobin of 3.3 g per 100 ml, and in reticulocytes of 1.2%. The mean leucocyte count dropped from 18.0 to 12.6 thousand per mm^3. These values do not fall below the normal range for mice, and their physiological significance is yet to be determined. Among the irradiated mice no significant hematological differences between those receiving cortisone and their controls were evident, reductions in both groups (15 mice in each, not included in Fig. 1) conforming to expectations for mice irradiated with 600 r, LD_{100}.

Cortisone given in 2 intraperitoneal injections of 0.2 mg each 21 hours and 3 hours prior to irradiation with 600 r did not significantly reduce mortality (RE, 20 mice, 95%; R, 20 mice, 100% mortality).

Subcutaneous injections of 0.25 mg of ACTH in 0.2 ml of saline begun a few hours after irradiation and given twice daily for 14 days post-irradiation were ineffectual in delaying or preventing death (Table I). In this experiment the χ^2 value, 11.8, indicates that the effect of the compound was harmful,

TABLE I.
Percentage Mortality and Mean Survival Time of Irradiated Mice (500 r) Receiving ACTH Compared with Irradiated Controls.

Group	Treatment	No. of mice	% dead	M.S.T., days
ACTH-C	No irradiation; ACTH as in R-ACTH-1	5	0	—
R-ACTH-1	0.25 mg ACTH twice daily from 3 hr post-irradiation	29	79.3	9.4
R-1	No inj.; mates to R-ACTH-1	29	31.0	11.6
R-ACTH-2	0.5 mg ACTH 22 hr and 5 hr pre-irradiation	19	63.5	10.6
R-2	No inj.; mates to R-ACTH-2	19	57.9	11.9

but the numbers are small and general conclusions are unwarranted. When ACTH was given in 2 injections prior to irradiation no effect was observed.

Summary. Intraperitoneal injections of cortisone, or subcutaneous injections of ACTH, failed to increase survival time or number of irradiated mice surviving.

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