Oxygen Consumption Following Whole-Body X-Irradiation of Guinea Pigs. (19803)

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By means of direct measurements of oxygen consumption in rats, increased Q_{O_2} has been reported to follow doses of total body X-irradiation ranging from 54 r to over 800 r(1). Smith *et al.*(2) could find no increased oxygen consumption in irradiated rats, but were able to detect a small increase in oxygen consumption of starved irradiated rats over their starved controls. The present report indicates that no significant change in oxygen consumption occurs after an LD_{30} dose of X-rays to guinea pigs.

Experimental. Oxygen consumption was determined in Exp. 1 by means of the apparatus described by Smith(3), while in Exp. 2 a modification of the instrument described by Tabor *et al.*(4) was used. The guinea pigs in Exp. 1 were fasted for 4 hours and those in Exp. 2 (Table I) for 20 to 24 hours prior to the measurement of oxygen consumption. With the animal in the chamber, 30 minutes were allowed for temperature equilibration and the Q_{O_2} for each observation was determined from the oxygen consumed during the succeeding 30 minutes. Twelve controls and their corresponding irradiated litter mates were tested for oxygen consumption on alternate days in each experiment. Guinea pigs of the Beltsville strain were given 250 r, a dose which was about an LD_{30} since 4 of 12 had died by 11 days after irradiation. Irradiation factors were: 170 Kv, 20 ma., 0.25 mm copper and 0.55 mm aluminum added filtration, 50 cm focal distance and rate 54 r per minute.

TABLE I.
Comparison of Mean Oxygen Consumption in Guinea Pigs Given 250 r of X-rays on Day R with Oxygen Consumption in Their Litter Mate Controls.

Days	No. observations	Mean Q_{O_2}, ml/g/hr S.T.P.	Stand. dev.
Exp. 1			
	Controls		
R — 3 to R +29	58	1.298	±.29
	250 r at day R		
R — 4 to R — 1	16	1.366	±.17
R + 1 R + 3	12	1.254	±.29
R + 4 R + 6	8	1.504	±.26
R + 7 R + 9	11	.969	±.17
R +10 R +13	10	1.273	±.36
Exp. 2			
	Controls		
R — 7 to R +24	60	.757	±.11
	250 r at day R		
R — 7 to R — 1	15	.808	±.03
R + 1 R + 3	11	.733	±.06
R + 4 R + 6	7	.726	±.05
R + 7 R + 9	9	.811	±.31
R +10 R +13	9	.731	±.11

Results and discussion. Oxygen consumption expressed in ml O_2 (S.T.P.) per hour per g of body weight for guinea pigs and their irradiated litter mates as found in 2 experiments is given in Table I. Relatively high values for oxygen consumption obtained in the first experiment are attributable to the short fast period (4 hours) which preceded the tests. The longer period of fast (20-24 hours) for the animals used in Exp. 2 resulted in oxygen consumption values which are comparable with basal Q_{O_2}'s reported for guinea pigs(5). No significant change in oxygen consumption up to 13 days following 250 r is indicated from the data given in Table I. Irradiated guinea pigs given 250 r gain weight at the same rate as their litter mate controls and Fig. 1 compares the weights of a typical lot of 4 guinea pigs from Exp. 1 with their irradiated litter mates. Guinea pigs given comparable doses of irradiation were shown by Smith *et al.*(6) to gain weight normally. The absence of altered oxygen consumption during the period of tissue destruction and regeneration following irradiation, in the guinea pigs, indicates that within the limits of the experiment no detectable disturbance to the overall metabolism occurred.

Summary. Oxygen consumption in guinea pigs given 250 r, remains within the limits de-

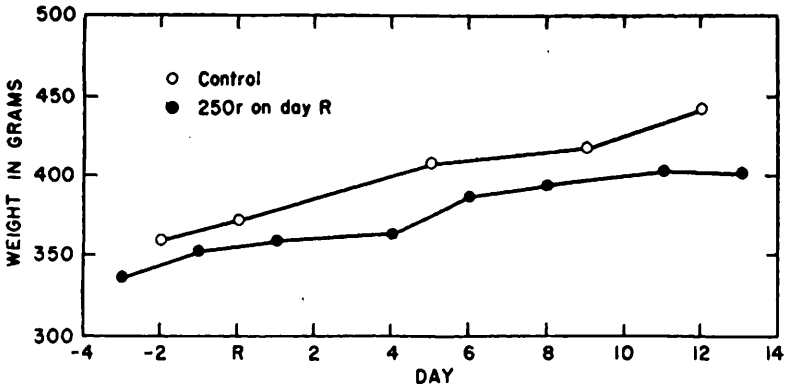

FIG. 1. Comparison of the mean weights in a typical lot of 4 guinea pigs from Exp. 1 with their corresponding litter mates given 250 r on day R.

termined for their nonirradiated litter mates up to 13 days following irradiation.

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Inotropic Action of Acetyl-Strophanthidin, Strophanthidin, and Tryptamine-Strophanthidin.* (19804)

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The partially synthetic ester, acetyl-strophanthidin. which has an extremely rapid onset of action after intravenous injection, has been suggested for use when digitalis action is urgently needed(1). It has proved valuable for slowing the ventricular rate in patients with auricular fibrillation, and for revision of paroxysmal auricular tachycardia(1,2). In pulmonary edema with normal sinus rhythm, where it has also been used, its value cannot be proven, for an experiment withholding other therapeutic measures would risk the life of the patient. Recently the clinical use of acetyl-strophanthidin has been challenged by Wedd and Blair. In strips of turtle ventricle they found that it failed to shorten the interval between action potentials (interpreted as the Q-T interval) without impairing contractility(3). Since digitalis glycosides do shorten the "Q-T interval" of turtle ventricle(4), Wedd and Blair concluded that acetyl-strophanthidin is not a digitalis-like substance, and that all its therapeutic benefit is due to vagal stimulation.

If acetyl-strophanthidin does not have a typical digitalis action, its use in patients with pulmonary edema and sinus rhythm should be discontinued. A reexamination of acetyl-

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