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Inability of Methionine to affect Lethality in Mice and Rats exposed to X-Rays

Nerurkar *et al.*[1] have shown that administration of methionine either before or after X-irradiation decreases the damage caused to nucleic acid synthesis in irradiated rats. Post-irradiation administration of methionine appears to be more effective. Other assays have shown a lower increase in nitrogen, uric acid and in creatinine excretion in irradiated rats injected with methionine after irradiation[2]. The increase in uric acid excretion suggests excessive breakdown of nucleic acids as a result of cellular destruction. Treatment with methionine also results in a beneficial influence on the rate of growth after irradiation.

The present communication shows that the administration of methionine, apparently effective in slowing down the fall in nucleic acid levels caused by a single exposure to ionizing radiations, affords no decrease in the mortality of mice (*C*57 black) and rats (Wistar albino) irradiated with 700 or 800 r. of X-rays.

220 male black *C*57 mice, weighing 20–25 gm., were divided into eight groups. Each irradiated group consisted of fifteen controls injected intraperitoneally with 0·9 per cent sodium chloride and fifteen animals injected intraperitoneally with an aqueous solution of L-methionine (Sigma) (5 mgm., 25 mgm., and 250 mgm./kgm.) 5 min. before or 30 min. after irradiation respectively. One irradiated group received one injection 30 min. after irradiation and two daily injections of methionine (5 mgm./kgm.) during the five days following irradiation. A control group, injected with methionine (250 mgm./kgm.), was not irradiated.

Table 1. Effect of Intraperitoneal Injection of L-Methionine before and after Total-Body X-Irradiation of 700 r. on Mortality Mouse Black C57 Strain.
kV., 200 ; m.amp., 20 ; d.f., 42 cm., 0·5 copper ; dosage-rate, 84 r./min. in air

Dose of L-methionine	No. of animals	Total mortality at 15 days (per cent)	Average time of survival (in days) ± *S.D.*
Methionine 5 min. before 700 r.			
Controls	15	100	8·00(±2·17)
5 mgm./kgm.	15	100	8·33(±2·16)
Controls	15	100	8·93(±1·39)
25 mgm./kgm.	15	100	10·06(±1·58)
Controls	15	100	9·33(±2·41)
250 mgm./kgm.	15	100	8·60(±2·29)
Methionine 30 min. after 700 r.			
Controls	15	100	7·60(±3·34)
5 mgm./kgm.	15	100	6·80(±1·22)
Controls	15	100	8·06(±1·87)
25 mgm./kgm.	15	100	7·20(±2·78)
Controls	15	100	7·60(±2·23)
250 mgm./kgm.	15	100	8·06(±2·52)
Chronic treatment			
Controls	15	100	8·40(±1·88)
5 mgm./kgm. ×11	15	100	7·13(±1·60)

Methionine does not significantly affect the mortality after irradiation ($P < 0·01$).

Table 2. Effect of Intraperitoneal Injection of Methionine (5 mgm./kgm.) After a Single Total-Body X-Irradiation of 800 r. on Mortality Male Wistar Albino Rats.
(kV., 200 ; m.amp., 20 ; d.f., 55 cm., 0·5 copper ; dose-rate, 50 r./min. in air

Dose of methionine	No. of animals	Total mortality at 30 days (per cent)	Average time of survival (in days) ± *S.D.*
Controls	30	96·6	8·16(±4·70)
5 mgm./kgm.	30	100	8·96(±4·55)

Methionine does not affect significantly the mortality after irradiation ($P < 0·01$).

Sixty male Wistar rats, weighing 175–225 gm., were divided into two groups of thirty animals each. The first group served as control and received an intraperitoneal injection of 0·9 per cent sodium chloride ; the second group, an injection of L-methionine 30 min. after a total-body X-irradiation of 800 r.

Physical factors of irradiation are given in Tables 1 and 2. All the mice irradiated with 700 r. and 96 per cent of rats irradiated with 800 r. died between the fourth and fifteenth days after irradiation. The same mortality was observed in the groups treated with methionine before or after irradiation (Tables 1 and 2). L-Methionine is not toxic, at the above-mentioned doses, to our mice or rats. In previous investigations, Bacq *et al.*[3] have observed that methionine does not protect mice against X-irradiation. The present results confirm these findings.

According to Nerurkar *et al.*[1,4] there is after irradiation a lack of available methionine, and the injection of methionine should help the restoration of the nucleic acid-synthesizing mechanism. But, in our opinion, this effect of methionine is not sufficiently important to affect the mortality.

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Radioactive 7-Iodo-6-Deoxytetracycline in Tumour Tissue

The observation[1,2] that several of the tetracyclines are localized in various tumour tissues for prolonged periods of time suggested the possible utility of a tetracycline labelled with iodine-131 in the detection of neoplastic disease by the use of external body-scanning techniques. In a recent communication[3] from this Laboratory, the preparation of 7-iodo-6-deoxytetracycline was described ; this was the first report of an iodotetracycline of unequivocal chemical structure. A labelled iodo (131) derivative was prepared by essentially the same method, by the reaction of N-iodosuccinimide[4] (^{131}I) and 6-deoxytetracycline in concentrated sulphuric acid :