

Effect of in vivo irradiation of the rat on the taurine concentration of the heart

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Summary. The taurine concentration in the heart of the rat ($\mu\text{moles/g}$ of tissue) was not modified during 10 days after an in vivo irradiation of 900 R.

Physiological roles have been suggested for taurine in various tissues, including the heart¹ in which its concentration is very high in the rat². As body irradiation of animals, as well as accidental irradiation of man, provokes an early and temporary increase of the urinary excretion of taurine, we examined the results of an in vivo irradiation of the rat on the taurine concentration of the heart. This appears to be of interest since the extra taurine excreted in the urine after total body irradiation comes from a stock of taurine existing in the animal^{3,4}.

Material and methods. The male Sprague-Dawley rats used in these experiments were provided by Charles River (France). At the beginning of the experiment the average body weight of the rats was 200 g and they were fed on the commercial diet R.S. Extra Labo (Piétrement, France). They received the diet ad libitum with free access to tap water. On 3 samples of this commercial diet, we found that the taurine concentration was about 1.83 $\mu\text{moles/g}$ of diet. Half of the animals were exposed to a total body irradiation of 900 R at a dose-rate of 41.5/min, the radiation being generated by a ⁶⁰Co source, as previously⁵. During 10 days after this treatment (this period of 10 days was chosen as it corresponds to the various phases of the syndrome of acute irradiation⁶) 2 irradiated rats and 2 control rats were

randomly taken each day, weighed and killed by decapitation. The hearts were removed immediately after the sacrifice of the rat, then weighed and frozen. The free amino acids of the ventricles were prepared and the taurine determination was performed according to the method described by Anzano et al.⁷. The results are expressed as concentration (μmoles of taurine/g of the heart). 3 experiments were carried out, each using 40 rats. The results obtained in a representative experiment are given here.

Results. On figures 1 and 2 are given, respectively, the weights of the rats and the weights of their hearts. It appears that during the 10 days of the experiment, the weights of the control rats increased (the increase was about 80 g) while the body weights of the irradiated rats decreased (fig. 1). Similarly, the weights of the hearts of the control rats increased whereas the weights of the hearts of the irradiated rats decreased (fig. 2). It is of interest to underline that the ratio weight of the heart (expressed in mg)/b.wt of the rat (expressed in g) was about 2.7–2.9 for the irradiated rats as well as for the control rats. On the other hand, the taurine concentration in the hearts of the control rats as well as in the hearts of the irradiated rats was approximately 18 $\mu\text{moles/g}$ during all the experiment. From this observation, the mean and the SD of the mean were calculated for both groups. The results we obtained were 17.6 ± 0.46 $\mu\text{moles/g}$ of heart for the control rats and 18.0 ± 0.4 $\mu\text{moles/g}$ of heart for the irradiated rats.

Discussion and conclusion. In the irradiated rats, a decrease of body weight associated with a decrease of the heart weights was observed; the ratio heart weight/body weight of the animal was similar in the irradiated rats and in the control rats. On the other hand, we also observed that the taurine concentration in the heart was not modified by irradiation. The origin of taurine in the heart is not clearly known⁸ but the stability of the concentration of this substance in the hearts of rats submitted to various nutritional conditions, such as starvation, pyridoxine-deficiency, diets containing taurine, has already been reported¹. Therefore, our results are in agreement with those previously published⁴ according to which the taurine concentration of the heart was not modified 48 h after an irradiation of 500 R and, furthermore, they extended these results as we showed that during 10 days after a body irradiation of 900 R no modification of the taurine concentration in the heart occurred.

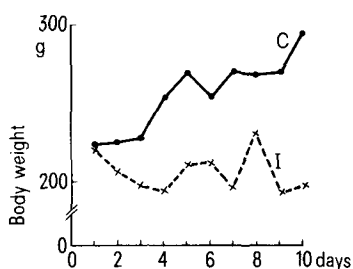


Figure 1. Modification of the body weight of the control rats (C, ●—●) and of the irradiated rats (I, x—x) during the duration of the experiment.

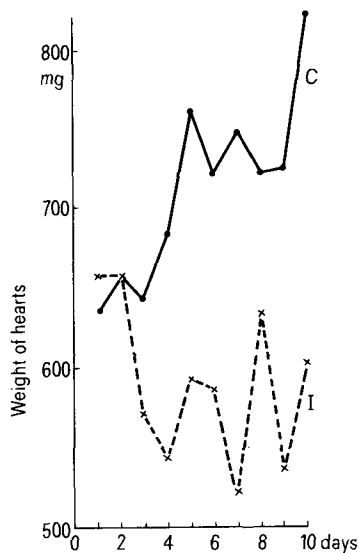


Figure 2. Modification of the weight of the heart of control rats (C, ●—●) and of irradiated rats (I, x—x) during the duration of the experiment.

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