

CARTA AL EDITOR

Effect of Ionizing Radiation on the Succinate Dehydrogenase Activity of Rat Liver

It has been observed (4) that a 20,000 r dose of X-rays administered *in vitro* on rat liver slices inhibit the oxygen consumption. This alteration is simultaneous with the mitochondrial swelling and disorganization of the cristae as observed by electron microscopy; with an increase in the ascorbate action on the mitochondria and inner mitochondrial membranes; and with a production of peroxides of structural lipids in the irradiated internal mitochondrial membranes. Other authors have described similar irradiation effects (2, 5, 6).

It was interesting to verify whether the observed oxygen consumption inhibition had its origin in a decrease of the enzyme activity of the electron transport chain.

Both the method and material used in this investigation are identical to that described in an earlier work (3, 4).

Following the irradiation of the rat liver slices, two types of experiments have been performed. In the first, the tissue was homogenized immediately following the irradiation and the succinate dehydrogenase activity of the homogenate was measured. In the second one, the irradiated tissue slices were incubated at 37° C, under

shaking, in Krebs-Ringer-Tris medium during a three hours period. Following this, they were homogenized and the enzyme activity then measured.

Under these conditions, inhibition of the succinate dehydrogenase activity of the irradiated liver homogenates was observed when the enzyme activity was measured 3 hours following the irradiation (Table I). No effect was encountered when the enzyme activity was measured immediately following the irradiation (Table I).

Table I. *Effect of 20.000 r X radiation in vitro on the succinate dehydrogenase activity of rat liver.*

Measurements were made 3 hours following the irradiation. The results are expressed in $\mu\text{M O}_2/\text{mg prot/min}$ together with the corresponding mean standard error. The numbers in parenthesis indicate the number of experiments.

	Activity ($\mu\text{M O}_2/\text{mg prot/min}$)
Control samples	0.0649 \pm 0.0013 (57)
Irradiated samples	0.0528 \pm 0.0009 (58)
Inhibition percentage	18.65
Signification	P < 0.001

DEMENT'EVA *et al.* (1) report inhibition of the succinate dehydrogenase activity in the heart and liver mitochondria of rats irradiated with a 1,000 rad dose. They associate this inhibition with that of the oxidative phosphorylation and with the lesions encountered in the mitochondrial structures.

As in the case of the tissue oxygen consumption, both the structure and permeability of the mitochondrial membranes immediately change following the irradiation. The succinate dehydrogenase activity, which is not inhibited until 3 hours following the irradiation, cannot be the cause of the decrease in the tissue oxygen consumption but rather only one of the effects of the changes in the structure of the membranes. The structure alterations are able to cause a diminution in the activity of the respiratory chain through alteration of the mechanism controlling substrate intake to the interior of the mitochondria, or by alteration of its ionic equilibrium, or by structural changes of internal membranes or by any simultaneous combination of these phenomena.

References

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