

β -CAROTENE AND VITAMIN PROTECTION OF MOUSE THYMUS AGAINST RADIATION EFFECTS

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Devastation of lymphoid organs is the promptest and the most sensitive response of organism to ionising radiation. Lympholytic action of this factor is followed by violation of immunity system (1), thus increasing the hazard of various diseases. An analysis of effects protective against degradation of lymphoid tissue is a promising test in a search for effective means enhancing the resistance of organism to radiation action. It has been reported that β -carotene, a provitamin A having antioxidant properties, is very promising as a radioprotector (2). As β -carotene is water-insoluble, it is preferable to use its water-dispersed forms with addition of α -tocopherol, tocopherol acetate (vitamin E), ascorbic acid (vitamin C) and its derivatives, proteins and emulsifying agents. These additions allow to achieve the stability of the water-dispersed form and improve the assimilation of β -carotene in organism (3). Below we describe the data on radioprotective ability of β -carotene and vitamins.

White mice (genetical type Swiss, males, weight 18-22 g) were exposed to ^{60}Co γ -rays at 100 rad/min. 24 h later, the mice were sacrificed, and the number of cells in thymus was determined. As a radioprotector, we tested Vektoron, a water dispersed commercial preparation (AQWA-MTD, Moscow, Russia) containing 2% β -carotene and vitamins E and C, each in concentration of 0.67%. The animals were fed with Vektoron enriched feed for 7 days prior to irradiation. The Vektoron enriched feed (31.2 mg of β -carotene per 100 g of the feed) was prepared daily.

The obtained data are shown in the Figure. At 24 h post exposure, a dose-dependent decline of the number of cells in thymus was observed. This dependence can be described, in semilogarithmic co-ordinates, by the equation

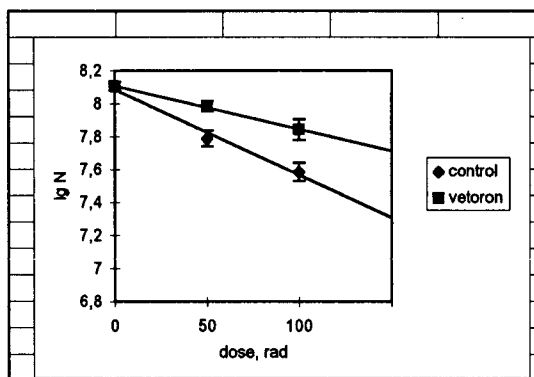
$$\lg N = (8.102 \pm 0.026) - (0.0053 \pm 0.0007) R$$

where N stands for the number of cells in thymus of exposed control animals, R is radiation dose (in rads). Preliminary feeding of mice with the Vektoron enriched feed exerted a significant ($P < 0.05$) protective action. The dose dependence of thymus devastation value obtained for this case can be described, in semilogarithmic co-ordinates, as

$$\lg N_v = (8.106 \pm 0.025) - (0.0026 \pm 0.0006) R$$

where N_v stands for the number of cells in thymus of exposed animals fed with Vektoron enriched feed, R is radiation dose (in rads). Comparison of the slopes of the dose curves obtained for control animals and for animals fed for a week with Vektoron enriched feed shows that this preparation reduced the radiation induced decrease of the number of cells in thymus by 50%.

Data on β -carotene induced increase of viability of irradiated animals can be found in literature (4, 5). Also it has been shown that decrease of concentration of β -carotene and other antioxidants, including vitamin C, in blood enhanced the hazard of cancer and cardio-vascular diseases (2, 6). Our results, together with these data, allow to conclude that composite water



Action of the Vetoron preparation on the number N of cells in thymus of the irradiated mice.

dispersed preparations containing β -carotene and vitamins E and C can be used for protection of organism against action of radiation and other unfavourable environmental factors.

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