THE PROTECTIVE ROLE OF MELATONIN IN RADIATION-INDUCED DAMAGE TO HUMAN ERYTHROCYTES

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The influence of ionizing radiation on biological systems consists mainly in the radical reactions of water radiolysis products or reactions of secondary radicals generated under given conditions of irradiation. In the case of erythrocytes irradiated in PBS it can be supposed, on the basis of our previous works and the data from literature, that apart from ˙OH radicals, radicals derived from chloride play a significant role in cellular damage. The reactions taking place during irradiation initiate the processes leading to cellular destruction. However, the final effect of irradiation depends on post-radiation processes, which may be modified in various ways.

In this work we studied the influence of melatonin on the degree of damage formed during the radiation of erythrocytes and on the post-radiation processes of cellular degradation. The erythrocyte suspensions in PBS (hematocrit 1%) were irradiated with the dose of 400 Gy under air at 22°C. The erythrocytes were irradiated in the presence of various concentrations of melatonin and without antioxidant, which was added to erythrocyte suspensions after irradiation. The degree of cellular damage was detrmined on the basis of MetHb, GSH and the course of post-radiation hemolysis of red blood cells. The obtained results show the protective role of melatonin as a free-radical scavenger. Erythrocytes irradiated in the presence of melatonin hemolysed during in the post-radiation incubation about 15 times slower than control erythrocytes (without antioxidant). However, erythrocytes incubated with melatonin added after irradiation hemolysed about 18 times slower. In this case melatonin inhibited the process of degradation of damaged cells.

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