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Modifying effect of different forms of lipid A on the induction in vitro of DNA double-strand breaks in mice hippocampal cells after exposure to ionizing radiation of different quality

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The search for new techniques and preparations modifying the radiosensitivity of different organisms' cells by immune system activity modulation is of immediate interest of radiation biology. A promising approach is studying the modifying influence of lipopolysaccharides and their derivatives that are widely used in biomedical research and pharmacology on the realization of radiation-induced effects. Lipid A is one of such agents; it shows high biological activity at low concentrations and can be an immune response modulator.
In this work, the modifying effect of different modifications of lipid A —diphosphoryl lipid A (DLA) and monophosphoryl lipid A (MLA) —on the induction of DNA double-strand breaks (DSBs) in mice hippocampal cells after in vitro exposure to 60Co γ-rays and accelerated 15N ions has been studied. It has been found that the DNA DSB yield is linear for both types of radiation. The highest DSB yield was observed after accelerated 15N ion exposure. For both types of radiation, the studied agents have different influence on cells' radiosensitivity: DLA has a radiosensitizing effect; MLA, radioprotective. It can be suggested that MLA's radioprotective properties are realized due to signal pathway activation involving TLR4 receptors.
The kinetics of DNA DSB repair in mouse hippocampal cells after in vitro exposure to 60Co γ-rays and accelerated 15N ions at a dose of 5 Gy under normal conditions has been studied. It has been found that the DNA DSB kinetics has an exponential character, and repair is practically completed after 6 h of post-irradiation incubation for both types of ionizing radiation.

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