

Effect of methylene blue on oxygenation level in mice with Ehrlich solid tumors

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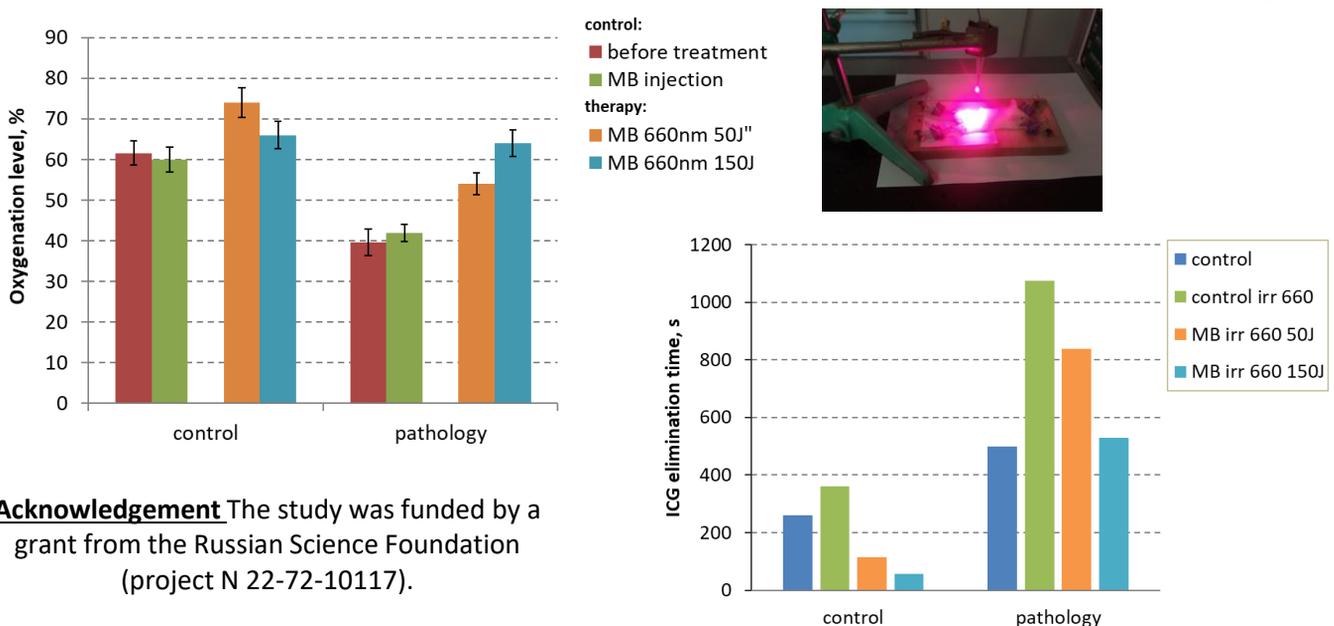
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Motivation One of the unresolved problems of PDT is the effect on tumors that are in a state of hypoxia, for example, many tumors of the prostate and pancreas. A promising photosensitizer for research in this direction is methylene blue (MB). MB has both photodynamic activity (under laser irradiation) and redox and catalytic properties (in the absence of light). According to the literature, MB is able to increase the oxygen consumption of tumors. The catalytic properties of MB in relation to tumors are due to its interaction with lactic acid, which is formed as a result of aerobic glycolysis. A positive effect of MB on peripheral blood flow has also been reported. At the same time, MB exhibits fluorescence in the red part of the spectrum and significant photodynamic activity.

Goal In this work, the effect of MB on the oxygenation level and blood flow rate on mice was analyzed using spectroscopic and video-fluorescence methods.

Methods Methylene blue was administered intravenously at a dose 10 mg/kg. The accumulation time was 20 minutes. The oxygenation level was assessed by the hemoglobin absorption spectra, which were measured *in vivo* using a fiber optic spectrometer and a halogen lamp as light source. The blood flow was estimated from the elimination time of indocyanine green (ICG) from the bloodstream, which was recorded using video fluorescence methods. It was believed that the longer the ICG elimination time, the lower the blood flow. Photodynamic therapy was performed using 660 nm laser, intensity 0,1 W/cm².

Results It has been shown that MB therapy increases tissue oxygenation level and restores normal blood flow, which contributes to more successful anticancer therapy.



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