

“Useful sun” strategy for photobiomodulation

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In photobiomodulation or modern phototherapy mainly used a purely hardware methods of treatment and rehabilitation (lasers, light emitting diodes (LED) and other artificial light sources These provides therapeutic and preventive effect, to reduce the intensity of inflammatory reactions , increase tissue regeneration and local resistance anti-infectious defense. Natural sunlight for heliotherapy has its limitations due to UV component, which leads to aging, photodamage and skin cancer , immunosuppression and the development of degenerative changes in eye structures . This project focuses on the development of nanoparticle containing light-converting materials (LCM) and the further of experimental validation our priority approach - strategies “useful sun” (Khramov et al. , 2010; Gapeev et al., 2012). Such LCM absorb shortwave (including UV) components of solar radiation and convert it into orange-red (OR) and infrared (IR) light. In our studies , it was found that the strategy of "useful sun " in comparison with the strategy of "safe sun" (to block UV only) provides the following benefits for the man and animals : a) increases physical performance of athletes at bench tests by 9% , b) speed up the rate of 40-100% of the regenerative processes of tissues and organs of human and animal without conceding a laser and LED technology photobiomodulation , c) increases by 50% the physical performance of animals (swimming test),in particular, with the improvement of morphological and functional characteristics of the myocardium , g) improves recovery retinal of rabbit after laser burn, d) protects the blood cells (in vivo and in vitro) from the damaging effect of genotoxic factors of physical and chemical nature. At present , it is particularly important that the red light , stimulating regenerative processes , no show measurable effect of red light on tumor growth (Myakishev-Rempel et al.,2012). Moreover some others offer photobiomodulation as a potentially safe and effective multi-target anticancer therapy, potentially amenable for use with other therapies or as a stand-alone approach (Santana-Blank et. al.,2013). All results can be considered as quite conclusive scientific justification prospects of the development of new environmentally friendly technologies to improve biomedical adaptive capacity and improvement of the person.