

THE LEVEL OF SPECIFIC PROSTAGLANDINS IN ULTRAVIOLET RADIATION-INDUCED ERYTHEMA AFTER USING SUN-PROTECTION CREAM SUN-PROTECTION CREAM WITH NANOPARTICLES OF CERIUM DIOXIDE IN TERMS OF PHOTOSENSITIZATION

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Erythema is a skin condition characterized by redness or rash. There are many types of erythema, including photosensitivity. Photosensitivity is caused by a reaction to sunlight and tends to occur when something, such as an infection or a medication, increases your sensitivity to ultraviolet radiation. There are many substances reinforcing the negative impact of ultraviolet radiation on the skin, including drugs (sulfanilamides, GCS, antibiotics, COCs, hypoglycaemic drugs, neuroleptics). UVB erythema increases the production of PGE₂ and PGF₂-alpha and their precursor arachidonate after 24 h UVB exposure of the skin. These prostaglandins cause an inflammatory reaction, local temperature rise and pain in UV-damaged skin. Therefore, the level of prostaglandins E₂ and F₂-alpha may be a marker of the degree of skin injuring caused by UV-irradiation.

Sun-protection cream with nanoparticles of cerium dioxide is sunprotective agent of new generation. Nanoceria has been proposed as inorganic material for sunscreen product because of its excellent UV-absorption ability and unique antioxidant properties. So the main task in our research was the study of impact of new sunscreen with nanoparticles of cerium and dioxide on the level of prostaglandins PGE₂ and PGF₂-alpha in terms of photosensitization.

In this research we use the model of UV-erythema modified with phototoxic reaction at guinea pigs divided by 7 groups (10 animals in everyone). All animals were shaved on identical sites along a back ($S=3\text{cm}^2$). Irradiation was done by UV-lamp at the distance 10 cm from animals, a radiation time was 3 minutes, UV-range was 240-320 nm. We used solution for external application «Ammifurin» 0,3% as a photosensitizer (1 ml in 1 hour before radiation). The sunscreen was put in 20 min. before to radiation in the dose of $2\text{mg}/\text{cm}^2$.

Determination of PGE₂ and PGF₂α level in homogenate of irradiated skin were performed in vitro by conventional immunoassays kits «General Prostaglandin E₂ ELISA Kit» (EIAab, Cat №.: E0538Ge) and «Enzyme-linked Immunosorbent Assay Kit For Prostaglandin F₂ Alpha (PGE₂a)» (Cloud-Clone Corp., Cat №.: CEA749Ge) according to standard procedures specified in the instructions. Incubation was performed in a thermostatic shaker ImmunoChem-2200 (HTI, USA), the optical density of samples was measured using a microplate reader ImmunoChem-2100 (HTI, USA).

The results show that the level of prostaglandins PGE₂ and PGF₂-alpha in animal serum in the group where we used sunscreen with nanoparticles of cerium dioxide was within the normal range. The highest level of prostaglandins PGE₂ and PGF₂-alpha was in the group of the control pathology.

Corollary, sun-protection cream with nanoparticles of cerium dioxide has an efficiency in terms of photosensitization. This is indicated by lower levels of prostaglandins in the blood serum of animals. This is due to the fact that the animals, which were applied the cream with nanoparticles of cerium dioxide, had the less UV-damaged skin. It follows that the sunscreen with nanoparticles of cerium dioxide has potent photoprotective properties but the confirmation of its efficiency in human still requires further clinical trials.