MECHANISMS OF THE BENEFICIAL EFFECTS OF ULTRAVIOLET RADIATION ON THE HUMAN BODY

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Introduction Human skin is exposed to sunlight daily. Although the specific gravity of ultraviolet radiation in the total solar radiation is insignificant (5%), it plays an important role in various biological processes in the human body.

Aim. The aim of this review is to provide an overview of the current knowledge on the mechanisms of the positive effect of ultraviolet radiation on the human body.

Materials and methods. Data analysis of literature and Internet sources.

Results and discussion. It is recognized that the effects of solar UV radiation have both positive and negative effects on human health and the skin as a target organ. The beneficial effects of sunlight are mediated by either melatonin or vitamin D. Melatonin is produced from serotonin by the pineal gland, located in the center of the brain, during periods of darkness, and its release is suppressed depending on the intensity of visible light received through the eye's photoreceptors. Vitamin D is produced in the skin as a result of ultraviolet B mediated photolysis of 7-dehydrocholesterol. Vitamin D3 provides potent effects of adaptive immune function through: an adaptive T-cell immune response; maturation of Langerhans cells (CL) from immature dendritic cells; increased innate immunity in the skin and regulation of antimicrobial protection in the epithelial layers (expression of cathelicidin), regulation of differentiation and proliferation of keratinocytes, as well as the production of an intact epidermal barrier. Changes in serum vitamin D levels can affect skin immunity, barrier function, and inflammatory responses. The presence of vitamin D3 in the skin is necessary for the normal development, differentiation and function of keratinocytes. Also, the sun's rays have an expressive antidepressant effect. UV actively influences the synthesis of serotonin involved in the regulation of the emotional state. The synthesis of vitamin D in the epidermis of the skin under the influence of UV-B rays and high concentrations of circulating serum 25-hydroxyvitamin D obtained can reduce the risk of many chronic and infectious diseases, in particular, cancer, hypertension and cardiovascular diseases, autoimmune diseases, bacterial and viral infections. In addition, it is assumed that most of the beneficial effects of sunlight associated with the cardiovascular system are provided by mechanisms that do not depend on the synthesis of vitamin D. For example, it has been hypothesized that nitric oxide (NO)-bound compounds (nitrites and nitrosothiols) in the skin, can be mobilized under the influence of UV-A rays and delivered into the systemic circulation, causing coronary vasodilation and hypotensive action

Conclusions. Both melatonin and vitamin D are pleiotropic substances that have a variety of cellular effects, interacting with membrane and nuclear receptors, as well as receptor-independent effects.