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FUTURE STUDIES OF THE ROLE OF IMMUNE STATUS IN REGENERATION OF SKIN
COVERING OF SPACE MISSIONS CREWMEMBERS

Abstract

The members of long space missions quite often suffer from the damage of skin covering which affects quality of their life and performance. Abnormal immune responses observed in microgravity may pose serious consequences, especially for long-term space missions to Moon and Mars. The immune mechanisms of regeneration of skin lost during diseases and injuries of various etiologies, that are important for space medicine, are still understudied, which will complicate treatment, especially in case of abnormal dynamics of wound healing. In order to develop a wound healing strategy in the conditions of during interplanetary missions, it is necessary to identify trigger immune mechanisms involved in the regeneration of the skin covering. Purpose: Study of the features of systemic immunity in cosmonauts at the stages of preparation to the long-term space flights on board the ISS and in patients with long-term non-healing trophic ulcers for the further development of the wound healing system in long-term space flights. Methods: Studies of indices of innate and adaptive immunity were conducted in 18 astronauts and 34 patients suffering from lower limb varicose veins disease with varying degrees of skin damage (C4-6 clinical class according CEAR). Cytofluometry, ELISA, etc. methods were used. Results: Changes in the immune system were identified in patients with trophic ulcers that support chronic inflammation and, as a result, slow down the regeneration of the skin. There was an increase in the level of leukocytes in the peripheral blood, associated with an increase in the level of granulocytes. Analysis of the receptor repertoire of cellular factors of natural resistance revealed in patients changes in the system of recognition receptors associated with a significant increase ($p < 0.05$) in the peripheral blood content of granulocytes and / or monocytes expressing on their surface signal Toll-like receptors - TLR2, TLR4 and TLR6, compared with cosmonauts. There were signs of T-link activation of adaptive immunity, expressed in a significant increase of the content in the peripheral blood of T-lymphocytes having the activation marker CD25. The conducted studies allowed to state that changes in the immune system can be one of the most important factors determining the results of such processes as inflammation, regeneration, proliferation, and play

an important role in the duration of healing, and resistance to treatment. The obtained results serve as a basis for continuing study of the role of the immune system in skin regeneration under space flight conditions.