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THE INFLUENCE OF THE LONG-TERM SPACE FLIGHT FACTORS ON THE HUMAN REGULATORY T-CELLS

Abstract

Immunity among the other systems of the human organism is exposed to adverse the factors of space flight such as microgravity, radiation, hypodynamia, extreme overloads on the stages of take-off and landing, psychological stress and others. All these factors influence both on humoral and cellular immunity. One of the most important cell population of cellular adaptive immunity is a population of the cells which modulate the immune system, preserve tolerance to self-antigens, and prevent autoimmune disease. It is known as a population of the regulatory T cells (Treg). Tregs come in many forms with the most well-understood being those that express on their surface CD4, CD25, and FOXP3 markers. To find out how the long-term space flight factors influence on the population of Tregs, we examined the peripheral blood of 5 cosmonauts 60 days before and on the 1 and 7 day after the long-term space mission on the board of ISS where we evaluate the content of Tregs and general level of T-helpers (CD4+). When we analyzed the data we found that on the 1 and on the 7 day after landing there is a significant increase of CD4+-lymphocytes level in compare with the pre-flight values. The picture was quite similar for all examined cosmonauts. Content of Tregs didn't statistically change after the space expeditions but we found two types of response: in first one the level of Tregs was decreased and in second type was increased. We can propose that if we expand the group of examined cosmonauts there would be significant changes in both two groups with the increased and the decreased level of Tregs. The low level of regulatory T cells could finally lead to autoimmune disease and the high level Tregs could lead to infectious disease or even cancer. That could be a considerable "immunological" risk of extending time of the long-term orbital missions and a substantial risk for interplanetary manned space flights.