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PERIPHERAL BLOOD DENDRITIC CELLS IN CREW MEMBERS OF THE "SIRIUS-17"

Abstract

The use of a system approach to the evaluation of the various components of the immune system made it possible to identify a number of characteristics of adaptive change, including the quantitative and functional changes of the innate and adaptive immunity. Among them the most important are: changes in the system of Toll like receptors (TLRs) such as a decrease in the content of circulating monocytes and granulocytes expressing TLR2, TLR4, TLR6, and inhibition of the functional potential of T-cells. However, such a fundamentally important problem as revealing the complex of intermolecular and cell-cell interactions during the development of the immune response of an organism as a whole under space flight conditions still remains unsolved. By now there exists quite strong evidence that important role on linking the innate and adaptive immunity through their unique expression patterns of TLRs and cytokine production play dendritic cells (DCs). In this study we examined the number of circulating plasmacytoid DCs (pDCs) and monocytes expressing signaling PRRs in 6 healthy participants in the "SIRIUS-17" project. Whole blood was collected at prior, during and post isolation periods from three male and three women volunteers at the age of 27 to 43 years who spent 17 days in permanent isolation in an enclosed habitat consisting of hermetically sealed interconnecting modules at the Institute for Biomedical Problems (IBMP) in Moscow. Results of the investigation showed a distinct effect of short-term isolation on the immune systems ability to mobilize. Although no significant changes in the percentages of cells which expressed TLR located on the cell surface (TLR1, TLR2, TLR5 and TLR6) and in endosome (TLR8 and TLR9) were noted, the percentage of pDCs (CD14-/CD16-CD123+CD85k+) was significantly increased on day 7 of the experiment compared with the baseline values. These changes were independent of gender of volunteers. On the 1-th day of recovery period in the most of cases the levels of TLRs and pDCs were lower than before the isolation. Undoubtedly, functioning under the influence of a set of unfavorable factors of the living space can result in changes in the innate immunity as compared to the normal conditions. This dynamism of the immune system allows it to adapt itself to the constantly fluctuating environmental conditions However, adaptive restructuring requires mobilization of functional resources at an early stage of adaptation, which can lead to depletion of reserve capabilities of immune system.