

IAA/IAF SPACE LIFE SCIENCES SYMPOSIUM (A1)
Human Physiology in Space (2)

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INFLUENCE OF SPACEFLIGHT DURATION AND INFLIGHT COUNTERMEASURES ON CREW
CONDITION AND PERFORMANCE REVISITED

Abstract

The safety of long-duration space missions was of interest to Russian scientists from the very beginning of human spaceflight. Starting with only 108 minutes, flight duration was gradually increased to several hours then days. Development of new countermeasure regimens and comparing their efficacy on missions of various lengths allowed the Russian human space program to achieve the record duration of orbital

flight of 438 days. Analysis of the data obtained in those flights revealed that cosmonauts' postflight condition and performance do not depend on flight length and are determined mainly by the level of inflight countermeasure activities (Kozlovskaya et al. 1990, Grigoriev et al. 1993). For example, studies of speed-power muscle capabilities in crews of Mir station expeditions had shown that the smallest decrements in power performance, and even some increments in high-speed modes, were observed in crews of the longest (approximately yearlong) missions. On the other hand, the cosmonaut that had lived in weightlessness for half of that time (160 days), exhibited the largest decrements (Kozlovskaya et al. 1990). The data collected recently on a one-year International Space Station (ISS) mission cosmonaut are consistent with the previous conclusion that the extent of changes in the muscular system after long-duration spaceflight is not determined by the length of exposure to weightlessness, but rather depends on the level of countermeasure activities performed inflight. Complicated Locomotion tasks such as "Tandem Walk" and "Walk with Step Over" are performed as part of the joint Russian-US "Field Test" (FT) battery within hours after landing and repeated several times in the first two weeks in the scope of both FT and "Efficiency" studies. Comparative analysis of execution of these locomotion tasks did not detect significant differences in physical performance of the one-year mission cosmonaut, who completed the prescribed inflight countermeasure routines, as compared to other crewmembers that spent approximately six months on the ISS. This work was supported by the RSF grant #14-25-00167.