

KINEMATIC EVALUATION OF WALKING AFTER LONG-TERM SPACE FLIGHTS: FIRST HOUR AFTER LANDING AND FURTHER RECOVERY PERIOD

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ABSTRACT

It is known that space flights (SF) of different duration are followed sensory-motor alterations, such as locomotor disturbances. Exposure to weightlessness in the course of SF is connected tightly to physiological changes of vestibular function, the support deprivation, and a significant decline of the proprioceptive information density, which affects negatively the ability to control such complex movements performance as walking [1-3].

The work was carried out according to the program of “Field Test” Russian-American space experiment; 6 Russian cosmonauts (mission duration of 168,1±22 days) have performed the 5-meter voluntary walking test: 60 and 30 days before SF, during the first hour after landing and on the 4th, the 8th and the 12th days after the SF.

The most significant alterations in the characteristics of voluntary walking were registered during the first hour after landing: the single support phase shortened (by 11.24±1.23%) due to the increase in the duration of the double support phase (by 10.32±0.76%), the gait cycle shortened by 5.34±0.21%, so that the frequency of the steps increased, as well as the values of ground reaction forces diminished by 19.51±2.03%, that the result of muscular system weakening due to muscle disuse during SF [4].

It can be assumed, that the mentioned phenomena after SF lead to an increase of density and timing of the contact of the soles with the support surface, which in turn lead to better stability of the cosmonaut's gait, since perhaps the proprioceptive signals entering the central nervous system from the Vater-Pacini corpuscles of the sole carry information about the interaction of the center of mass with the support surface [5].

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