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CHARACTERISTICS OF THE ACCURACY OF CONTROL OF MOVEMENTS UNDER
MICROGRAVITY CONDITIONS

Abstract

The number of studies performed recently has shown that hypogravitational motor syndrome is characterized by the changes in all the structures of motor system (Kozlovskaya et al., 1987; Reschke et al., 1997). The goal of this work was to study the effects of long term space flights (SF) and simulated microgravity on the characteristics of precise voluntary movements.

The study was carried out with participation of 30 Russian cosmonauts – members of 146-182 days ISS missions and 12 healthy volunteers who were exposed to 5-days of the microgravity simulation in the Dry Immersion model (DI). To study the precise voluntary movements control of the force gradation task executed with single-joint isometric plantar flexions has been used during which the subject should differentiate the number of movements (from minimal to the maximal one) with the minimal difference between neighboring efforts. The initial minimal effort that serves as an absolute threshold of the control system and the mean between neighboring efforts - considered as a differential threshold were analyzed. The cases when the subsequent effort didn't exceed the previous one were defined as errors. The number of executed efforts and errors were also analyzed.

The results of the study revealed significant decrease of precise abilities of motor task execution after SF accomplishment. The number of efforts decreased by $16 \pm 7,8\%$ together with 2 times increase of errors'

number. Variability of parameters under study was also increased after SF revealing the decline of the motor control system abilities.

Under conditions of simulated microgravity the subjects executed the motor task as a rule correctly. However the number of properly selected efforts in the sequence of movements declined by 15–32%. At the same time the number of errors also decreased. We consider that to be a result of training.

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