

International Cooperation for Space Exploration (1)
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PHYSIOLOGICAL STATUS OF SEVEN-DAY SPACE FLIGHT PARTICIPANT

Abstract

Preparation for long flights which include the stage of Luna base requires scientists to de-velop a concept for maintaining the astronaut's physical performance after short-term flights, comparable in duration to an expedition to the Moon. In this regard, the purpose of this study was to assess the condition of the cosmonaut's cardiorespiratory system and level of physical performance at locomotor test after seven-day space flight. Study of body composition and determination of fluid sectors, parameters of central and peripheral hemodynamics, heart contractile properties, G-tolerance in space flight was carried out. Changes in the physical performance of a seven-day space flight participant were determined on the basis of recording the maximum running speed, gas exchange parameters during locomotor loading before and after the space flight. In flight, the mechanisms of heart regulation were not strained, the stroke volume at rest was significantly higher than the pre-flight values. And the energy spent by the heart muscle on the movement of blood is significantly reduced. The change in the hydration status of the organism was not pronounced, however, on the 5th day of flight, a decrease in the volumes of total body water and cellular fluid was noted, which is consistent with previously obtained data in flights of various durations. The fulfillment of locomotor loading was accompanied by a smaller increase in pulmonary ventilation than before the flight, which was due to a decrease in the "weight loading". During the descent from orbit to Earth, the transfer of axial overloads of + Gx direction amounted to 4.76 G at the stage of the ship breaking in the atmosphere and when touching the Earth - 7.4 G. On second and fifth days after returning to Earth's gravity conditions, an adequate reaction of the cardiovascular system to an orthostatic test was revealed in the SFP, there were no signs of orthostatic instability. On the 7th day when performing the test with the incrementally-increasing load, the maximum running speed was not reduced, compared with the pre-flight, which indicates the maintaining of efficiency at a sufficient level. The parameters of pulmonary ventilation are increased at all stages of the load. Gravity-dependent changes with the cardiovascular and respiratory systems both at rest and during exercise generally coincide with those after long flights, but they are less expressed.