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

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MIOCARDIUM BIOELECTRICAL CHARACTERISTICS, AUTONOMIC REGULATION AND CIRCADIAN RHYTHMS IN SPACE

Abstract

Background. Assessment and prediction of possible health risks is one of the main objectives for medical control system in future interplanetary space flights. Not only environmental stressors (microgravity, radiation, confined living place, workloads) but low functionality of different body systems in space may become one of the limiting factors for medical care. So, we must be focused on use of instruments for early detection of health disorders. Materials and methods. “Cosmocard” experiment involves Russian ISS crew-members and consists of 24-hours ECG monitoring with further analysis of ECG-signal electrical microalternations in 30-sec ECG samples (ECG dispersion mapping) and of autonomic regulation (heart rate variability analysis) in 5-min ECG samples. We also study the circadian rhythms of these processes. Data analysis provides the calculation of averaged hour-to-hour, daily, day and night values of all parameters. Investigations are conducted twice before flight, every month in-flight and +1, +7 days after landing. The results for 12 cosmonauts in 6-months missions are presented. Results. By the results of 24-hours ECG monitoring we observe the shift of autonomic balance towards reduced parasympathetic activity under long action of microgravity. This is especially evident in the decreased daily mean values of HRV parameter pNN50 during space flight (5,29 0,15 All these changes of autonomic regulation and of myocardium bioelectricall properties during space flight were more pronounced and occurred earlier (from the first month of flight) during night period. The circadian rhythms of HRV during flight were smoothed in comparison with pre-flight data. Conclusion. The role of reduced RR-variations in maintaining of electrical stability of the myocardium needs further investigation. The amplitude of circadian rhythms is important for assessing the functional conditions of crew-members. A smoothing of circadian rhythms is a prognostic sign, evidence of the adaptation mechanisms violation during space flight.