

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

Author: Dr. Elena Luchitskaya
Institute for Biomedical Problems, Russian Federation

Prof. Roman Baevsky
Institute for Biomedical Problems, Russian Federation
Dr. Irina Funtova
SSC RF-Institute of Biomedical Problems RAS, Russian Federation
Mrs. Anna Chernikova
RF SRC - Institute of Biomedical Problems of the RAS, Russian Federation

THE SPECTRAL ANALYSIS OF HEART RATE VARIABILITY IN FORECASTING OF
POST-FLIGHT ORTHOSTATIC INTOLERANCE AFTER LONG-TIME SPACE FLIGHTS**Abstract**

Introduction. The problems of orthostatic stability estimation and forecasting of cosmonauts after a long stay in weightlessness continue to keep the urgency. Results of scientific experiments Pulse and Pneumocard which are carried out on ISS since 2003 have allowed to receive the new data in this direction. **Methods and materials.** The heart rate variability (HRV) analysis was carried out at 25 Russian cosmonauts who had made 5-6 month flights on ISS. The preflight data were compared to the results of postflight orthostatic tests. All cosmonauts have been divided into three groups on their postflight heart rate (HR) values in standing position during active ten-minute stand test: with high, average and low orthostatic tolerance. **Results.** Comparison of preflight values of HRV parameters for the cosmonauts with different orthostatic stability has shown that in supine position high frequency (HF) component relative power (in %) significantly higher in groups with decreased orthostatic stability. The attitude of absolute total powers in low frequency (LF) and HF band (LF\HF) was significantly lower in the groups of cosmonauts with low and middle level of orthostatic stability to orthostatic stress (1,24 and 1,39) compared with the cosmonauts with good orthostatic stability (3,28). The decrease of LF/HF, which characterizes the autonomic balance, points to the relative weakening of the sympathetic level of regulation. Potentially it could be the reason for insufficiency of the mobilization mechanisms of functional reserve, which is manifested in the post-flight period. **Conclusion.** The spectral analysis of HRV in supine position before space flights may be useful as a method of forecasting the potential reductions in tolerance to orthostatic loads after a long-term space flight. In this case the low values of LF/HF should be considered as an unfavorable prognostic sign.