

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medicine in Space and Extreme Environments (4)

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orlov@imbp.ruSTUDY OF THE HUMAN CARDIORESPIRATORY SYSTEM DURING A LONG STAY AT THE
ANTARCTIC VOSTOK STATION IN RELATION TO THE FUTURE LONG-TERM INHABITED
MOON BASE**Abstract**

The study of the consequences of the impact of extreme working conditions on a person in such hard-to-reach climatic and geographical zones, such as Antarctica, makes it possible to approach the solution of the problem of deep space exploration. The conditions for a long stay at the Antarctic Vostok station are high-altitude hypoxia, the changed length of daylight hours (polar day and polar night), and more frequent heliogeomagnetic oscillations. The objectives of the research were to study changes in the of cardiac and hemodynamics circadian rhythms and human respiration under the influence of extreme factors during the prolonged stay at the Vostok station in relation to a long space flight, stay at the lunar base and medical support of polar expeditions. Registration of diurnal blood pressure (BP), the electrocardiogram (ECG) and breathing only during sleep were carried out in 9 men aged 49.7 ± 10.4 years. The study was carried out within 24 hours, at the 2nd, 4th, 8th and 10th months of wintering. Everyone polar explorers marked episodes of cardiac arrhythmias in the form of ventricular and supraventricular extrasystoles, episodes of tachycardia. The BP data obtained showed an increase in both the average diurnal grows of BP and the facts of nocturnal hypertension at almost all members of the expedition. For the first time, quantitative data on sleep apnea increasing within the duration of wintering are presented. It is important that respiratory arrest at everybody polar explorers was characteristic of the central type of apnea, with the cessation of not only the air flow, but also the movement of the chest. The data obtained on the heart rate variability showed the increasing role of the sympathetic branch of the autonomic nervous system in the process of adaptation to polar wintering conditions. Also, for the first time, within the framework of the study of the vascular bed, the state of the vessels of the fundus were monitored using a portable digital camera, filmed every 2 months of wintering. The state of the fundus vessels reflected the general

trend of adaptation of the cardiovascular system. There was a moderate narrowing of the fundus arteries and increased venous blood filling. This work was supported by the Russian Academy of Sciences (64.1).