

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

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DAY- VS. NIGHT TIME HEART RATE VARIABILITY CHANGES IN MICROGRAVITY:  
EXPERIMENTS “PNEUMOCARD” AND “SONOCARD”**Abstract**

**Introduction.** Heart rate variability (HRV) analysis may reflect at least in part the sympathovagal balance of autonomic heart rate (HR) control. HRV analysis is part of two inflight experiments, “Pneumocard” and “Sonocard”. “Pneumocard” measures autonomic HR control under day time resting conditions. “Sonocard” measures HRV during sleep. We tested the hypothesis that HRV changes seen during long term microgravity at day time may be accompanied by similar changes of HRV during sleep. **Methods and Materials.** 10 male Russian crew members participated in both flight experiments starting with the ISS mission 16. During the “Pneumocard” experiment an ECG was recorded under resting conditions at day time and with spontaneous breathing before flight, monthly inflight and after landing. During the “Sonocard” experiment a seismocardiogram was recorded continuously during sleep every two weeks by simply putting the sensor into the chest-pocket of the cosmonauts shirt. Sample rate of the ECG and SCG was 1 kHz. HRV was analyzed in the time (mean; SD; CV; SDNN; pNN50; SI – stress index, modification of TI - triangular index) and frequency domain (TP - total power, VLF - very low frequency, LF - low frequency, HF - high frequency power) using 5 minutes intervals in accordance with the standards of the European Task Force. **Results.** Mean HR was lower and HRV in the time domain (SDNN, pNN50) tended to be higher during sleep throughout the space flight. Relative LF power of HRV in **Conclusions.** Our data clearly demonstrate that seismocardiogram recordings are reliable to perform HRV during sleep in microgravity. Moreover, comparisons of HRV analysis between day time and sleep recordings may provide deeper insight into the mechanisms of changed autonomic HR control, which may be functional and due to preflight and daily activities without consequences on HR control during sleep. The impact of those findings for crew health monitoring needs further investigations.