Paper ID: 43156
student

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

Author: Ms. Lea Rundfeldt
Charité Universitätsmedizin Berlin, Germany

Dr. Martina Anna Maggioni
Charité Universitätsmedizin Berlin, Germany
Mr. Marc Jörres
Charité Universitätsmedizin Berlin, Germany
Prof. Hanns-Christian Gunga
Charité Universitätsmedizin Berlin, Germany
Dr. Mathias Steinach
Charité Universitätsmedizin Berlin, Germany

CARDIAC AUTONOMIC MODULATION AS A TOOL TO PREDICT PERFORMANCE IN A 100 KM ULTRAMARATHON

Abstract

In ultramarathon competition, endurance performance may be monitored and predicted by assessment of cardiac autonomic modulation in terms of heart rate variability (HRV). As for pre-race investigation, the optimal methodological approach is yet to be elucidated.

We therefore aimed to assess implications for the predictive value of pre-race HRV assessment regarding differences related to age, gender, day, and day-time of measurement. From 19 competitors (ALL: 10 males, 9 females; mean age 35.5 y) of a 24-hour ultramarathon (10 finishers: total covered distance 100 km; 9 non-finishers: mean total covered distance 78.5 km), baseline R-R interval recordings were obtained in supine (10 min) and standing (5 min) position.

Subgroup differences in baseline HRV upon supine and standing were observed for gender and age ($P < 0.05$). There were no significant baseline differences between finishers and non-finishers, or related to the day or day-time of assessment. In supine position, for ALL, higher indexes of vagal drive and total power in HRV were positively correlated with performance (i.e., the higher NN50, HFnu and TPlog (all $P < 0.05$), the higher the velocity and the longer the total covered distance). Also, there were associations between performance and the autonomic reaction to orthostatic challenge: competitors with a lower decrease in parasympathetic drive indexes (e.g. NN50) and/or a greater increase of sympathovagal balance (e.g. LFnu, DFAα1) in the posture change from supine to standing, accounted for a higher velocity and longer total covered distance ($P < 0.05$). For subgroups, this was comparably observed independent of age, but with significant differences between gender, day and day-time of recording.

Assessment of HRV, especially combined with an orthostatic challenge, may be a valuable tool for monitoring and predicting performance in ultra-endurance competition. Our findings indicate several methodological implications, as for significant subgroup differences upon baseline, as well as differential sensitivity for performance prediction, depending on gender and exact time of pre-competitive assessment.