ASSESSMENT OF REPEATED SPRINT ABILITY USING A COMBINED SUBMAXIMAL AND EXHAUSTIVE TREADMILL PROTOCOL

Drust, B. 1), Cullen, C. 1) & Di Michele, R. 2)

1) Res. Institute for Sports & Exercise Sciences, Liverpool John Moores University, UK
2) Dep. of Histology, Embryology & Applied Biology, University of Bologna, Italy

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Introduction

Repeated sprint ability (RSA) is a key capacity for a football player [1]. Repeated sprint performance is therefore an important component of any physiological test battery used within the sport. The majority of assessments for RSA have been designed for field based testing despite the need to frequently evaluate such performance characteristics in the laboratory. This study aimed to analyze the reliability and validity of a new exhaustive RSA test (RST) for a motorized treadmill.

Methods

Nine football players completed a $\dot{V}O_2$max assessment and a Yo-Yo IR2 test. Participants then completed the RST test on a motorized treadmill twice in normoxia and once in hypoxic conditions (corresponding to a 3600-m altitude). The first phase of the RST protocol consisted of ten 15-s sprints at 23 km $\cdot h^{-1}$, interspersed by a 15-s static pause. Thereafter, the duration of each sprint and recovery period was increased and decreased by 5 s respectively every 5 sprints. The test was terminated upon volitional exhaustion. The maximum achieved heart rate (HR_{MAX}) during the test, and the end heart rate after the 10th sprint (HR_{10}) were recorded along with a ratings of perceived exertion (RPE_{10}). Upon the termination of exercise, the number of completed sprints (N_{SP}) and blood lactate concentration (LA) were measured.

Results & Discussion

When comparing the first vs. the second normoxia RST trial, the 95% limits of agreement were 0.33 ± 2.59 bpm (HR_{MAX}), 1.25 ± 7.31 bpm (HR_{10}), -0.4 ± 3.8 (RPE_{10}) and -0.44 ± 2.61 sprints (N_{SP}). This data would seem to indicate acceptable levels of reliability for all the considered variables. The number of completed sprints was highly correlated to both VO_2max (r_s=0.79, p=0.01) and Yo-Yo IR2 performance (r_s=0.88, p=0.001) illustrating a good concurrent validity for the test against recognised assessments of aerobic and anaerobic performance. In hypoxia vs. normoxia, significantly lower mean values were observed for HR_{MAX} (176.5 ± 6.3 vs. 189.4 ± 5.2 bpm, p=0.01), N_{SP} (9 ± 3 vs. 14 ± 3 sprints, p<0.001), and LA (11.6 ± 1.5 vs. 13.6 ± 2.2 mmol $\cdot l^{-1}$, p=0.044). The RST therefore demonstrated sensitivity to acute hypoxia.

Conclusion

The RST seems to provide an effective tool for an RSA assessment in a laboratory setting using a motorised treadmill.

References

1. Spencer, M. et al. (2005). *Sports Med,* 35(12): 1025-1044.