

Physiological Determinant of Yo-Yo Intermittent Recovery Test in Young Basketball Players

Carlo Castagna^{1,2}, Franco M. Impellizzeri³, Ermanno Rampinini³, Maurizio Marini⁴, Stefano D'Ottavio² and Vincenzo Manzi²

¹Scuola Regionale dello Sport delle Marche, Italian Olympic Committee (CONI), Ancona, Italy;

²School of Sport and Exercise Sciences, Faculty of Medicine and Surgery, University of Rome Tor Vergata, Rome, Italy;

³Human Performance Lab, S.S. MAPEI, Castellanza, Varese, Italy.

⁴Stamura Basket, Ancona, Italy.

Introduction

Yo-yo intermittent recovery (Yo-yo) test has recently been proposed to test team-sport players' endurance. To our knowledge no study has examined the relevance of the Yo-yo test for assessing aerobic fitness in basketball players. Therefore the first aim of this study was to examine the relationship between the Yo-yo test and laboratory-based aerobic-fitness parameters, in well-trained basketball players (population validity). The second aim was to assess the degree of association between Yo-yo performance and game-related physical-performance (McInnes, Carlson et al. 1995) to examine test specificity.

Methods

Twenty-two basketball-players (Stamura Basket, body mass 72.4 ± 11.4 kg, height 181.7 ± 6.9 cm, and age 16.8 ± 2 y) were tested for Yo-yo, VO_{2max} , ventilatory threshold (VT), running economy (RE, VO_2 at $8 \text{ km}\cdot\text{h}^{-1}$) and speed attained at VO_{2max} (MAS) on a motorized-treadmill. Gas analysis was performed using a portable gas analyzer (K4b², COSMED, Rome, Italy). Game-related physical performance was assessed before and after an experimental basketball game (Hoffman, Nusse et al. 2003).

Results

Players VO_{2max} , MAS, VT and Yo-yo performance values were $60.4 \pm 5.1 \text{ ml kg}^{-1} \text{ min}^{-1}$, $40.2 \pm 4.7 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ and $1678 \pm 397 \text{ m}$ respectively. Yo-yo performance resulted significantly correlated with VO_{2max} ($r=0.77$, $p<0.001$) and MAS ($r=0.71$, $p<0.001$). During the first and the second half of the experimental-game, players attained 86.2 ± 5.3 and $86.7 \pm 4.3\%$ of the individual HR_{max} , respectively ($p=0.42$). The mean blood lactate concentration during the experimental games was $3.72 \pm 1.39 \text{ mmol}\cdot\text{l}^{-1}$. Yo-yo was related to pre-post Line-drill (LD) decrements ($r= -0.51$, $p=0.04$).

Discussion/Conclusion

The present results support the likelihood of basic physiological association between Yo-yo performance and the individual level of aerobic-fitness in basketball players. The exercise intensity attained by our players in the experimental-game was similar to the values previously reported in professional basketball players during competition (McInnes, Carlson et al. 1995). These results support the ecological validity of the research design devised for this investigation.

The LD is a common performance test in basketball that is used to assess physical performance. The significant moderate association between Yo-yo performance and post-game decrements in LD performance suggests that the Yo-yo is relevant to basketball. On this basis, we suggest that the Yo-yo to be a potentially important basketball-specific field-test for assessing specific-endurance. However in order to fully validate Yo-yo test, it should be compared with selected game-activities through sound match and time-motion analysis.

References

Hoffman, J. R., V. Nusse, et al. (2003). "The effect of an intercollegiate soccer game on maximal power performance." *Can J Appl Physiol.* **28**(6): 807-817.

McInnes, S. E., J. S. Carlson, et al. (1995). "The physiological load imposed upon basketball players during competition." *Journal of Sports Sciences* **13**: 387-397.