Effect of active versus passive recovery on metabolism and performance during subsequent treadmill running

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Introduction
The positive effects of active versus passive recovery on subsequent exercise bouts are controversial (McAinch et al., 2004, Tessitore et al., 2003). Thus, the aim of the present study was to investigate metabolic and power performances in a subsequent bout of an aerobic exercise following passive and active recovery interventions.

Methods
Six males (age 21.9±1.2 yrs.; height 175.1±9.29 cm; body mass 71.2±9.8 kg; percentage of body fat 15.0±3.8%; VO2max 57.9±5.1 ml kg⁻¹ min⁻¹), recruited from the military population in Rome participated in this study. The study was designed to assess performance during two 20-min bouts of treadmill exercise separated by 4-hr rest (morning 10:00-12:00, afternoon 15:00-17:00). During the first two hours of the rest period participants received a standard meal (carbohydrates 58%, lipids 27%, proteins15%; total caloric intake 900 kcal). The treadmill exercise included four 5-min steps at 60%, 70%, 80% and 90% of individual’s HRmax, respectively. At the end of the first exercise bout participants were administered either active (15-min of low intensity dry-aerobic exercises) or passive recovery. Metabolic measurements included: oxygen consumption (VO2; Quark b², Cosmed, Italy), heart rates (HR; Polar, Finland), blood lactate (La; Accutrend Lactate Analyser, Roche, Switzerland), rate of perceived exertion (RPE), and tissue haemoglobin oxygen saturation (%StO2; Near InfraRed Spectroscopy, Inspectra, Hutchinson Technology, USA) of quadriceps muscle. Before, after the exercise bouts and after the recovery interventions, photocells (Optojump, Microgate, Italy) were used to measure participant’s counter movement jump (CMJ) and bounce jumping (BJ) performances. The participants’ body weight and water intake was registered until the end of the experimental session. ANOVA was applied (p<0.05) to test differences between passive and active recovery in performance and metabolic parameters.

Results
No significant difference was found between active and passive recovery for VO2 (Fig. 1), HR, La, RPE, body weight, and water intake. Significant (p<0.0001) higher %StO2 values were found (Fig. 2) for active recovery (78.9±10.1%) with respect to passive recovery (72.2±10.9%). In the morning, CMJ performances were significantly lower (p<0.01) before the exercise (pre test 31.0±2.5 cm; post test 33.5±2.2 cm; post recovery 32.5±1.7 cm). However, there were no differences when comparing active with passive recovery. No difference in BJ performances was found between test sequence (pre test 24.7±2.7 cm; post test 25.0±3.0 cm; post recovery 24.0±2.8 cm) and recovery interventions. When morning and afternoon performances were compared, no difference between recovery interventions was found.

Discussion/Conclusion
These preliminary results indicate that active recovery between exercise bouts does not result in a better maintenance of performance in the second bout of exercise when compared with passive recovery. However, the significantly higher %StO2 of quadriceps muscle following active recovery provides preliminary evidence for the diagnostic ability of this parameter with regard to muscle recovery.

References
Tessitore et al. (2003). 5th world congress of Science & Football 109
McAinch et al. In J Sport Nutrition and Exerc Metab; 14: 185-196