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O2SCORE DEVICE : ANALYSIS OF THE KINETICS OF RECOVERY AFTER EXERCISE

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Key Words : recovery, O2Score and antioxidant.

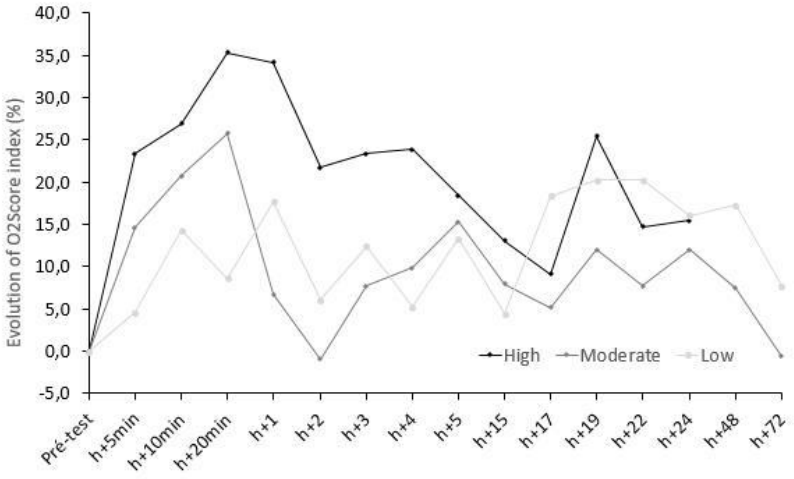
Abstract

Background : The O2Score system was recently developed as a mobile device able to measure the quantity of antioxidants in the body. Since the quantity of antioxidants is modified during effort (to provide a defense system against free radicals [1]) it appears that O2Score system could be used to follow and control the recovery of athletes. However, no known study was conducted to test the relevance of O2Score system.

Purpose: Therefore, the first aim of this preliminary study was to determine the ability of the O2Score to detect different levels of fatigue induced by different training loads. Second aim was to establish a link between perceptive scales and the results obtained with the O2Score.

Methods: 3 subjects were included in this study. Each one performed 3 sessions on a cycle ergometer: at low (mean mechanical work 300 ± 101 kJ), moderate (562 ± 188 kJ) and high (1099 ± 367 kJ) training load. The O2Score index (obtained using capillary blood sample) and Hooper scales ([2] graduated from 0 (good feeling) to 7 (bad feeling)) were used to quantify the recovery from +5 min post exercise to +72 h. Spearman test was used for correlation.

Results: The O2Score index increased until 20 min post-exercise whatever experimental sessions: + 35.3% after high, +25.7% after moderate and +17.7%



after low load. Then the O2Score index decreased until 2 hours post exercise with a tendency to return to basal values. After the curves overlapped.

Figure 1: Mean kinetics of the O2 Score index after each training load

A significant correlation was obtained between O2Score index and stress (R2 = 0.343; p <0.01), between O2Score index and torque sleep - stress (R2 = 0.275; p <0.01) and between O2Score index and the global scale sleep - stress - fatigue - muscle soreness (R2 = 0.162; p <0.05).

Spearman correlation with the Score EDEL			
	R	R^2	P Value
Torque Sleep - Stress	-0,524	**0,275****	0,005
Sleep - Stress - Fatigue - Muscle soreness	-0,402	**0,162***	0,035
Stress	-0,586	**0,343****	0,001

Tableau 1: Correlations between perceptual scales and O2Score index

Discussion : The O2Score device seemed sensitive to different post exercise training load with 3 distinct curves until 20 min post exercise. The explanation for this response is a difference in oxygen consumption. That is why a proportional increase of free radicals and antioxidant response [3]. However, between 2 and 72 h post exercise, it appears complex to provide a clear interpretation of the data that appear to be influenced by other factors than the training load such as stress, sleep or fatigue. Sure stress was the factor influencing the most the index O2score (R2 = 0.343; p <0.01). This result could be explained by the fact that after intense exercise, the recovery is faster with a lower stress level compared to high level of stress [4]. Another result concerns the significant correlation between the torque stress - sleep and O2Score index (R2 = 0.275; p <0.01). Indeed, the lack of sleep, as well as stress are known to be noxious for the recovery. The work of Milewski et al. (2014) [5] showed that athletes with low sleep time have a higher probability of injury than athletes with an adequate sleep time. A final correlation was obtained between the global scale sleep - fatigue - stress - muscle soreness and O2Score index (p <0.05, R2 = 0.162). An explanation could be that the O2 Score is a system involving all the parameters surrounding the athlete's environment.

Conclusions: The O2Score seems able to identify different training loads during the first 20 minutes post exercise. Factors significantly influencing O2Score index are stress, torque sleep - stress and all the parameters of the Hooper scales (sleep - stress – fatigue - muscle soreness).

References:

[1] Davalos, A., Gomez-Cordoves, C., Bartolome, B. (2004). Extending applicability of the oxygen radical absorbance capacity (ORAC-fluorescein) assay. *J Agric Food Chem*, 52 (1), 48-54.7.

[2] Hooper., Mackinnon. (1995). Monitoring overtraining in athletes : Recommendations. *Int J Sports Med*, 20(5), 321-327.

[3] Granger, DN., Korthuis, RJ. (1995). Physiologic mechanisms of postischemic tissue injury. *Annu Rev Physiol*, 57, 311-332.

[4] Styles-Kolehmainen, MA., Sinha, R. (2014). The effects of stress on physical activity and exercice. *Int J Sports Med*, 44(1), 81-121.

[5] Milewski, MD., Skaggs, DL., Bishop, GA., Pace, JL., Ibrahim, DA., Wren, TA., Barzdukas, A. (2014). Chronic lack of sleep is associated with increased sports injuries in adolescent athletes. *J Pediatr Orthop*, 34 (2), 129-133.