28th ECSS Anniversary Congress, Paris/France, 4-7 July 2023

Assessment of High-Intensity Training Load and Exercise-Induced Lipid Peroxidation in Professional Football Players

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INTRODUCTION:
It is documented that intense periods of football can induce lipid peroxidation, the negative effects of which can lead to compromised performance. However, few studies have explored the potential association between exercise-induced lipid peroxidation and training load intensity. Therefore, the aim of the study was to quantify a biomarker of lipid peroxidation relative to objective indicators of high-intensity training load in a cohort of professional football players throughout different phases of a competitive in-season.
METHODS:
Ten professional football players (age: 23 ± 2 yrs; body mass: 83.5 ± 6.2 kg; stature: 181.3 ± 5.3 cm; VO2max: 57.2 ± 6.7 mL·kg·min¯1) participated in the study. Training load was assessed at three time points throughout a competitive in-season (T1: early in-season [1st microcycle]; T2: mid-season [16th microcycle]; T3: end of in-season [32nd microcycle]) using Global Positioning System (GPS) and heart rate (HR) based methods to quantify high-intensity external training load (HETL) and high-intensity internal training load (HITL). Urine samples were collected at each time point and analysed for urinary malondialdehyde (MDA) as a biomarker of lipid peroxidation; data normalised to creatinine. Results presented as M ± SD.

RESULTS:
High-intensity training load varied significantly throughout the competitive in-season and was significantly higher at T2 compared to T1 (HETL: 18.56 ± 7.30 m.min-1 vs. 6.71 ± 2.62 m.min-1, an increase of 11.84 m.min-1, 95% CI [4.33, 19.36], p = .004; HITL: 60 ± 34 %Time spent > 80% HRmax vs. 23 ± 14 %Time spent > 80% HRmax, an increase of 37 %Time > 80% HRmax, 95% CI [13, 60], p = .004; T2 vs. T1, respectively). Urinary MDA concentrations decreased significantly throughout the competitive in-season, x2(2) = 6.889; p = .032, (T1: 0.76 ± 0.90 µM.mmol-1 vs. T3: 0.18 ± 0.12 µM.mmol-1, Z = -2.192, r = .52, p = .028). No significant correlations were observed between indicators of high-intensity training load and MDA.
CONCLUSION:
Participation in chronic football training appears to promote an adaptive response as lipid peroxidation was attenuated over the competitive in-season, irrespective of high-intensity training load. Monitoring urinary MDA may be a useful tool to provide sports scientists with an insight into adaptive or maladaptive responses throughout a competitive season in football.

Topic: **Physiology**

Presentation **Poster**

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