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ENDOCRINE, IMMUNE AND INFLAMMATORY ADAPTATIONS IN MEN FOLLOWING EXERCISE-INDUCED CHRONIC STRESS

Diogo V. Leal¹; Ariane Standing²; Glen Davison³; Anna Furmanski²; John Hough¹

Athletes elevate training load to improve physical performances. This process may lead to detrimental overreaching states (functional or non-functional) or to the more serious state, the overtraining syndrome (OTS). Overreaching is difficult to diagnose and recovery from these states may take weeks to years (Meeusen et al., 2013). Preliminary evidence suggests that blunted exercise-induced salivary testosterone and cortisol responses to a 30-min, high-intensity cycling bout may be indicative of overreaching (Hough et al., 2013). This test may not be useful for non-cyclists, therefore, a 30-min, high-intensity running bout ($RPE_{\text{treadmill}}$) using the Borg scale as a measure of exertion has been developed. Additionally, $RPE_{\text{treadmill}}$ induced reproducible plasma cortisol and testosterone responses in our laboratory (unpublished data). While overreached immunosuppression may occur (Lancaster et al., 2003). Cortisol influences inflammation regulation by elevating neutrophils and suppressing lymphocytes (Malm et al., 2004). Therefore, the reported blunted cortisol when in an overreached state may be linked with a suppressed immune function. Furthermore, incidence of upper respiratory tract infections increased with a 40% decrease in secretory immunoglobulin A (SIgA) after 5 days of military combat, returning to baseline levels after 1 week of recovery (Tiollier et al., 2005). This study aims to examine $RPE_{\text{treadmill}}$ -induced leukocyte proliferation, neutrophil phagocytic activity, plasma cortisol and testosterone, SIgA and cytokine responses, before and after a 12-day intensified-training (intercalated a)90-min run at ~60% velocity at maximal oxygen uptake; b)5-km time-trial; c)70-min run at ~13 (somewhat hard) on the Borg scale) and 5-day recovery periods. To date, 4 (aim $N = 8$) healthy, active males (means $\pm$ SD; age: 24 ± 6 y; height:

• 91

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175 ± 6 cm; body mass: 72.3 ± 6.2 kg; maximal oxygen uptake: 54 ± 6 ml·kg⁻¹·min⁻¹) completed the study. Recovery-stress and URTI questionnaires were completed before and after training and recovery. Flow cytometric analysis of leukocyte subsets and neutrophil phagocytic activity was performed. Inflammatory markers will be analyzed upon cessation of data collection (April 23rd). Blunted exercise-induced SIgA is expected following chronic stress. Training volume increased by ~178% during the 12-day period. Exercise-induced plasma cortisol and testosterone increased (~16%) and blunted (~15%) after training, respectively. Exercise-induced neutrophil phagocytic activity elevated by ~109% Pre-training and blunted by ~36% Post-training. Pre-training, RPE_{treadmill} reduced total whole blood leukocytes whilst neutrophils elevated. Opposite responses were observed Post-training. This study may uncover some effects of overreaching/OTS in immunity and inflammation and propose the utilization of the RPE_{treadmill} as a novel, suitable tool to be used to highlight overreaching aiming to reduce OTS.