



## Abstract

# Different Kinetics of Oxidative Stress and Inflammatory Markers after Eccentric Exercise in Upper and Lower Limbs <sup>†</sup>

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**Abstract:** **AIM:** Subclinical, low-grade, inflammation is one of the main pathophysiological mechanisms underlying the majority of chronic diseases. It is therefore obvious that an inflammatory model, inducing inflammatory responses to humans in a regulated, specific, and non-harmful way, could greatly facilitate the assessment of redox and immune status. Exercise-induced muscle damage (EIMD) could serve as such a model; however, the kinetics of biomarkers may be substantially different according to the muscle groups examined. Therefore, the aim of this study was to assess the responses of selected inflammatory and redox biomarkers after eccentric-induced muscle damage in upper and lower limbs. **MATERIAL & METHOD:** Ten healthy, sedentary volunteers (5 males) performed, in a randomized and cross-over fashion, two discrete exercise protocols in lower (10 sets × 10 drop jumps from a height of 40 cm) and upper extremities (8 sets × 10 eccentric muscle contractions of the biceps at 90% of 1RM) separated by 6 weeks. Venous blood samples were collected pre-, immediately post-, 2, 24 and 48 h after the exercise protocols. Body composition was evaluated with dual-energy X-ray absorptiometry, blood cell count analysis by an automated hematology analyzer, CK, CRP and IL-6 by commercially available kits, while serum glutathione peroxidase (GPX3) by enzymatic assays adapted for microwell plates. **RESULTS:** A different pattern of response (time × protocol  $p < 0.05$ ) was observed for CK, IL-6 and CRP, with lower limbs reaching the highest increases at 2 h post-exercise, while upper limbs at 24 and 48 h. A similar response between the two protocols was observed for WBC and neutrophils, with a transient 30% increase at 2 h (time  $p < 0.05$ ). No effect of time or protocol was observed for GPX3. **CONCLUSIONS:** Kinetics of selected inflammatory and redox biomarkers follow different patterns depending on the muscle group tested. Thus, depending on the targeted muscle group, blood samples should be obtained at specific time points. The higher levels of CK, IL-6 and CRP at 24–48 h implies an augmented inflammatory response at upper limbs, probably due to a lower adaptation to eccentric exercise, indicating that EIMD of upper limbs is a better protocol for the assessment of the inflammatory status in humans.

**Keywords:** eccentric exercise; inflammation; oxidative stress



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