PROJECT REVIEW

"Effects of glucocorticoid during repeated bouts of high-intensity exercise"

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This project, which constitutes a follow-up from two previous works funded by WADA aims at widening our understanding of the effects of glucocorticoids (GC) on muscle function, exercise performance, postural control and health risks. Indeed, we demonstrated in our previous works that short-term but not acute GC administration improves performance during endurance exercise lasting at least 40 minutes, without any gender effect. However, no study, to our knowledge, has focused on the ergogenic effects of GC during repeated bouts of high-intensity exercises. In the same way, whether the numerous deleterious effects of chronic (>1 month) GC intake are well known, there is no consensus on health risks after short-term (1 week) systemic GC intake.

We therefore propose to study whether short-term GC administration would improve performance during repeated bouts of high-intensity exercise. In parallel, we will investigate with complementary methods the repercussions of GC administration on biomechanical (especially the magnitude of the braking of the fall during the swing phase), and physiological parameters (cardio-respiratory, muscular and inflammatory) in order to assess both GC ergogenic effects and health risks induced by short-term high dosage treatment.

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Results and Conclusion

In the project "*Effects of glucocorticoid during repeated bouts of high-intensity exercise*" we tested the ergogenic effects and health risks of short-term GC administration. Physiological and biomechanical parameters were analyzed. Several results can be highlighted:

- No ergogenic effect of short-term systemic GC (i.e. 60 mg prednisone/day/7 days) was found during repeated bouts of brief intense exercise. Muscle oxygenation parameters measured with the near infrared spectroscopy technique were not altered by short-term GC administration at rest and during repeated bouts of high-intensity exercise. These suggest that GC treatment had no effect on the blood oxygen transport capacity and on the muscle oxygen extraction during exercise. The unaltered oxygen availability at the muscle level seems to be in accordance with the lack of improvement in performance during the last sequence of hopping with the GC treatment.

- Regarding hormone responses during exercise, while no change was found in saliva testosterone, GC intake induced changes in saliva cortisol and DHEA concentrations. In parallel, blood IL-6 and IL-10 were altered at rest and during the exercise performed. It is interesting to note that the anti-inflammatory effects of prednisone were maximal and stable from the beginning of treatment, in the resting and exercise conditions. However, hormonal concentrations continued to decline during short-term intake. Lastly, our study shows that short-term prednisone treatment affects the circadian pattern of saliva DHEA but not testosterone in our recreationally trained subjects.

- Regarding baroreflex sensitivity (BRS), heart rate (HR) and systolic blood pressure (SBP) variability (HRV, SBPV) short-term GC intake did not change SBP. However, a low frequency (LF) SBPV increase associated with a LF-BRS decrease and a HR increase was observed, indicating a sympathetic cardiovascular stimulus.

- Regarding EMG activities in the ankle extensors EMG during single leg hopping, and balance control during single stance of the first step in gait initiation, no GC effect was

noted compared to placebo.