**SPINAL MODULATION OF THE MUSCLE ACTIVITY AFTER PROLONGED RUNNING**

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Purpose: To investigate the spinal loop modulations after prolonged locomotion activities.

Methods: Eleven males (aged 19 to 30 years) randomly performed two 90-min running exercises either continuously (CONT, first ventilatory threshold) or intermittently (INT, 150 s at a velocity 20% higher than during CONT / 30 s of recovery). Neuromuscular tests of the plantar flexors (including Mmax and Hmax at rest as well as Msup and Vsup during MVC) were performed before then 5 and 30 min after the running exercises. Data were analyzed for each variable by a two-way ANOVA for repeated measures.

Results: During MVC, the torque significantly decreased (P<0.05) from pre- to 5 and 30 min post-exercise (-11% and -9%, respectively), as did the RMS/M ratio (-11% and -13%, respectively) and the V/M ratio (-19% and -37%, respectively) for the soleus muscle. At rest, the H/M ratio also decreased significantly (P<0.001) from pre- to 5 and 30 min post-exercise (-61% and -55%, respectively). Lastly, no difference in the alteration of spinal loop properties was noted between CONT and INT.

Discussion: In the present study, significant decreases in the evoked reflex-wave amplitudes (i.e., both Hmax and Hmax/Mmax) were observed after a 90-min running exercise performed continuously or intermittently. This indicates for the first time that a decrease in motoneuron pool excitability probably occurs after this type of task. A presynaptic inhibition of the motoneuron pool mediated by group III and IV muscle afferents seems the more probable explanation for the decreased amplitude of the reflex waves observed in this study. However, the possibility of changes in the intrinsic properties of human motoneurons has not yet been addressed.

Conclusion: Our results confirmed the occurrence of central fatigue (according to the superimposed twitch method and the RMS/Msup ratio) after a prolonged locomotion task. In accordance with our initial hypothesis, the main findings show for the first time a spinal component to this central fatigue. In general terms, if an alteration in physiological function, for example a change in skeletal muscle contractile properties, is called "fatigue", other factors should be named "modulation" if they are linked to a conscious or unconscious decision of the subject to adapt the exercise intensity.

The second purpose of this study was to determine whether an intermittent exercise with brief recovery periods would minimize central fatigue. The H-reflex and V-wave suggest a modulation of spinal loop properties after prolonged running that was independent of the continuous/intermittent running session.