## Summary

**The effect of short-term lower limb ischaemia on human plantar-flexors muscle force and related neuromechanical mechanisms**

Ischemic lower limb is a syndrome that causes neuromuscular dysfunction in both acute and chronic periods. Only a short period of ischaemia can produce disturbances affecting peripheral and spinal mechanism of human motor control. The aim of this study was to assess the influence of short term ischaemia in lower limb on plantar-flexors muscle force production, eliciting by H-reflex and M wave recruitment curves and to determine the main site in the neuromuscular system affected by the pathogenic condition of ischaemia.

Seventeen healthy adult volunteers participated in the study with their Informed consent. The subjects lay prone on a physiotherapy table with both legs extended and the right foot attached and secured to the force platform. Ischemia was induced by blood pressure cuff placed around the right thigh 15 cm above the knee and inflated to a pressure of 200 mmHg for 10 min. During the experiment, the plantar-flexors force, H and M-responses of soleus muscle evoked by tibial nerve stimulation were measured at rest, during 10 minutes of ischaemia, 10 and 20 minutes after the occlusion was released. Obtained data were analyzed by means of one-way repeated measures ANOVA with Tukey post hoc analysis ($p<0.05$).

Background EMG activity of the soleus muscle was not significantly different between the four periods of experiment. However, thresholds, recruitment curves and transmission across the synapses of Ia afferent were significantly altered during ischemia. At the post-ischeamic period the plantar flexors force fall significantly compare to pre-ischemic values and to ischaemia.

In conclusion our results show that ischaemia significantly reduce the mechanical performance (force) of plantar-flexors muscle for at least 10min and induce metabolic intracellular processes influencing excitability of both peripheral nerves and muscle fibers. These changes resulted in alteration of neuromechanical coupling.



**Keywords:** H-reflex, Ischaemia, Nerve excitability, Synapse transmission, Plantar-flexors muscle force, Neuromechanical coupling.