O21. BLOOD FLOW RESTRICTION DURING AN INCREMENTAL MAXIMAL RUNNING PROTOCOL

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AIM: Blood flow restriction (BFR) has gained the interest of the scientific community. Numerous studies are being conducted to examine the chronic benefits of BFR in muscle strength and hypertrophy, as well as in aerobic and anaerobic capacity and performance. However, the acute effect of BFR on maximal oxygen consumption (VO2max) has not been studied. The purpose of this study was to examine the influence of BFR application during a maximal incremental running protocol.

MATERIAL AND METHOD: Nine male club level runners (41.1 + 7.7 yrs, 175.9 + 6.6 cm, 73.51 + 6.50 yrs, mean + SD) performed twice an incremental running protocol (speed increment 1 km/h per 90 s, inclination 0%) to volitional fatigue with (BFR) and without (Control) BFR in a random order. The occlusion pressure applied for BFR was at 40% of the total BFR and cuffs were placed at the upper third of the thigh. During the Control condition participants were only wearing the cuffs without any further pressure applied. Diet and physical activity on the day before and the day of the measurements were controlled

RESULTS: Exercise time (BFR: 483 + 83 Vs. Control: 588 + 67 s, p=0.001) and speed at VO2max (BFR: 16.4 + 1.7 km/h Vs. Control: 17.5 + 1.0 km/h, p=0.007) were lower with occlusion, whereas no difference (p> 0.05) was observed in VO2max (BFR: 49.9 + 5.7 Vs. Control: 50.2 + 5.9 ml/kg/min), lactate before (BFR: 2.1 + 0.6 Vs. Control: 3.0 + 1.2 mmol.l-1) and 5 min after exercise (BFR: 13.3 + 3.6 Vs. Control: 15.4 + 5.8 mmol.l-1). On the other hand, average heart rate (BFR: 168 + 11 Vs. Control: 164 + 11 b/min, p=0.032), perceived rate of exertion (BFR: 12 + 2 Vs. Control: 10 + 1, p=0.024) and a 10-point pain scale (BFR: 4.5 + 1.2 Vs. Control: 1.7 + 0.7, p< 0.001) were lower in Control condition.

CONCLUSION: The application of BFR at 40% of the total BFR during an incremental running protocol reduces exercise time and speed at VO2max but does not affect VO2max values in male club level runners.

O22. NIRS-DERIVED MUSCLE DEOXYGENATION AND MICROVASCULAR REACTIVITY DURING OCCLUSION-REPERFUSION AT REST ARE ASSOCIATED WITH WHOLE-BODY AEROBIC FITNESS

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AIM: Near-infrared spectroscopy-(NIRS) indices during an arterial occlusion-reperfusion maneuver have been used to examine the muscle oxidative metabolism and microvascular function; both important determinants of whole-body aerobic-fitness. We examined whether NIRS-derived indices of muscle deoxygenation and microvascular reactivity assessed during an occlusion-reperfusion at rest are (i) associated with maximal/submaximal indices of whole-body aerobic-fitness and (ii) could discriminate individuals based on their VO2max. We, also, investigated which NIRS-parameter during occlusion-reperfusion correlates best with whole-body aerobic-fitness.

MATERIAL & METHOD: Twenty-five young individuals performed an arterial occlusion-reperfusion at rest. Changes in oxygenated- and deoxygenated-hemoglobin (O2Hb and HHb, respectively) in vastus-lateralis were monitored and the adipose tissue thickness (ATT) at NIRS-application was assessed. Participants also

underwent a maximal incremental exercise test for VO2max, maximal aerobic velocity-(MAV), and ventilatory-thresholds-(VTs) assessments.

RESULTS: The HHbslope and HHbmagnitude of increase (occlusion-phase) and O2Hbmagnitude of increase (reperfusion-phase) were strongly correlated with VO2max (r=0.695-0.763, p<0.001) and moderately with MAV (r=0.468-0.530;p<0.05). O2Hbmagnitude was moderately correlated with VTs (r=0.399-0.414;p<0.05). After controlling for ATT, the correlations remained significant for VO2max (r=0.672-0.704;p<0.001) and MAV (r=0.407;p<0.05). Individuals in the high percentiles after median and tritile splits for HHbslope and O2Hbmagnitude had significantly greater VO2max vs. those in the low percentiles (p<0.01-0.05). NIRS-parameters showed an excellent-outstanding ability to detect high VO2max values (>56ml·kg-1·min-1; AUC:0.807-0.904;p<0.01-0.05). The HHbslope during occlusion was the best predictor of VO2max.

CONCLUSIONS: NIRS-derived muscle deoxygenation and microvascular reactivity (reoxygenation) indices during a single arterial occlusion-reperfusion maneuver performed are strongly associated with whole-body maximal indices of aerobic-fitness (VO2max, MAV) and may discriminate individuals with different VO2max.

O23. THE EFFECT OF EXERCISE-INDUCED MUCLE DAMAGE ON MUSCLE AND CEREBRAL OXYGENATION AND ON MUSCLE MORPHOLOGICAL FEATURES

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AIM: The aim of the present study was to investigate the effect of eccentric exercise-induced muscle damage on muscle and cerebral oxygenation and the muscle architecture of vastus lateralis.

MATERIAL & METHODS: Twelve healthy men (age 25.2±4.8 years, mass 79.4±10.2kg, height 1.80±0.13m, and BMI 24.5±2.2) performed five sets of ten repetitions of unilateral eccentric exercise (ECC) on a 45-degree leg press machine at an intensity of 70% of maximal concentric contraction. The experimental limb was randomly selected and the contralateral leg was used as a control. Pre and 48 hours after ECC, muscle and cerebral oxygenation (Δ[H2Ob], Δ[HHb], Δ[tHb]) were evaluated using near-infrared spectroscopy (Portamon, Artinis Medical System, The Netherlands) at rest, during 5 and 30 seconds of maximal isometric contraction on a modified force platform. At the same time points, the rate of force development (RFD) was assessed during isometric muscle contraction and concentric muscle strength. The architectural structure of vastus lateralis was evaluated through ultrasound imaging pre- and 48 hours post eccentric exercise (Z5 Mindray, Bio-Medical Electronics Co., Ltd, Shenzhen, China).