CONCLUSION

Post-exercise urine lactate (UL) has been suggested as a novel exercise biomarker of lactate production. The few studies examining the association between post-exercise peak blood lactate (BL) and UL have reported moderate to high linear correlations. However, these studies have not considered BL concentration during exercise. Also, the range of BL values was narrow (about 10 mmol/L), thus limiting the predictive value of UL.

PURPOSE: To examine the association between UL and BL concentrations during continuous and interval exercise of equal mean power.

METHODS: Eleven healthy young males performed four trials in random, counterbalanced order, one week apart. All trials included 20 min of cycling with equal mean power output, performed either continuously (CON) or in the form of interval training including 48 ± 10 s (HIIT10), 16 ± 30 s (HIIT30), or 8 ± 60 s (HIIT60) bouts at a power output corresponding to 100% of VO2max. Recovery intervals during the HIIT trials included cycling at 15% of VO2max for 150% of the exercise bout time. Capillary BL concentration was measured at rest and every 5 min during exercise, and UL concentration was measured in urine samples obtained pre- and 1 hour post-exercise, with controlled hydration. BL and UL results were analyzed using 2-way ANOVA with repeated measures (trial x time). The association between incremental area under the blood lactate curve (BL-UL) and UL concentration was determined using linear and exponential functions.

RESULTS: BL increased compared with baseline in all trials from the first 5 min of exercise (p < 0.01). BL-AUC increased from CON to HIIT10, HIIT30 and HIIT60 (61.7 ± 21.2, 83.4 ± 29.0, 97.8 ± 34.0, 147.4 ± 44.2 mmol/L·min, respectively, p < 0.01). However, post-exercise UL increased from baseline only in HIIT60 (from 1.2 ± 1.0 to 22.5 ± 23.3 mmol/L, p < 0.001). Exercise BL ranged from 3.0 to 17.7 mmol/L, while post-exercise UL ranged from 0.2 to 76.4 mmol/L. The best function describing the BL-AUC and UL relationship was exponential (r = 0.68, p < 0.05).

CONCLUSIONS: The lack of increase in UL despite an increase in BL and their exponential association suggest that there may be a threshold above which BL cannot be disposed within the body and is excreted by the kidneys.

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The Autonomic Balance Of Master Athlete During Stress Is Associated To Antioxidant Profile

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There is a lack in the literature regarding the relationship between autonomic function, as measured by markers of heart rate variability, and the redox balance of master athletes.

PURPOSE: The redox profile and autonomic responses to stress were measured in master athletes and untrained controls, and the relationships between markers of HRV and redox balance were determined.

METHODS: Participants (n=55) were 16 master athletes (52.7±9.7yrs, minimal of 20 yr. of lifelong athletic training), 19 age-matched (49.5±10.5yrs) and 20 young controls (22.4±3.8yrs). The volunteers remained seated for 15-min in early morning, with the final 10-min being considered for baseline HRV recordings (Polar RS800X Heart Rate Monitor®), and then were submitted to a cold pressure test (CPT) by immersing the right hand in cold water (3.4 °C) for two minutes in which HRV was measured. The pro- and anti-oxidant status were determined in blood after 8-hour fasting by using commercial kits. A two-way ANOVA with repeated measures and Pearson’s moment correlation enabled for comparisons and correlations.

RESULTS: The autonomic profile of master athletes was better than age-matched controls and similar to young control group. No significant correlations were observed between redox profile and HRV parameters in resting [SOD, CAT, AU & TBARS (p=0.05)]. However, during stress (CPT) the participants who presented a higher HRV index (indicating an increased parasympathetic tone during CPT) had a better antioxidant defense, with significant correlations between SOD vs. SDNN (r=0.389; p=0.02), RMSSD (r=0.362; p=0.03), and mn50 (r=0.416; p=0.01); between CAT vs. Mean R-R (r=0.346; p=0.03), SDNN (r=0.375; p=0.02), and RMSSD (r=0.348; p=0.03); as well as between AU vs. mn50 (r=0.383; p=0.02). Similar relationships were observed during post-stress recovery: SOD vs RMSSD (r=0.386; p=0.02) and mn50 (r=0.395; p=0.02); CAT vs. RMSSD (r=0.436; p=0.008) and mn54 (r=0.413; p=0.01); and AU vs. RMSSD (r=0.386; p=0.02) and mn50 (r=0.350; p=0.03).

CONCLUSION: Besides having a better autonomic and redox balance in comparison to aged-matched controls, the responses of master athletes were similar to young group. Moreover, an improved autonomic balance during stress was associated to a better antioxidant status of the participants.

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Effect Of Wearing Compression Tights On Muscle Oxygenation And Exogenous Glucose Utilization During Prolonged Cycling

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There is a lack in the literature regarding the effect of wearing compression tights on muscle oxygenation and exogenous glucose utilization during prolonged cycling in endurance athletes.

PURPOSE: To determine effect of wearing compression tights on muscle oxygenation and exogenous glucose utilization during prolonged cycling in endurance athletes.

METHODS: Ten triathletes (19.9 ± 1.2 years, 172.2 ± 4.4 cm, 62.0 ± 3.8 kgBMI, 20.9 ± 0.7 kg·m-1; VO2max; 59.3 ± 4.4 ml·kg-1·min-1) completed 3 trials under respective conditions: 1) wearing a compression tights with approximately 15 mmHg [MED trial], 2) wearing a compression tight with approximately 30 mmHg [HIGH trial], and 3) wearing a tight with below 5 mmHg [CON trial]. The exercise consisted of 90 min of cycling at 65% of VO2max. Changes in exogenous glucose utilization (1C excretion in expired gas after consuming 1C labeled glucose), muscle oxygenation (oxy-hemoglobin, deoxy-hemoglobin, total hemoglobin and tissue saturation index), blood parameters (blood glucose and lactate, and serum glycerol, insulin and total ketone body concentrations), blood gas parameters (pH, pO2, pCO2, HCO3-, Na+ and K+), respiratory variables (VO2, VCO2, VE, RER), heart rate and rating of perceived exertion were evaluated throughout the exercise. Time to exhaustion test (at 85% of VO2max) was performed after completing 90 min of cycling to evaluate endurance performance.

RESULTS: Exercise rapidly increased 1C excretion, but highest value of 1C excretion was significantly shown earlier in the MED trial (47.1 ± 9.9 min) compared with the other trials (HIGH trial: 67.3 ± 23.7 min, CON trial: 54.0 ± 9.5 min, P = 0.033). Although MED trial showed significant lower oxy-hemoglobin throughout the exercise (P = 0.003), the changes in deoxy-hemoglobin, total hemoglobin and tissue oxygenation index did not differ among the trials. No significant difference was observed for changes in other variables among the trials.

CONCLUSION: Wearing a compression tights exerting approximately 15 mmHg on thigh facilitated exogenous glucose utilization during 90 min of cycling.