TACSM Abstract

Differences in Skeletal Muscle Oxygenation of Vastus Laterals and Gastrocnemius During Exhaustive Exercise

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ABSTRACT

Maximal oxygen uptake (VO_2 Max) is utilized to assess cardiorespiratory fitness (CRF) and performance in various populations. Although VO2max is the gold standard for assessing aerobic performance and CRF, the accessibility, time, and cost are limiting factors for frequent evaluation. Recently, skeletal muscle oxygen saturation (SmO_2) has been utilized to characterize the amount of oxygen available in skeletal muscle tissue and the efficiency of oxygen uptake and to serve as an alternative metric to assess CRF. However, minimal research has been conducted to observe the difference in SmO_2 location placement between the vastus laterals (VL) and gastrocnemius (GS) during exhaustive aerobic exercise. **PURPOSE**: The purpose of this study was to assess differences in SmO_2 levels between the VL and GS during maximal exercise **METHODS**: Ten healthy fit individuals (Age 38.6 + 16.0 yrs.; Ht. 66.5 + 4.0 in.; Wt. 153.4 + 26.8 lbs.; %BF 23.6 + 9.4; VO_2 37.7 + 12.4 ml/kg/min^{-1}) completed a single VO_2 max ramp protocol treadmill test while wearing a MOXY sensor to assess SmO_2 differences. The MOXY sensor was placed on the VS, 6 inches above the lateral border of the patella, and on the lateral posterior belly of the GS. SmO_2 and total hemoglobin (THb) were obtained at baseline, the end of the exercise protocol, and during recovery. The data was analyzed using a paired sample t-test to compare SmO_2 and THb measures of the VL and GS and a 2 (site) x 3 (time) ANOVA. All analyses were performed on SPSS (v.29.01). **RESULTS**: There were significant differences observed in THb at rest between the VL and GS ($t = -2.54$, $p = 0.017$), but not during exercise. SmO2 was significantly difference between the VL and GS during exercise ($t = -1.92$, $p = 0.046$) and recovery ($t = 8.91$, $p = 0.001$). SmO_2 and THb significantly decreased during exercise ($F = 11.87$, $p = 0.006$) and returned above baseline during recovery. **CONCLUSION**: There are significant differences in SmO_2 concentrations based on the site (VL or GS) placement of the MOXY sensor. Differences in SmO_2 concentrations based on sites are potentially the result of the VL being more aerobic when compared to the GS and an individual's CRF training status.