TACSM Abstract

Skeletal Muscle Desaturation during Moderate and Severe Intensity Cycling Exercise is related to Half-Time from the Reactive Hyperemia Response

JACOB R. DELLINGER & JOAQUIN U. GONZALES

Vascular Aging Laboratory; Department of Kinesiology & Sport Management; Texas Tech University; Lubbock, TX

Category: Masters

Advisor / Mentor: Gonzales, Joaquin (joaquin.gonzales@ttu.edu)

ABSTRACT

Reactive hyperemia responses are a common method for assessing peripheral microvascular function, and the half-time reperfusion response, in particular, has been shown to be highly reproducible and sensitive to vascular dysfunction associated with disease. It is unclear, however, whether this parameter also provides information about microvascular responses during exercise. **PURPOSE**: The aim of this study was to determine the relationship between reactive hyperemia half-time response and the change in skeletal muscle oxygenation during cycling exercise. **METHODS**: Thirty young adults (20 men, 10 women; Age: 23 ± 5 y; peak VO_2: 35.4 ± 4.4 ml/kg/min) completed a maximal cycling exercise test to determine moderate (95% gas exchange threshold, GET) and severe (75% of the difference between the GET and peak VO_2) intensities for a cycling exercise protocol. Upon a follow-up visit, reactive hyperemia was measured using near-infrared spectroscopy (NIRS; PortaLite, Artinis Medical Systems, Netherlands) at the vastus lateralis muscle. Following a five-minute occlusion period, oxygen resaturation rate was recorded, and the half-time was determined as the time to reach 50% of the peak hyperemic response. During cycling exercise, the change in tissue saturation index (TSI) was measured using NIRS at the same location on the vastus lateralis as reactive hyperemia. Steady-state TSI was recorded as the 60-second average at the end of two 4-minute bouts of moderate exercise, and at 60-seconds into one bout of severe exercise. TSI is reported as the change in oxygenation from a 20 Watt cycling baseline. Pearson correlations were used to determine associations, and data are reported as mean ± SD. **RESULTS**: The half-time resaturation response was found to be 16.5 ± 4.9 seconds. The change in TSI during moderate exercise (-3.4 ± 2.4%) was correlated with the half-time response ($r = -0.42$, $p = 0.01$). Additionally, the change in TSI during severe exercise (-7.2 ± 2.8%) was correlated with the half-time response ($r = -0.53$, $p = 0.002$). These results remained significant after adjusting for sex or skinfold thickness using partial correlation. **CONCLUSION**: Our results suggest that lower peripheral microvascular vasodilatory capacity at rest, as indicated by the TSI half-time response, is related to higher rates of desaturation during moderate and severe intensity cycling exercise.