**Differences in muscle O2 dynamics during treadmill exercise between aerobic capacity-matched overweight and normal-weight adults**

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**Abstract:** Overweight is an important health issue in the world, and overweight people are characterized not only by excess adipose tissue but also by several functional alterations. However, effects of overweight on O2 dynamics in skeletal muscle during exercise are not fully understood. Previous studies have demonstrated that muscle O2 dynamics are potentially affected by age and aerobic capacity. Therefore, the aim of this study was to compare muscle O2 dynamics during exercise between aerobic capacity- and age-matched overweight and normal-weight adults. Overweight women (OW, n=9, 38 ± 5 years, 38.6 ± 2.5% of body fat) and normal-weight women (NW, n=14, 39 ± 6 years, 29.1 ± 2.7% of body fat) performed graded treadmill exercise until exhaustion. Muscle O2 saturation (SmO2) and relative changes from rest in oxygenated hemoglobin concentration (∆oxy-Hb), deoxygenated hemoglobin concentration (∆deoxy-Hb), and total hemoglobin concentration (∆total-Hb) were monitored continuously at gastrocnemius medialis (GM) muscle by near infrared spatial resolved spectroscopy, with optical correction for the effect of light scattering in the fat layer. Pulmonary O2 uptake (VO2) was measured by gas analysis. Fat mass and fat-free mass (FFM) were measured by bio-impedance analysis. At GM, significantly higher SmO2 and lower ∆deoxy-Hb and ∆total-Hb were observed in OW compared with NW. ∆Oxy-Hb did not significantly differ between groups. VO2 normalized by FFM was similar between groups during submaximal and peak exercise. In both groups, peak VO2 was significantly correlated with change in SmO2 and deoxy-Hb. Our findings suggest that both muscle blood volume and deoxygenation were minor in overweight adults, compared to normal-weight adults. Because VO2 was similar throughout exercise, muscle O2 extraction, rather than convective O2 transport, may have been compromised in overweight adults. Moreover, lowered muscle O2 extraction was related to peak VO2 in overweight adults, as well as in normal-weight adults.

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