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Comparison of Near-Infrared Spectroscopy Measured Muscle Metabolism with Predicted Whole-Body Metabolism

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Resting metabolic rate (RMR) comprises the majority of energy expenditure in a given day and is associated with overall health. Research has shown that an altered RMR is associated with illness, disease, and mortality. Skeletal muscle (SM) is one of the largest contributors to RMR and evaluation of SM metabolism may provide more detail on the association between altered metabolism and disease. **PURPOSE:** To explore the relationship between whole-body RMR and rate of resting muscle oxygen consumption using near-infrared spectroscopy (NIRS) at four different muscle beds. **METHODS:** A NIRS device was placed on the belly of the muscle of participants (n=13, age = 30 ± 10 yrs) and a pneumatic rapid inflation cuff placed proximal to the testing site to occlude arterial blood flow. While laying supine, participants experienced 5 minutes of rest followed by three rounds of 30s arterial occlusion and 30s of rest. This protocol was conducted at the medial gastrocnemius (MG), brachioradialis (BR), vastus lateralis (VL), and tibialis anterior (TA). Differences in oxygenated and deoxygenated hemoglobin (Hb_{diff}) at each testing site were collected and the average rates of resting muscle oxygen consumption ($\%/s^{-1}$) for each muscle were calculated. RMR was predicted from recorded age, height, and weight of each participant using the Mifflin-St. Jeor equation and was compared to NIRS measures of muscle metabolism through Pearson correlations. **RESULTS:** Resting rate of oxygen consumption was significantly lower in the MG (0.08±0.04 %/s, $p<0.05$) compared to the other muscle tissue (BR: 0.17±0.05 %/s; TA: 0.14±0.07 %/s; VL: 0.13±0.07 %/s). BR showed a greater correlation between muscle oxygen consumption rate and predicted RMR while the TA had the lowest correlation, however none of the correlations were significant within the different muscles tested (BR: b=0.43, p=0.17; MG: b=0.33, p=0.33; VL: b=0.36, p=0.27; TA: b=0.09, p=0.77). **CONCLUSION:** Though differences in oxygen consumption rates were found between the different muscles tested, no significant relationships were found with predicted RMR. Further evaluation should include direct measure of RMR through indirect calorimetry.

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