Limb and Sex, but Not Dietary Capsaicin, Modulate the Near-Infrared Spectroscopy-Vascular Occlusion Test Estimated Metabolism

Stephen J. Ives FACSM, Lauren M. Greaves, Kendall S. Zaleski, Alexs A. Matias, Abena O. Gyampo, Gaia Giuriato, Meaghan Lynch, Brian Lora, Tawn Tomasi, Emma Basso, Emma Finegan, Jack Schickler, Massimo Venturelli, Elena Shostak, Oliver Blum, Justin A. DeBlauw.

1Skidmore College, Saratoga Springs, NY, 2University of Delaware, Newark, DE, 3University of Verona, Verona, Italy

Assessing muscle metabolism is essential for physiological understanding, as well as studying the effects of deteriorating factors (e.g. age, disease, etc.) and mitigating strategies (e.g. exercise training). Near-infrared spectroscopy (NIRS) is known to provide a valid estimate of muscle oxidative capacity. Recently, the NIRS-vascular occlusion test (NIRS-VOT) has been purported as a simplified estimate of both metabolism and vascular reactivity, but little is known about sex/limb specificity, or whether it may be acutely altered. **PURPOSE:** Thus, we investigated the effects of acute dietary capsaicin treatment on muscle metabolism using tissue deoxygenation rates (DeO$_2$) during a NIRS-VOT, and if there is limb- or sex-specificity in this assessment. **METHODS:** Forty-five young healthy men (n=25, 21±4yr) and women (n=20, 20±1yr) ingested either placebo or capsaicin, in a counterbalanced, blinded, placebo-controlled, crossover design after which a simplified NIRS-VOT was conducted to determine the DeO$_2$ (change in tissue oxygen saturation, StO$_2$, %/s), as an estimate of oxidative muscle metabolism, in both the forearm (FA) and quadriceps (Q, vastus lateralis). Slope was derived during the initial 10 s of rapid occlusion. Handgrip maximal voluntary contraction (MVC), site skinfold thickness, and body mass index (BMI) were measured to determine relation to DeO$_2$. **RESULTS:** There was a significant limb effect with the Q having a greater DeO$_2$ than the FA (-2.31±1.34 vs. -1.78±1.22%/s, p=0.01, η$_p^2$=0.19). There was a significant effect of sex on DeO$_2$ (p=0.01, η$_p^2$ =0.20) with men exhibiting a lesser DeO$_2$ than women (-1.73±1.03 vs. -2.36±1.32%/s, respectively). This manifested in significant interactions of limb and capsaicin (p=0.00, η$_p^2$=0.26) as well as limb, capsaicin, and sex on DeO$_2$ (p=0.01, η$_p^2$=0.16) being observed. In the FA under placebo, modest positive relation between DeO$_2$ and MVC (r=0.37, p=0.02) but negative relations with skinfold thickness (r=0.34, p=0.02). However, there were no significant relations between DeO$_2$ in both FA and Q with weight (p> 0.92, r<0.13), Skinfold Q (p=0.43, r=0.13) or BMI (p>0.89, r<-0.27). **CONCLUSION:** Capsaicin treatment does not induce favorable changes in O$_2$-dependent metabolism in muscle, but there are apparent limb and sex specificity in such NIRS-derived assessments. **SIGNIFICANCE/NOVELTY:** A simplified integrated vascular occlusion test, using near infrared spectroscopy has been suggested to provide estimate of oxidative muscle metabolism and vascular reactivity. If such a test is to be adopted, understanding how factors such as sex or limb may alter the results is paramount. Further, whether dietary capsaicin acutely impacts this estimate of metabolism is unknown. We demonstrate that sex and limb, but not acute capsaicin, significantly influence the deoxygenation slope, and needs to be considered in the design of studies using the NIRS-VOT.