TACSM Abstract

A Contralateral Comparison of Beta-Band Oscillations in the Motor Cortex Following Blood Flow Restriction Training

SIERRA M. WASHINGTON[1], KASE J. PENNARTZ[1], ADAM C. AVALOS[1], CALVIN D. SMITH[1], LINDSAY K. RANKIN[1], ISABELLA E. ZAPATA[1], JORDYN M. WATSON[1], DAKOTA R. HARRIS[1], JOSHUA L. KELLER[3], AMBER HARRIS-BOZER[2], MICHAEL J. LUERA[1]

[1]Human Performance Laboratory; Health and Human Performance; [2]Behavioral Neuroscience and Psychophysiology Laboratory; Tarleton State University; Stephenville, TX; [3]Integrative Laboratory of Exercise and Applied Physiology Department of Health, Kinesiology and Sport Exercise Science; University of South Alabama; Mobile, AL

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Advisor / Mentor: Luera, Michael (luera@tarleton.edu)

ABSTRACT

Contralateral adaptations following unilateral training is commonly associated with the cross-education phenomena. Identifying the contributions to peripheral activation of voluntary muscle contractions can be represented in Beta-band (13-30Hz) oscillations within the human motor cortex. These individualistic electrophysiological changes may display potential hemispheric differences that contribute to skeletal muscle activation patterns following single limb training common in rehabilitation settings. **PURPOSE**: The purpose of this investigation was to compare the responses of beta-band mean power frequency (MPF) in the motor cortex during varying isometric contraction intensities after blood flow restriction training. **METHODS**: 13 untrained males (age: 21.7 ± 1.7yrs; height: 176.6 ± 5.2cm; weight: 83.4 ± 12.4kg) were randomly assigned to a BFR (n=8) and non-BFR (n=5) group. Both groups completed 8 isokinetic dorsiflexion training sessions separated by 48 hours at 30% of their session peak torque at a velocity of 60°/s. Pre and post isometric dorsiflexion trapezoidal ramp tracings were recorded at 25%, 50%, 75%, and 100% of their maximal voluntary contraction (MVC). A 64-channel electroencephalography (EEG) cap recorded neural activity during the isometric tracings. Signals were filtered to reject artifact and compute Fast Fourier Transforms. Separate 3-way mixed factorial ANOVAs (group [BFR v non-BFR] x time [pre v post] x location [C5 v C3 v C1 v C2 v C4 v C6]) were used to compare MPF values of the beta-band at all intensities. Additional ANOVAs (group [BFR v non-BFR] x time [pre v post] x leg [right v left] were used to compare the CZ location MPF values of the beta-band at all intensities. **RESULTS**: There were no significant group x time x location interactions or main effects for MPF at 25%, 50%, or 100% intensities, however there was a main effect for location at 75% ($p = .045$) (C5 [944.383 ± 150.647], C3 [834.815 ± 150.647], C1 [745.956 ± 150.647], C2 [1057.821 ± 150.647], C4 [1082.626 ± 150.647], C6 [1246.386 ± 150.647]; mean ± SE). When comparing group x time x leg, there was a significant interaction at 25% ($p = .049$) and main effect on time at 75% ($p = .030$) (pre [755.646 ± 126.276], post [1052.475 ± 126.276]; mean ± SE). **CONCLUSION**: Beta-band oscillations are often linked with various cognitive and motor functions. These results support a presence of contra-lateralization of the motor cortex with voluntary muscle activation patterns of the tibialis anterior during isometric contractions.