TACSM Abstract

Neuromuscular Adaptations to Low-intensity Blood Flow Restricted Training

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ABSTRACT

Low-intensity blood flow restricted (BFR) training has been shown to induce adaptations in muscular strength and size similar to traditional high-intensity resistance training. However, the reporting of peripheral neuromuscular adaptations is lacking within the current literature. **PURPOSE**: The purpose of this investigation was to examine the effects of BFR training on motor unit (MU) firing behaviors. **METHODS**: 13 untrained males (age: 22 ± 2yrs; height: 175.7 ± 6.0cm; weight: 81.9 ± 13.3kg) were randomly assigned to the BFR (*n* = 7) or non-BFR (*n* = 6) group. All subjects completed preliminary testing consisting of 3 isometric maximal voluntary contractions (MVC) of dorsiflexion muscle action, along with subsequent randomized ramp contractions at 25%, 50%, 75%, and 100% MVC. Surface electromyography (EMG) was used to record muscle activation of the tibialis anterior and later decomposed into their constituent motor unit action potential (MUAP) trains. Both groups completed 4 weeks (8 sessions) of isokinetic dorsiflexion training at 30%MVC of their daily peak torque values at 60°/s. At least 48 hours after the last training session, subjects repeated the pretesting protocol where MUAPS were then validated and assessed for relative behavioral properties of slopes and y-intercepts between MUAP size and mean firing rate (MFR). Separate two-way repeated measures ANOVAs (group [BFR v non-BFR] x time [pre v post]) were used to compare the slopes and y-intercepts of MFR vs. MUAP at all intensities. **RESULTS**: In regard to slopes, there were no significant group x time interactions at any of the intensities ($p>0.05$); however, at the 25% slopes, there was a significant main effect for time ($p = 0.038$). Specifically, the 25% MFR v MUAP slope coefficient increased from pre- to post- (-0.105 ± 0.010 to -0.081 ± 0.005; mean ± SE). In regard to the intercepts, there were no significant group x time interactions or main effects for any of the intensities ($p>0.05$). **CONCLUSION**: The main effect for time in the 25% slopes, in addition to a lack of differences in the 25% intercepts, indicates MUAP size increased independently from MFR following BFR training. This shift within the MU pool may be due to the recruitment of MUs at slightly higher thresholds during low intensity contractions, which is common within concurrent literature.