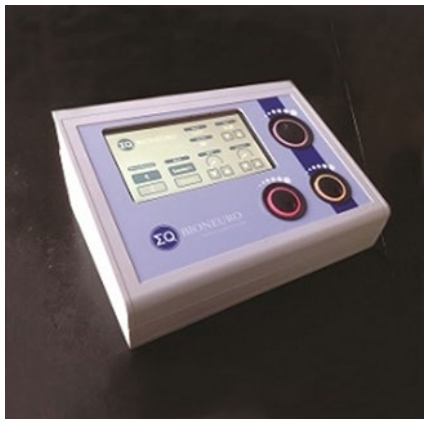
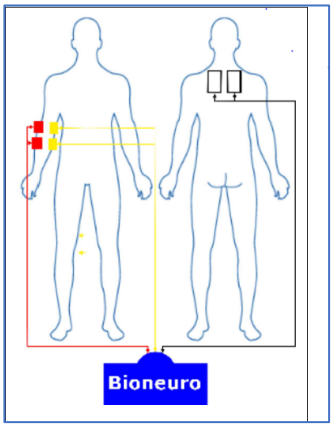
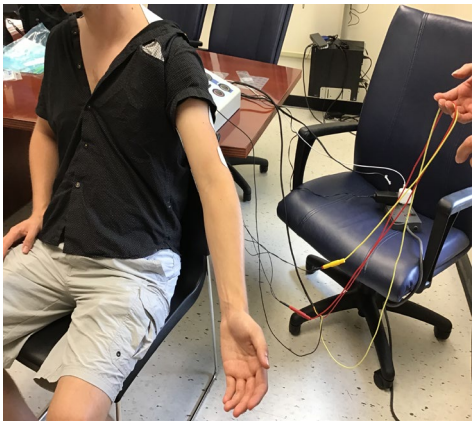
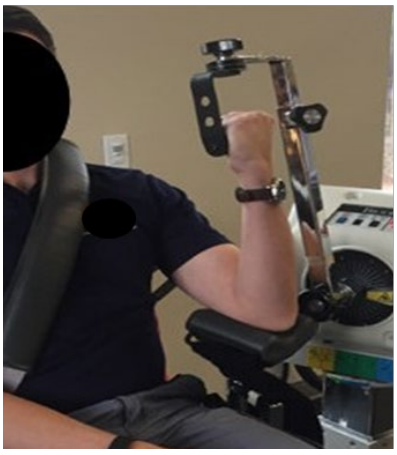
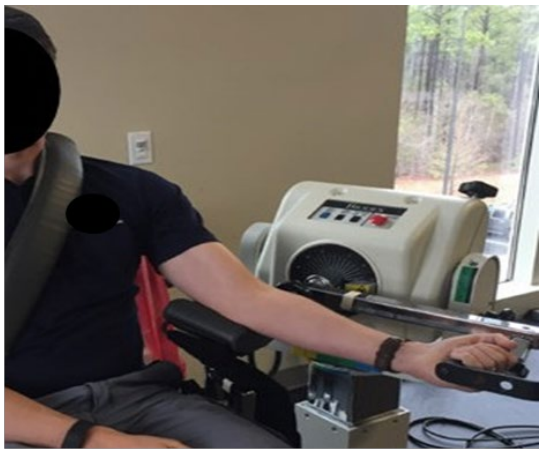
Evaluation of Cumulative Charge Activation Technology In Decreasing Delayed-Onset Muscle Soreness After Eccentric Exercise











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BIOSYSCO

Executive Summary

Purpose

The purpose of this study was to investigate the effectiveness of Biosysco Sigma Q® treatment with respect to: 1) Reducing the symptoms associated with delayed-onset muscle soreness (DOMS), and 2) examine evidence of an improved healing response of musculoskeletal tissues experiencing DOMS subsequent to exposure to a fatiguing bout of eccentric exercise. Sigma Q® Treatment system consists of new, patented deep tissue neuromuscular stimulation protocols designed to provide noninvasive muscle re-education, deep conditioning, diagnosis, and rehabilitation.

Method

Twenty-four subjects were randomly assigned to either an experimental group or a no-treatment control group. Both groups were exposed to an eccentric exercise regimen designed to elicit DOMS on Day 0 of the experiment. The treatment group was provided five Sigma Q® treatments subsequent to administration of the eccentric exercise. These treatments were administered on Day 0 (4 hours post exercise), and on Days 1 through 4 of the 8-day recovery period. The control group was allowed to recover normally (i.e., no treatment was provided).

Dependent measures for this study included: 1) subjective responses collected on a wellness questionnaire that included items assessing symptoms and sleep quality; 2) resting elbow angle (a measure of the severity of the DOMS response; 3) serum creatine kinase (a measure of muscle damage); and 4) maximum voluntary isometric contractions (a measure of the damage and recovery of muscles subsequent to eccentric exercise). Independent variables included Group (treatment versus control) and Day (of post-DOMS recovery period). Statistical analysis procedures included analysis of variance (ANOVA) with repeated measures and linear and non-linear regression methods.

Results

Significant Group*Day interactions were observed for both subjective measures of the soreness/stiffness of the exercised arm ($F_{5,110} = 7.60$, $p < 0.001$), and assessment of arm pain ($F_{5,110} = 2.58$, $p < 0.05$). In both cases, the treatment group demonstrated significantly lower ratings compared to the control group. Group*Day interaction trends ($p < 0.10$) were observed for questions related to limitations to work/daily activities and physical readiness. Regression analyses of the recovery of resting elbow angle demonstrated a significant recovery slope for the treatment group ($T = 2.92$, $p < 0.01$), but not for the control group ($T = 1.39$, $p = 0.169$). Regression coefficients suggest that the rate of recovery for the treatment groups was approximately twice that of the control group. Measures of serum creatine kinase and maximum voluntary contraction showed differences by Day ($p < 0.05$) but were not affected by Group or Group*Day interactions ($p > 0.05$).

Conclusions

This study presented evidence that following a muscle soreness and fatigue protocol, Sigma Q® treatment provides markedly significant improvement in muscle flexibility recovery through measuring resting elbow angle – nearly twice that of the control group. This suggests an enhancement to healing of the damaged sarcoplasmic reticulum. In addition, application of Sigma Q® treatments significantly reduce perception of pain associated with muscle stiffness/soreness and pain compared to those who did not receive such treatment. While measures of maximum voluntary isometric contraction in the DOMS recovery period did not show a significant difference with respect to treatment versus control group membership and nor did measures of serum creatine kinase, there were no adverse effects or recovery setbacks observed with any of these measures. In conclusion, the Bioneuro Sigma Q® treatment in a controlled muscle injury study displayed substantial measurable improvement in flexibility and functionality recovery as well as considerable reduction in perception of pain post injury with no adverse effects on all measures of recovery.