Combined Blood Flow Restriction Training and Betaine Supplementation Impacts on Serum Betaine and Homocysteine Concentrations

STEVEN B. MACHEK1,2, EMILIA E. ZAWIEJA3, JEFFREY L. HEILESON2, DILLON R. HARRIS2, DYLAN T. WILBURN2, JASON M. CHOLEWA4, & DARRYN S. WILLOUGHBY, FACS
tm2,5

1 Kinesiology Department, California State University; Monterey Bay, CA
2Department of Health, Human Performance, and Recreation, Baylor University; Waco, TX
3Department of Human Nutrition and Dietetics, The Poznań University of Life Sciences; Poznań, Poland
4Human Physiology Department, University of Lynchburg; Lynchburg, VA
5School of Exercise and Sport Science, University of Mary Hardin-Baylor; Belton, TX

Category: Professional

Willoughby, Darryn (dwilloughby@umhb.edu)

ABSTRACT

Homocysteine (HCY) is a clinically implicated in inflammation and cardiovascular impairments. Although both betaine supplementation and acute resistance (both high-load [HL] and low-load blood flow restriction [LL-BFR]) training notably attenuate HCY concentrations, it is hitherto unknown if these independent modalities synergistically interact. PURPOSE: to determine whether a combination of betaine supplementation, as well as acute HL and/or LL-BFR training can attenuate post-exercise HCY more effectively than either isolated modality. METHODS: Eighteen recreationally trained males (25±5y) were randomized in double-blind fashion to supplement 6g/day of either betaine anhydrous (BET) or identically dosed cellulose placebo for 14-days. Subsequently, all subjects performed four standardized sets of one-leg press and two additional sets to muscular failure on both legs in a counter-balanced and crossover design. Specifically, one leg performed standard high-load (HL; 70%1RM) exercise and contralateral limb underwent BFR (LL-BFR; 20%-1RM) training at 80% arterial occlusion pressure. Serum homocysteine (HCY) and betaine (BET) concentrations were analyzed before and 30-minutes post-exercise prior to quantification via ELISA and liquid chromatography-mass spectrometry, respectively. The changes in all aforementioned variables from baseline (∆HCY and ∆BET) were assessed via separate two-way mixed model ANOVA with repeated measures at a significance level of p<.05. RESULTS: Analyses failed to reveal any significant main nor interaction effects for serum ∆BET. Although no apparent main supplement nor interaction effects were observed, ∆HCY demonstrated a significant main exercise condition effect (p=.045; ηp²=.228), whereby the LL-BFR group displayed significantly greater concentrations versus HL (p=.045). CONCLUSION: While these findings ultimately do not support a betaine-resistance training synergy-mediated reduction in serum HCY, our data otherwise suggest BFR training may preferentially result in lower post-training concentrations relative to a commonly employed, high-load approach. Future research should elucidate the credence of this interpretation via additional longitudinal investigations amidst hyperhomocysteinemia-predisposed clinical populations.