



The Anabolic Hormone Response to a Lower-Body Resistance Exercise Bout in Conjunction with Oral BCAA Supplementation

Bill Campbell¹, Paul LaBounty², Austin Oetken², Mike Greenwood², Richard Kreider³, & Darryn Willoughby²

¹University of South Florida, Exercise & Performance Nutrition Laboratory – Tampa, Florida

²Baylor University, Waco, Texas

³Texas A&M University, College Station, Texas



ABSTRACT

BACKGROUND: BCAAs (leucine, isoleucine, and valine), particularly leucine, activate key enzymes in protein synthesis after physical exercise. Research has demonstrated that BCAAs increase mTOR phosphorylation and activate p70 S6 kinase in human muscle via an Akt-independent pathway. The extent to which BCAAs influence the anabolic hormone response in conjunction with resistance exercise is not well established. A randomized, double-blind, placebo-controlled study was performed to evaluate the effects of BCAA ingestion in conjunction with an acute bout of lower-body resistance exercise (RE) on various anabolic hormones. **METHODS:** 20 recreationally active males ingested a BCAA supplement (120mg/kg/bw) (n=10; 24.4 years; 178.3 cm; 85.4 kg) or a placebo (n=10; 21 years; 176.8 cm; 83 kg) at 3 time points: 30 minutes prior to RE, and immediately pre-RE and immediately post-RE. Subjects performed 4 sets of leg press and 4 sets of leg extension at 80% 1RM to failure. Rest periods between sets and exercises was approximately 150 seconds. Venous blood was sampled at baseline; 30min later, immediate postexercise, 30min post-exercise; 2hrs post-exercise, and 6hrs post-exercise for serum insulin, growth hormone (GH), and free insulin-like growth factor-1 (IGF-1). A two-way ANOVA with repeated measures was utilized to analyze the data. **RESULTS:** Data are reported as means ± SD at baseline; 30min later, immediate postexercise, 30min post-exercise; 2hrs post-exercise, and 6hrs post-exercise. Insulin values were 19.2 ± 7.8, 23.0 ± 9.6, 25.3 ± 12.9, 24.8 ± 14.3, 19.0 ± 9.0, 15.8 ± 6.4 and 22.0 ± 10.5, 22.0 ± 10.9, 27.8 ± 9, 24.1 ± 8.7, 17.9 ± 8.8, 21.2 ± 12.8 uIU/mL for the BCAA and Placebo groups, respectively. A significant main effect for time was observed (p < .001), but no significant main effect for group (p = .758) or significant interaction (p = .465) was observed for insulin. GH values were .41 ± .81, .64 ± .97, 1.9 ± 2.2, 1.5 ± 2.6, .23 ± .32, 2.6 ± 4.0 and .07 ± .09, .84 ± 1.3, 2.2 ± 1.9, 2.2 ± 3.8, .28 ± .76, .36 ± .56 ng/ml for the BCAA and Placebo groups, respectively. A significant main effect for time was observed (p = .021), but no significant main effect for group (p = .672) or significant interaction (p = .217) was observed for GH. Free IGF-1 values were 1.3 ± .83, 1.2 ± .72, 1.2 ± .77, 1.4 ± .91, 1.1 ± .74, .95 ± .64 and 1.3 ± .43, 1.2 ± .43, 1.6 ± .54, 1.5 ± .57, 1.4 ± .46, 1.1 ± .53 ng/ml for the BCAA and Placebo groups, respectively. A significant main effect for time was observed (p = .014), but no significant main effect for group (p = .569) or significant interaction (p = .356) was observed for free IGF-1. **CONCLUSION:** An acute bout of lower-body RE significantly increases insulin, GH, and IGF-1 in the immediate post-exercise time period, but oral ingestion of BCAA at a dosage of 120 mg/kg/bw does not impart an additional effect on the hormonal response to the resistance exercise stimulus.

BACKGROUND

BCAAs (leucine, isoleucine, and valine), particularly leucine, activate key enzymes in protein synthesis after exercise. Research has demonstrated that BCAAs increase mTOR phosphorylation and activate p70 S6 kinase in human muscle via an Akt-independent pathway. The extent to which BCAAs influence the anabolic hormone response in conjunction with resistance exercise (RE) is not well established. A randomized, double-blind, placebo-controlled study was performed to evaluate the effects of BCAA ingestion in conjunction with an acute bout of lower-body RE on various anabolic hormones.

METHODS

Twenty recreationally active males ingested a BCAA supplement (120mg/kg/bw) (n=10; 24.4 years; 178.3 cm; 85.4 kg) or a placebo (n=10; 21 years; 176.8 cm; 83 kg) at 3 time points: 30 minutes prior to RE, and immediately pre-RE and immediately post-RE. Subjects performed 4 sets of leg press and 4 sets of leg extension at 80% 1RM to failure. Rest periods between sets and exercises was approximately 150 seconds. Venous blood was sampled at baseline; 30min later, immediate postexercise, 30min post-exercise; 2hrs post-exercise, and 6hrs post-exercise for serum insulin, growth hormone (GH), and free insulin-like growth factor-1 (IGF-1). A two-way ANOVA with repeated measures was utilized to analyze the data.

RESULTS

Data are reported as means ± SD at baseline; 30min later, immediate postexercise, 30min post-exercise; 2hrs post-exercise, and 6hrs post-exercise. Insulin values were 19.2 ± 7.8, 23.0 ± 9.6, 25.3 ± 12.9, 24.8 ± 14.3, 19.0 ± 9.0, 15.8 ± 6.4 and 22.0 ± 10.5, 22.0 ± 10.9, 27.8 ± 9, 24.1 ± 8.7, 17.9 ± 8.8, 21.2 ± 12.8 uIU/mL for the BCAA and Placebo groups, respectively. A significant main effect for time was observed (p < .001), but no significant main effect for group (p = .758) or significant interaction (p = .465) was observed for insulin. GH values were .41 ± .81, .64 ± .97, 1.9 ± 2.2, 1.5 ± 2.6, .23 ± .32, 2.6 ± 4.0 and .07 ± .09, .84 ± 1.3, 2.2 ± 1.9, 2.2 ± 3.8, .28 ± .76, .36 ± .56 ng/ml for the BCAA and Placebo groups, respectively. A significant main effect for time was observed (p = .021), but no significant main effect for group (p = .672) or significant interaction (p = .217) was observed for GH. Free IGF-1 values were 1.3 ± .83, 1.2 ± .72, 1.2 ± .77, 1.4 ± .91, 1.1 ± .74, .95 ± .64 and 1.3 ± .43, 1.2 ± .43, 1.6 ± .54, 1.5 ± .57, 1.4 ± .46, 1.1 ± .53 ng/ml for the BCAA and Placebo groups, respectively. A significant main effect for time was observed (p = .014), but no significant main effect for group (p = .569) or significant interaction (p = .356) was observed for free IGF-1.

SUMMARY AND CONCLUSION

An acute bout of lower-body RE significantly increases insulin, GH, and IGF-1 in the immediate post-exercise time period, but oral ingestion of BCAA at a dosage of 120 mg/kg/bw does not impart an additional effect on the hormonal response to the resistance exercise stimulus.

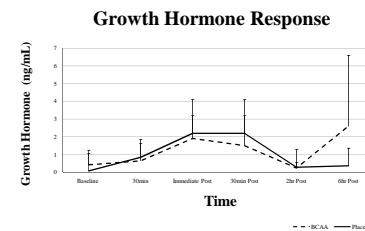


Figure 1. Growth Hormone changes over time (±SD) for BCAA and Placebo groups following an acute bout of heavy, lower-body resistance exercise. No differences between groups were observed (p = .217).

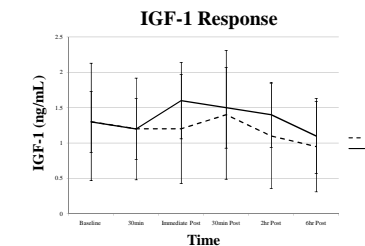


Figure 2. IGF-1 changes over time (±SD) for BCAA and Placebo groups following an acute bout of heavy, lower-body resistance exercise. No differences between groups were observed (p = .356).