Journal of the International Society of Sports Nutrition

Poster presentation

Open Access

The effects of oral BCAAs and leucine supplementation combined with an acute lower-body resistance exercise on mTOR and 4E-BP1 activation in humans: preliminary findings

Paul La Bounty*[1], Bill Campbell[2], Austin Oetken[1] and Darryn Willoughby[1]

Address: [1]Baylor University, Waco, TX, USA and [2]University of South Florida, Tampa, FL, USA

Email: Paul La Bounty* - paul_la_bounty@baylor.edu

* Corresponding author

from 2008 International Society of Sports Nutrition Conference and Expo
Las Vegas, NV, USA. 9–10 June 2008

Published: 17 September 2008

Journal of the International Society of Sports Nutrition 2008, **5**(Suppl 1):P21 doi:10.1186/1550-2783-5-S1-P21

This abstract is available from: http://www.jissn.com/content/5/S1/P21

Background

A randomized, double-blind, placebo-controlled study was performed to evaluate the effects of oral BCAA and leucine supplementation combined with an acute bout of lower extremity resistance exercise (RE) on the phosphorylation/activation states of mTOR and 4EBP1.

Methods

30 fasted, recreationally trained males (22.5 yrs; 83.1 kg; 178.4 cm) consumed 120 mg/kg/bw of BCAA, 60 mg/kg/bw of leucine, or a placebo. The supplements were consumed in three equal doses at 30 minutes before RE, immediately prior to RE, and immediately post RE. The participants completed 4 sets of both leg press and knee extension at 80% of their 1 RM to failure (~8–12 reps). Rest periods of 2.5 minutes were given between both sets and exercises. Percutaneous muscle biopsies of the vastus lateralis were obtained at: baseline, and 30 minutes, 2 hours, and 6 hours post RE. The phosphorylated states of both mTOR and 4E-BP1 were assessed through the use of an ELISA with a primary antibody specific to phosphorylated mTOR [pS2448] and a phosphoELISA kit for phosphorylated 4E-BP1 [pT46], respectively. Other serum and muscle variables were analyzed as part of a greater, overall study, but only the phosphorylated mTOR and 4E-BP1 are reported in this abstract. Delta values of mTOR and 4E-BP1 were analyzed using a 3 (group) × 4 (time) repeated measures MANOVA. Separate ANOVAs for each criterion variable were utilized as follow-up tests. Significant main effects were determined Bonferroni post-hoc tests. Significant interactions discovered in the ANOVAs were assessed by independent samples T-tests. SPSS version 15.0 was utilized throughout this analysis.

Results

There was no main effect for group, time or group × time interaction for phosphorylated mTOR. In regards to phosphorylated 4E-BP1, no main effect for time was observed. However, a significant group main effect for 4E-BP1 was observed ($p = 0.002$). Bonferroni post-hoc analysis demonstrated that both the BCAA group ($p = 0.002$) and the leucine group ($p = .037$) were significantly greater than the placebo group in regards to phosphorylated 4E-BP1. Additionally, a group × time interaction for 4E-BP1 was also observed. Activated 4E-BP1 was significantly greater in the BCAA group ($p = 0.001$) and leucine group ($p = .037$) at 2 hours post RE as compared to the placebo. At 6 hours post RE, 4E-BP1 activation was greater in the BCAA group as compared to both the placebo ($p = 0.022$) and leucine groups ($p = 0.041$).

Conclusion

Both leucine and BCAA supplementation, combined with an acute bout of lower extremity RE, led to greater levels of phosphorylated 4E-BP1, as compared to a placebo, 2 hours following RE. Furthermore, BCAA group led to significantly greater levels of activated 4E-BP1 when compared to both the placebo and leucine at 6 hours post RE.

These findings suggest that the other two BCAAs (isoleucine and valine) may contribute to greater activation states of 4E-BP1 above and beyond that of leucine alone. Lastly, in the current study, neither BCAA nor leucine supplementation did not have a significant effect on the phosphorylation state of the cell signaling protein, mTOR.