Consuming Branched-Chain Amino Acid Supplement During a Resistance Training Program Increases Lean Mass, Muscle Strength and Fat Loss

Jim Stoppani[1], Timothy P. Scheett[2], James Pena[1], Chuck Rudolph[3], and Derek Charlebois[3]

[1]Weider Research Group, Woodland Hills, CA; [2]Human Performance Laboratory, College of Charleston, Charleston, SC., [3]Ekawa Performance Training, Huntington Beach, CA.

Abstract

A randomized, double-blind study was performed to evaluate the efficacy of consuming a supplement containing branched-chain amino acids (BCAAs) during an eight-week resistance-training program. **Methods:** Thirty-six strength-trained males with a minimum of two years resistance-training experience (25.5 yrs, 177.7 cm, 85.2 kg and 9.3 % body fat) were randomly assigned to receive either 14 grams of BCAAs (n=12), 28 grams of whey protein (n=12), or 28 grams of carbohydrates from a sports drink (n=12) while performing an eight-week resistance-training program. Participants followed a periodized, whole-body training program that involved training all major muscle groups once per week using a four-day training split. Subjects body weight, body composition, and 10-rep max on the bench press and squat were determined before and after the eight-week training program. Subjects followed a standardized diet while following the program. **Results:** All groups had a 100% compliance with the study protocol. The BCAA group experienced a significantly greater gain in body weight than the whey group (2 ± 1 kg vs. 1 ± 1 kg; $p < 0.02$) and the carbohydrate group (2 ± 1 kg vs. 1 ± 1 kg; $p < 0.01$). For lean mass, the BCAA group gained significantly greater lean mass than the whey group (4 ± 1 kg vs. 2 ± 1 kg; $p < 0.01$) and the carbohydrate group (4 ± 1 kg vs. 1 ± 1 kg; $p < 0.01$). The whey group also gained significantly more lean mass than the carbohydrate group (2 ± 1 kg vs. 1 ± 1 kg; $p < 0.02$). BCAA group decreased their percent body fat significantly more than the whey group (2 ± 1 % vs. 1 ± 1 %; $p = 0.039$) and the carbohydrate group (2 ± 1 % vs. 1 ± 1 %; $p < 0.01$). Muscular strength was significantly greater in the BCAA group on the 10-RM bench press than the whey group (6 ± 3 kg vs. 3 ± 2 kg; $p < 0.01$) and the carbohydrate group (6 ± 3 kg vs. 2 ± 2 kg; $p < 0.01$). For the squat, the BCAA group gained significantly more strength on their 10-RM than the whey group (11 ± 5 kg vs. 5 ± 3 kg; $p < 0.01$) and the carbohydrate group (11 ± 5 kg vs. 3 ± 2 kg; $p < 0.01$). **Conclusion:** Ingestion of a supplement containing BCAAs while following an 8-week resistance training program resulted in a greater decrease in percent body fat, an increase in lean mass, and 10-RM strength gains on the bench press and squat vs. ingestion of a whey supplement or a sports drink. In addition, the ingestion of a whey protein supplement resulted in greater lean mass gains than ingestion of a sports drink.

Introduction

Branched-chain amino acids (BCAAs) include the three essential amino acids leucine, isoleucine, and valine. Because these amino acids tend to bypass metabolism in the liver they are utilized directly by the muscle as both an energy source and to support muscle growth.

Leucine in particular is important for initiating muscle protein synthesis. In addition, the BCAAs provide numerous other benefits such as enhanced fat loss, fatigue reduction, increased growth hormone levels, and reduced cortisol levels during exercise.

Taking BCAAs around workouts has been found to enhance muscle protein synthesis.

Due to these benefits, bodybuilders have long supplemented with BCAAs in addition to complete protein supplements, particularly around workouts.

Purpose

The purpose of this study was to evaluate the efficacy of consuming a supplement containing branched-chain amino acids (BCAAs) during an eight-week resistance-training program as compared to the consumption of a whey protein supplement or a carbohydrate drink.

Subject Characteristics

Age (years)	Height (cm)	Mass (kg)	Body Fat (%)	Bench Press 10 RM (kg)	Squat 10 RM (kg)
25.5 ± 4.0	177.7 ± 7.5	85.2 ± 6.6	9.3 ± 1.7	93 ± 3.3	32 ± 16

Methods

Thirty-six strength-trained males with a minimum of two years resistance-training experience were recruited. Subjects were randomly assigned to receive either 14 grams of BCAAs (n=12), 28 grams of whey protein (n=12), or 28 grams of carbohydrates from a sports drink (n=12).

All subjects reported to the training facility and were tested for their body mass, body fat percentage, and 10 RM on the barbell bench press and barbell squat.

After being randomly assigned to their respective group, subjects started the eight-week periodized resistance-training program. The training program consisted of training chest, triceps and abs on Mondays, legs on Tuesdays, shoulders and abs on Thursdays and back, biceps and forearms on Fridays.

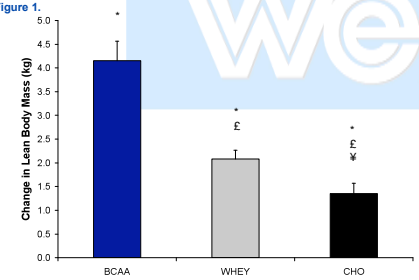
At the end of the eight-week program all subjects returned to the training facility and were retested for their body mass, body fat percentage, and 10 RM on the barbell bench press and barbell squat

Statistical Analyses

A 2x3 ANOVA was used to determine significant within and between group differences. A Tukey's post-hoc was used for significant interactions. Significance was set at $p \leq 0.05$.

Results

Figure 1.



Results

Figure 2.

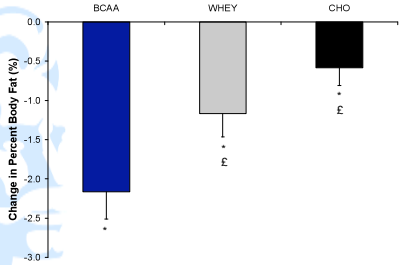


Figure 3.

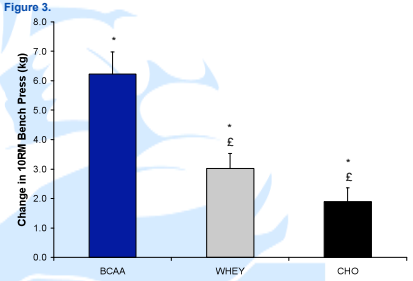


Figure 4.

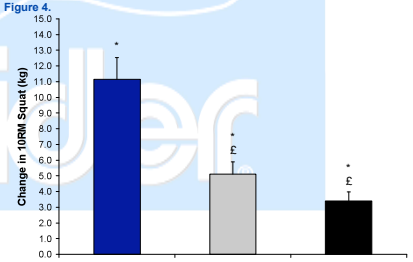


Figure Legend. Change in lean body mass (Figure 1), Change in percent body fat (Figure 2), Change in 10RM barbell bench press (Figure 3) and Change in 10RM barbell squat (Figure 4) with either 14 grams of BCAAs (BCAA), 28 grams of whey protein (WHEY), or 28 grams of carbohydrates from a sports drink (CHO) (mean ± SE). *, denotes significant difference ($P<0.05$) within group; £, denotes significant difference ($P<0.05$) from BCAA; ¥, denotes significant difference ($P<0.05$) from WHEY.

Discussion

Consuming the BCAA supplement during workouts resulted in significantly greater gains ($p<0.01$) in lean mass (4.2 kg) than the whey protein supplement and the carbohydrate drink.

Consuming the whey protein supplement (2.1 kg) during training resulted in significantly greater gains ($p<0.05$) in lean mass than consuming an isocaloric carbohydrate drink (1.4 kg).

Consuming the BCAA supplement during workouts resulted in a significantly greater reduction ($p<0.05$) in body fat (-2.2%) than those consuming the whey protein supplement (-1.2%) and the carbohydrate drink (-0.6%).

Consuming the BCAA supplement during workouts resulted in significantly greater gains ($p<0.01$) in 10 RM strength on the barbell bench press (6.2 kg) and barbell squat (11.1 kg) than consuming the whey protein supplement (3.0 and 5.1 kg, respectively) or the carbohydrate drink (1.9 and 3.4 kg, respectively).

The greater gains in lean mass and strength experienced by the BCAA group may have been due to a greater increase in muscle protein synthesis following resistance-training workouts. However, this is difficult to determine in this study as muscle biopsies were not performed.

The BCAA supplement also contained glutamine (5 g) and citrulline malate (2 g) which could have augmented muscle energy levels during workouts and contributed to the greater gains seen with the BCAA supplement.

Conclusion

The data from this study suggests that consuming a BCAA supplement during resistance training workouts may result in greater gains in lean mass and strength, as well as a greater reduction in body fat than consuming a whey protein supplement or a carbohydrate drink.

In addition, consuming a whey protein supplement during workouts increased lean mass gains greater than consuming a carbohydrate drink.

Further studies should be done to determine if consuming both a BCAA supplement and a whey protein supplement around workouts would have an additive effect on lean mass and strength gains.

Acknowledgements

Study funded by Scivation, Inc., Graham, NC.

For further information contact:

Jim Stoppani, PhD
Weider Publications
21100 Erwin Street
Woodland Hills, CA 91367
Phone: 818-251-2976
Email: jstoppani@weiderpub.com