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

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Abstract
In a randomized, double-blind study, a six-week resistance-training program was designed to determine 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 following 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 and a prescribed resistance-training program. The BCAA group experienced a significantly greater gain in body weight than the whey group (16 ± 4 kg vs. 5 ± 3 kg; p < 0.01) and the carbohydrate group (12 ± 4 kg vs. 1 ± 1 kg; p < 0.01). The training program consisted of training chest, back, shoulders, triceps, legs, and core. All subjects reported to the training facility and were tested for their body mass, body fat, and 10RM on the barbell bench press and barbell squat. 

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 (16 ± 4 kg vs. 5 ± 3 kg; p < 0.01) and the carbohydrate group (12 ± 4 kg vs. 1 ± 1 kg; p < 0.01). The BCAA group increased their percent body fat significantly more than the whey group (2 ± 1 % vs. 1 ± 1 %; p < 0.01) and the carbohydrate group (2 ± 1 % vs. 1 ± 1 %; p < 0.01). Muscle strength was significantly greater in the BCAA group on the 10-RM bench press than the whey group (6.2 kg vs. 3.4 kg; p < 0.01) and the carbohydrate group (6.3 kg vs. 2.4 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 during 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 both 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 compared to ingestion of a sports drink.

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 %). 

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 difficult to determine in this study as muscle biopsies were not performed.

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

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. 

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.

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