Comparison of a Plasma Modified Branched Chain Amino Acid Supplement and a Standard Processed Branched Chain Amino Acid Supplement on Bioavailability in Resistance-Trained Males

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ABSTRACT

Background
Plasma modification (PM) is an effective treatment technique for many different materials, and there is growing interest in its use on organic materials like protein. To this point, research on the use of PM to promote changes of organic materials has focused largely on experiments using aqueous solutions, particularly as they relate to end-use applications in pharmacological development. The purpose of this study was to explore PM's impact on BCAA powder and its ability to increase the bioavailability of the BCAA supplement following ingestion.

Materials and Methods
10 resistance trained males (26.4±7.4years; 178.8±5.9cm; 85±12.3kg) participated in this randomized, double-blind investigation. In a crossover fashion, participants reported to a Quest Diagnostics patient laboratory facility on two different occasions separated by 7-days. After a baseline blood sample was taken, participants ingested 10-grams of a BCAA powder that was either processed with PM technology (Plasma-BCAA) or not processed with this technology (Standard-BCAA). Further samples were taken at 30min, 1hr, 2hrs, 3hrs, and 4hrs post-ingestion and analyzed for BCAA plasma concentrations. Time course data were analyzed via a 2-factor [2x6] within-subjects repeated measures ANOVA and total BCAA concentrations and BCAA area under the cure (AUC) data were analyzed via a paired samples t-test.

Results
The repeated measures ANOVA revealed a main effect for time ($p<0.001$), a main effect for treatment ($p\leq0.009$), and treatment x time interaction ($p\leq0.003$) for all BCAAs. Baseline adjusted plasma BCAA concentrations are summarized in Table 1. There was also a significant difference between the treatments for total BCAA and for BCAA area under the curve (Table 2). For all analyses, the plasma modified BCAA dietary supplement resulted in significantly greater bioavailability as compared to the standard BCAA dietary supplement.

Conclusions
In resistance trained males, a plasma-modified BCAA dietary supplement is more bioavailable than a standard BCAA dietary supplement.

BACKGROUND

Plasma modification is an effective treatment technique used to change the chemical composition and properties of various materials. To date, research on the use of plasma modification to promote changes of organic materials has focused largely on experiments using aqueous solutions, particularly as they relate to end-use applications in pharmacological development. There is growing interest in the use of plasma modification (PM) on organic materials such as protein.

The purpose of this study was to explore PM's impact on BCAA powder and its ability to increase the bioavailability of the BCAA supplement following ingestion in resistance trained male subjects.

METHODS

10 resistance trained males (26.4±7.4years; 178.8±5.9cm; 85±12.3kg) participated in this randomized, double-blind investigation. In a crossover fashion, participants reported to a Quest Diagnostics patient laboratory facility on two different occasions separated by 7 days. Participants arrived to the facility in the overnight fasted state, refrained from exercise activities for the previous 24-hours, and recorded and replicated all food intake for the 48-hours prior to each visit.

Upon arrival to the laboratory, a baseline blood sample was taken and measured for plasma BCAA concentrations. Following the baseline blood draw, participants ingested 10 grams of a branched chain amino acid powder (mixed in 500mL of water) that was either processed with PM technology (Plasma-BCAA) or not processed with this technology (Standard-BCAA). After ingestion of the BCAA supplement, further blood plasma samples were taken at 30min, 1hr, 2hrs, 3hrs, and 4hrs post-ingestion and analyzed for BCAA plasma concentrations.

Time course data were analyzed via a 2-factor [2x6] within-subjects repeated measures ANOVA and total BCAA concentrations and BCAA area under the curve (AUC; calculated via the trapezoid rule) data were analyzed via a paired samples t-test.

RESULTS

The repeated measures ANOVA revealed a main effect for time ($p<0.001$), a main effect for treatment ($p\leq0.009$), and treatment x time interaction ($p\leq0.003$) for all BCAAs. Baseline adjusted plasma BCAA concentrations are summarized in Table 1. There was also a significant difference between the treatments for total BCAA and for BCAA area under the curve (Table 2).

For all analyses, the plasma modified BCAA dietary supplement resulted in significantly greater bioavailability as compared to the standard BCAA dietary supplement.

CONCLUSION

In resistance trained males, a plasma-modified BCAA dietary supplement is more bioavailable than a standard BCAA dietary supplement.

Table 1: Baseline Adjusted Plasma BCAA Concentrations (μmol/L)

	Baseline	30-min	1hr	2hr	3hr	4hr	Treatment x Time
Plasma-Leucine	0	464±149	329±55	143±36	68±30	41±26	p=0.001
Standard-Leucine	0	241±77	107±41	32±31	10±27	8±28	
Plasma-Isoleucine	0	224±74	130±30	32±19	0.5±16	-8±15	p=0.001
Standard-Isoleucine	0	111±40	37±17	-5±16	-15±11	-16±14	
Plasma-Valine	0	294±146	257±89	115±50	59±43	34±40	p=0.003
Standard-Valine	0	131±65	69±28	8±37	-24±30	-36±32	

Note: Plasma = plasma modified; Standard = not plasma modified

Table 2: Total BCAA (μmol/L) and Area Under the Curve Comparisons

	Total BCAA	p-value	AUC	p-value
Plasma-BCAA	5,277±438	<0.001	2,149±527	<0.001
Standard- BCAA	3,959±388		681±316	

Note: This investigation was supported by Plasma Nutrition, Inc.