The effects of heavy resistance training and a high protein diet on body composition and exercise performance in resistance-trained individuals- a follow up investigation

Anya Ellerbroek CISSN, Corey Peacock PhD, Steve Orris CISSN, Max Scheiner CISSN, Adriana Gonzalez CISSN, Tobin Silver PhD, Jose Antonio PhD, FISSN
Exercise and Sport Science, Nova Southeastern University, 3532 S. University Drive, University Park Plaza, Suite 3532 Davie, FL 33314

Abstract

The purpose of this investigation was to determine the effects of a high protein diet (>3 g per kg daily) combined with a periodized heavy resistance training program on measures performance, body composition and health.

Methods

Forty-eight healthy individuals participated in this study (11 females, 37 males). Subjects were randomly assigned to one of the following groups: Normal (NP) or high protein (HP). The NP group was instructed to consume 1.1-2.2 g/kg/d protein diet and the HP group was instructed to consume 3.3 g/kg/d of protein. Both groups were instructed to follow the same periodized heavy resistance training for 8 weeks, and were also instructed to maintain the same dietary habits (e.g. maintain the same fat and carbohydrate intake). Subjects' strength and power was measured at baseline and after 8 weeks. Strength test consisted of: 1RM bench press, and squat, and pull ups to failure. Power test consisted of: long jump, and vertical jump. Body composition (Bod Pod®), training volume (i.e. volume load), and food intake were determined at baseline and over the 8 week treatment period. Blood was drawn pre and post study.

Table 1. Subject Characteristic::

	Age years	Height cm	Weight kg	Years training
Normal Protein (NP) n=17 (4 female, 13 male)	24.8±6.9	174.0±9.5	74.7±153	2.4±1.7*
High Protein HP N=31 (7 female, 24 male)	22.9±3.1	172.3±7.7	74.3±124	4.9±4.1

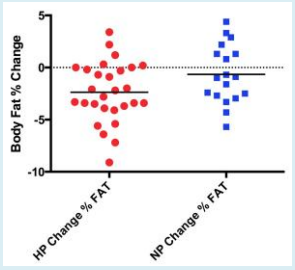
Data are mean ±SD. Legen: cm - centimeters, kg–kilograms. *P <0.05 – significant between group differences.

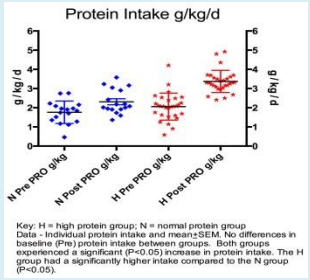
Results

Table 2. Body Composition Measures

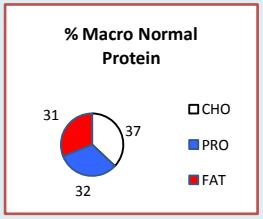
	NP Pre	NP Post	HP Pre	HP Post	Between Group
BW (kg)	74.7±15.3	76.0± 14.9	75.8±11.3	75.1 ± 11.8	P=0.04#
FFM (kg)	59.6±13.4	61.1±13.5*	61.4 ±11.8	62.9±11.3*	P=0.97
FM (kg)	15.1± 6.0	14.8± 5.4*	13.5 ± 5.6	11.9 ±5.9*	P=0.04#
%BF	20.2 ± 7.6	19.6± 6.8*	18.3 ± 7.7	15.9 ±7.3*	P=0.05#

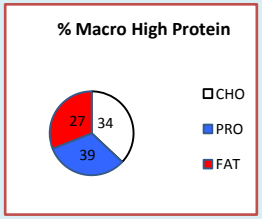
Data are means ±SD. *Denotes significant times effects (Pre. Vs. Post) (P<0.05).
#Denotes significant time by group effects (NP vs. HP).
Legend: BW-body weight, FFM-fat free mass, %BF-percentage body fat, HP-high protein, NP-normal protein.





% Macronutrients





Basic Metabolic Table

	NP (n=9) Pre	NP Post	HP (n=14) Pre	HP Post	Normal values
Glucose (mg/dl)	83.7± 11.6	77.4 ±12.4	84.0± 10.3	85.4 ±11.1	65-99
BUN (mg/dl)	15.7± 2.9	17.6 ±4.7	19.6± 5.5	20.7± 4.4	7.0 25.00
Creatinine (mg/dl)	1.0 ±0.2	1.0 ±0.2	1.1 ±0.2	1.1± 0.1	0.6 1.35
GFR	101.8 ±12.8	100.1± 15.5	90.7 ±13.8	90.2 ±9.1	>=60ml/min/1.73m2
BUN/Creatinine	16.6 ±3.9	18.8 ±7.5	17.7 ±6.3	18.5 ±4.2	6.0-22.0
Sodium (mmol/l)	139.± 1.9	139.6 ±1.9	139.1 ±1.5	138.8± 2.1	135-146
Potassium (mmol/l)	4.1± 0.2	4.0 ±0.2	4.4 ±0.3	4.3± 0.2	3.5-5.3
Chloride (mmol/l)	103.1± 1.4	103.7 ±1.4	102.6 ±2.3	102.7 ±2.0	98-110
CO^2 (mmol/l)	27.4± 2.9	26.7± 2.2	27.1 ±2.9	27.1± 1.4	19-30
Calcium (mg/dl)	9.6 ±0.3	9.5± 0.3	9.6 ±0.3	9.6 ±0.3	8.6 10.3

Conclusion

Consuming a high -protein diet (>3 g per kg daily) for 8 weeks may result in improved body composition. Furthermore, this investigation demonstrates that consuming a high-protein diet has no harmful effects. Future research should examine very long-term consumption of a high-protein diet (e.g. 1 year)

Acknowledgment:

We would like to thank Essentia Metabolic Nutrition for donating the beef protein for this investigation.