Whey Protein

Effects of supplemental protein on body composition and muscular strength in healthy athletic male adults

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Abstract

Objective

The purpose of this double-blind, randomized study was to assess the effects of supplemental whey protein with or without added L-glutamime and branched-chain ainino acids on body mass, body composition, and exercise performance for a 10-week period.

Results

Compared with group 1, group 2 gained a significant amount of body mass (1.25 kg; $P \leq 0.05$) over the 10 weeks. During the first 5 weeks, group 2 gained a significant amount of fat-free mass (0.72 kg; $P = 0.05$) compared with group 1. At 10 weeks, group 2 exhibited a trend toward gaining fat-free mass (1.6 kg). No significant changes were noted comparatively for change in percent body fat. In terms of exercise performance (bench press repetitions), group 2 improved significantly ($P = 0.001$) compared with group 1 after 10 weeks of supplementation. Group 2 also exhibited a trend over 10 weeks compared with group 1 for improvement in leg press repetitions (9.13 vs 5.13).

Conclusions

Results of the present study suggest that whey protein combined with glutamine and branched-chain amino acids, in addition to resistance exercise, leads to improved body composition and exercise performance.

Dietary whey protein lowers serum C-peptide concentration and duodenal SREBP-1c mRNA abundance, and reduces occurrence of duodenal tumors and colon aberrant crypt foci in azoxymethane-treated male rats

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Abstract

We evaluated partially hydrolyzed whey protein (WPH) for inhibitory effects on the development of colon aberrant crypt foci (ACF) and intestinal tumors in azoxymethane (AOM)-treated rats. Pregnant Sprague–Dawley rats and their progeny were fed AIN-93G diets containing casein (CAS, control diet) or WPH as the sole protein source. Colons and small intestines from the male progeny were obtained at 6, 12, 20 and 23 weeks after AOM treatment. At 6 and 23 weeks, post-AOM, WPH-fed rats had fewer ACF than did CAS-fed rats. Intestinal tumors were most frequent at 23 weeks, post-AOM. At this time point, differences in colon tumor incidence with diet were not observed; however, WPH-fed rats had fewer tumors in the small intestine (7.6% vs. 26% incidence, P=.004). Partially hydrolized whey protein suppressed circulating C-peptide concentration (a stable indicator of steady-state insulin secretion) at all four time points relative to the corresponding CAS-fed animals. The relative mRNA abundance for the insulin-responsive, transcription factor gene, SREBP-1c, was reduced by WPH in the duodenum but not colon. Results indicate potential physiological linkages of dietary protein type with circulating C-peptide (and by inference insulin), local expression of SREBP-1c gene and propensity for small intestine tumorigenesis.

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Whey protein concentrate promotes the production of glutathione (GSH) by GSH reductase in the PC12 cell line after acute ethanol exposure

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Abstract

Excessive ethanol consumption may increase the production of reactive oxygen species (ROS), which results in the damage of tissues, especially the neurons and glial cells in the central nervous system (CNS). The purpose of this study is to evaluate the effects of whey protein concentrate (WPC) on the glutathione (GSH) status after acute ethanol exposure in the pheochromocytoma (PC12) cell line. In this study, we assayed the cell viability, the percentage of lactate dehydrogenase released (% LDH released), the level of GSH, and the activity of GSH reductase (GRx). The results showed that with the supplement of WPC, the cell viability displayed no significant difference after acute exposure of ethanol in groups with or without ethanol treatment. The ethanol-induced cytotoxicity showed a slight decrease ,and the level of GSH showed a significant increase. The activity of GRx significantly increased when 0.1, 10 mg/ml of WPC was supplied. In conclusion, these results suggest that WPC in a moderate concentration should be a precursor agent to promote the production of GSH and will enhance the antioxidant capacity in the PC12 cell line.

Abbreviations: WPC, whey protein concentrate; GSH, glutathione; ROS, reactive oxygen species; LDH, lactate dehydrogenase; GRx, GSH reductase; GSSG, GSH disulfide

Dietary whey protein downregulates fatty acid synthesis in the liver, but upregulates it in skeletal muscle of exercise-trained rats

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Abstract

Objective

This study compared the effects of casein and whey protein as the source of dietary protein on the activity of lipogenic enzymes and mRNA levels in the liver and skeletal muscle of exercise-trained rats.

Results

A significant decrease in the activity of the hepatic lipogenic enzymes, glucose-6-phosphate dehydrogenase, malic enzyme, adenosine triphosphate citrate lyase, acetyl-coenzyme A carboxylase, and fatty acid synthase (FASN) was observed in rats fed whey protein compared with animals fed casein. Compared with the casein diet, the whey protein diet also lowered mRNA expression of these enzymes, except for FASN. In contrast to the findings in liver, whey protein, as compared with casein, increased skeletal muscle FASN activity and mRNA. Further, exercise training resulted in increased skeletal muscle glucose-6-phosphate dehydrogenase and FASN activity and adenosine triphosphate citrate lyase, acetyl-coenzyme A carboxylase-1, and FASN mRNA expression.

Conclusions

Exercise training or whey protein may play an important role in suppressing hepatic fatty acid synthesis, thereby decreasing accumulation of body fat and stimulating the skeletal muscle to increase energy substrate as fat during prolonged exercise.

Effect of dietary whey protein concentrate on primary and secondary antibody responses in immunized BALB/c mice

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Abstract

Proteins derived from the whey fraction of bovine milk are known to modulate immune responses. We have previously described a rennet whey protein concentrate (WPC) that can boost intestinal tract antibody responses to orally administered T-dependent antigens. In the present study, we investigated the effects of feeding WPC to mice on specific antibody responses to several orally or parenterally administered antigens, including influenza vaccine, diphtheria and tetanus toxoids, poliomyelitis vaccine, ovalbumin and cholera toxin sub-unit. WPC-fed mice produced elevated levels of antigen-specific intestinal tract and serum antibodies against all tested antigens, compared to mice that were fed a standard chow diet. Both primary and secondary intestinal tract antibody responses were elevated by WPC feeding, while only secondary serum responses were increased in WPC-fed mice. Significant up-regulation of intestinal tract antibody was observed within 2 weeks of primary oral immunizations. A period of pre-feeding with WPC, prior to commencement of immunization, did not alter the kinetics or magnitude of immune enhancement. These results identify bovine WPC as a potentially important dietary protein supplement, capable of enhancing humoral immune responses to a range of heterologous antigens.

Author Keywords: Dietary supplement; Nutraceutical; Whey protein; Antibody; Immune enhancement