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New Research Reveals Whey Protein Preserves Muscle Protein Synthesis After Weight Loss

Including whey protein as part of a short-term, energy-restricted diet preserves muscle protein synthesis in overweight and obese adults

ROSEMONT, IL (March 16, 2015) – New research[i] published in the February 2015 issue of the Journal of Nutrition shows twice-daily whey protein supplementation, as part of an energy-restricted diet, is better than soy protein or carbohydrate supplementation at preserving muscle protein synthesis (MPS) during weight loss in obese and overweight adults.

The double-blind, randomized controlled trial included 40 overweight or obese participants who received supplements of whey protein, soy protein or carbohydrate as part of their reduced calorie diet. While it is normal to see a decline in MPS during a time of caloric restriction, the whey protein supplement preserved protein synthesis to a significantly greater degree than the other supplements. Specifically, MPS rate was only reduced by 9 percent in the whey group, in sharp contrast to a reduction of 28 percent seen in the soy supplement group and the 31 percent reduction in the carbohydrate supplement group.

Whey supplementation also led to significantly higher levels in plasma amino acid concentrations, including the branched-chain amino acid leucine, which has been shown to be a potent stimulator of muscle protein synthesis.

“The greatest metabolic health benefits resulting from weight loss would be achieved with retention of muscle and a loss of fat,” said Stuart Phillips, PhD, FACSM, FACN[ii] the study’s senior author. “Although higher protein diets have been shown to promote retention of muscle during weight loss, many protein sources are known to affect MPS differently. A single amino acid from protein—known as leucine—may be the reason why certain proteins are more or less effective in stimulating MPS. In our study, we showed that whey, but not soy, protein preserved the MPS response during weight loss. These results may not be surprising when one considers whey has more leucine than soy. Our results indicate whey would be effective at promoting the retention of muscle when people are trying to lose weight.”

Whey protein is a high-quality, complete protein naturally found in dairy. This means it is readily digested and absorbed by the body and contains all of the essential amino acids (protein "building blocks") the body needs. Whey protein also is one of the best sources of the branched-chain amino acid leucine. Existing evidence at the cellular level (at least in adipocytes and muscle cells) suggest leucine — in addition to muscle synthesis stimulating properties — also may have a synergistic role in muscle and adipocyte cells because it inhibits adipocyte lipogenesis and stimulates lipolysis.[iii,iv] More data, however, is needed to confirm this in humans.

This research is one of several studies supported by the Whey Protein Research Consortium, an international partnership working together to support whey research. Other studies from the Consortium have shown that daily consumption of whey protein resulted in positive anthropometric changes compared to carbohydrates in free-living overweight and obese adults[v] and that whey protein, either as a supplement combined with resistance exercise or as part of a weight-loss/weight-maintenance diet, may provide body composition benefits to both men and women.[vi]

"The Consortium's work supports evidence-based scientific research into the muscle benefits of whey protein," said Moises Torres-Gonzalez, PhD, a dairy proteins subject matter expert at the Whey Protein Research Consortium.[vii] "We continue to learn more about the value of whey protein as part of a diet or as a supplement in consumers experiencing different health conditions and across various ages and life stages. The growing body of validated science showcases the vital impact whey protein could have on muscle health."

The study can be accessed here:
http://jn.nutrition.org/content/early/2014/12/17/jn.114.200832.abstract

Study Details

The Study: The aim of this study was to examine the efficacy of supplementation with whey vs. soy protein compared with carbohydrate, an isoenergetic control, in affecting protein turnover and body composition. Participants were randomized to one of three treatment groups; these groups were matched and stratified by age, sex and BMI. Participants' baseline energy requirements were estimated using validated techniques, and they were provided with all meals for the study's duration — with caloric levels both for weight maintenance during the baseline assessment phase and then with a 750 daily calorie deficit during the supplement treatment period. The 14-day weight loss period included participants consuming all of the provided pre-packaged meals and supplements twice daily that were included in the participant's daily energy allowance. Baseline and post-weight loss period assessments included blood samples for plasma amino acid, insulin, glucose and glycerol concentrations; pre- and postprandial muscle biopsies as well as body composition analyses using a DXA scan.

Results: Forty participants completed the study, 19 males and 21 females. All participants lost total body mass, fat mass, lean body mass and trunk fat mass during the 14-day hypocaloric study period. Significant differences were seen in amino acid measurements between all three groups, with

significantly higher values seen in the whey supplement group than the soy protein and carbohydrate supplement groups (P < 0.001). Plasma glucose and insulin levels after the three-hour sampling period were significantly higher in the carbohydrate supplement group than in the whey and soy supplement groups (P < 0.001). Plasma insulin levels pre- and post-intervention also were significantly higher in the carbohydrate supplement group than the other two (P < 0.001). Glycerol rate of appearance decreased in all groups after feeding (P < 0.001). However, it was significantly lower after supplementation in the carbohydrate group than in the whey and soy supplement groups (P < 0.001). A significant increase in the fractional synthetic rate of myofibrillar protein was seen after the ingestion of the whey supplement both pre- and post-diet compared to the soy protein and carbohydrate supplements (P < 0.001). A significant increase in MPS also was seen in response to ingestion of the whey and soy supplements before and after the diet (P < 0.01). Postprandial rates of MPS were reduced by 9 percent in the whey group, which was significantly less than the reduction in the soy (-28%; P = 0.021) and carbohydrate (-31%; P = 0.013) groups after the 14-day weight loss intervention.

Conclusions: Including whey protein as part of an energy-restricted weight loss regimen can result in a reduced rate of the decline normally seen in myofibrillar protein synthesis during an energy deficit. This could translate to preserving lean body mass in longer-term weight loss.

About the Whey Protein Research Consortium

The Whey Protein Consortium Research Consortium (the Consortium) is an international partnership of dairy cooperatives, associations, processors and multinational companies working together to grow the market for whey protein. The mission of the Consortium is to create incremental global usage of whey proteins through the development and documentation of whey protein's health and wellness benefits. The goal of the integrated research efforts of the Consortium is to develop a generic, non-proprietary body of knowledge, establishing measurable health and wellness benefits of whey proteins that will create a scientific foundation for new marketing opportunities through the development of scientific support for health, qualified health and/or structure function claims.

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[i]Hector AJ, et al. Whey Protein Supplementation Preserves Postprandial Myofibrillar Protein Synthesis during Short-Term Energy Restriction in Overweight and Obese Adults. *J Nutr*. 2015;145:246-252. doi:10.3945/jn.114.200832.

[ii]Unpublished interview: Stuart Phillips, PhD, FACSM, FACN, (Exercise Metabolism Research Group, Department of Kinesiology, McMaster University, Canada) in discussion with the author, Feb. 18, 2015.

[iii]Sun X, Zemel MB. Leucine and calcium regulate fat metabolism and energy partitioning in murine adipocytes and muscle cells. *Lipids* 2007;42:297-305.

[iv]Sun X, Zemel MB. Leucine modulation of mitochondrial mass and oxygen consumption in skeletal muscle cells and adipocytes. *Nutr Metab* (Lond) 2009;6:26.

[v]Baer DJ, Stote KS, Paul DR, Harris GK, Rumpler WV, Clevidence BA. Whey protein but not soy protein supplementation alters body weight and composition in free-living overweight and obese adults. *J Nutr*. 2011;141(8):1489-94.

[vi]Miller PE, Alexander DD, Perez V. Effects of Whey Protein on Body Composition: A Meta-Analysis of Randomized Controlled Trials. *JACN*. 2014:33(2):163-175.

[vii]Unpublished interview: Moises Torres-Gonzalez, (Director of Nutrition Research, National Dairy Council, Rosemont, Ill.) in discussion with the author, Feb. 18, 2015.