

Athletes Can Benefit from Protein Supplements

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Abstract

Protein supplements have become increasingly popular in the last few years. They are used to increase the growth of muscle beyond that which is achievable by eating a healthy, balanced diet. There are several varieties of protein supplements, ranging in composition, price, and effectiveness. The most effective protein supplement contains more leucine and less carbohydrate. It is best consumed within in 3 hours after completing exercise. The additional calories needed are about 600 for strength training and 1200 for endurance training.

Introduction

Due to the recent increase in the use of protein supplements among athletes, there has been increased concern as to whether they actually benefit the user, or if they are simply a waste of money. Muscle glycogen is burned during prolonged exercise. During the recovery phase directly after exercise, either protein or carbohydrates must be consumed to replenish the muscle glycogen. It has been proven that protein is more effective in this respect (2*). High amounts of protein are hard to consume without also consuming carbohydrates and fats. For this reason, athletes turn to protein supplements, found at most health food or supplement stores, as well as online.

Protein supplements are a dietary supplement, usually a powder added to water to make a thick drink. They contain a high amount of protein, often in combination with a small amount of carbohydrates, usually sugar or flavor enhancers to make the supplement more appetizing. There are four main kinds of protein supplements: egg-, rice-, soy-, and whey-based. Athletes who use protein supplements use them in different ways, and at different frequencies, based on the knowledge they find on bodybuilding websites, from health store employees, and athletic trainers. Protein supplements are usually consumed either directly before or after exercise.

The protein requirement for active individuals depends on if they are trying to gain strength or endurance.

Table 1:

Type of Athlete	Daily Requirements for a 70kg (154 lb) Individual (Gatorade Sports & Science Institute*)		
	Energy (calories/day)	g protein/kg per day	% of daily calories
Endurance	3800	1.2 - 1.4	9 - 10%
Strength	3200	1.6 - 1.7	14 - 15%
Normal	2400	0.8	9%

My hypothesis is that if a protein supplement with the proper composition is taken at the right time in combination with resistance training, then the muscle growth rate will be higher.

Method

Literature was assessed to reach conclusions about the usage of protein supplements with resistance training, the effect of the amino acid leucine, and the importance of timing between supplementing and exercise. Many of the sources providing useful information were not peer-reviewed, so this information must be viewed with caution. A GNC employee was interviewed to find what is recommended to athletes who inquire about protein supplements.

Results

Protein supplements must be used after resistance training exercise, within the recovery phase, to experience the benefits. During the recovery phase, directly after exercise, either protein or carbohydrates must be consumed to replenish the muscle glycogen, and protein is superior in this process. The amino acids consumed during this time promote the growth of muscle. If a protein supplement is being used to replenish muscle glycogen, carbohydrates should be avoided, or kept to a minimum during the first two to six hours of exercise recovery (2*).

The recovery phase in which the protein supplement should be consumed is between 0 and 3 hours of exercise. No studies have shown that there is any difference in muscle anabolism if taken directly after exercise rather than up to three hours after resistance training (5).

The protein supplement should be taken in addition to the daily energy requirement in calories. It is not effective to replenish muscle glycogen by replacing calories by taking a protein supplement instead of eating a meal.

The composition of the protein supplement is very important. Non-essential amino acids do not increase muscle anabolism. Essential amino acids are the primary mechanism in the replenishment of muscle glycogen (1).

Table 2:

Essential Amino Acids
Histidine
Isoleucine
Leucine
Lysine
Methionine
Phenylalanine
Threonine
Tryptophan
Valine

Leucine is proven to be the most important amino acid in stimulating skeletal muscle anabolism (1). Other important amino acids to this process are valine and lysine, though increasing the amounts of either valine or lysine provides no extra benefit. Higher quantities of leucine increases the rate of muscle anabolism.

Table 3:

Comparison of Popular Brands		
Brand	Leucine Content	Price*
Mega Isolate (whey)	5400 mg	\$21.97**
Soy Protein 95	1940 mg (made with water) 2720 mg (with milk)	\$41.99
100% Whey Protein	2300 mg	\$43.99
100% Whey Protein Gold	2531 mg	\$34.99**

* according to GNC of Beloit, WI

** promotional prices, regular price not available

Discussion

The use of protein supplements can be beneficial to an athlete if a brand is chosen properly, and it is used at the proper time in relation to exercise, specifically resistance training. The best choice at the GNC of Beloit, Wisconsin, is Mega Isolate. It is the least expensive and contains the most leucine.

The protein supplement must be taken during the six hour recovery phase after resistance training or prolonged exercise to replenish glycogen and promote muscle anabolism. Taken within the first three hours of the recovery phase, the amino acids are most effective (5).

Other food should not be eaten along with the supplement during the first three hours of the recovery phase. Although carbohydrates can replenish muscle glycogen, if increased muscle anabolism is desired, carbohydrates should be avoided during the recovery phase if a protein supplement is taken. This includes protein supplements that are high in sugars. Supplements with high carbohydrate contents should be avoided. Carbohydrates interfere with the rate of muscle anabolism (2*).

A good brand is chosen based on composition. The proper amino acids must be incorporated. Leucine promotes the rate of muscle anabolism, but other amino acids are necessary, too. Specific amino acids to look for are leucine, lysine, and valine. Most protein supplements list information about their amino acid contents on the label.

If consumed in combination with a healthy diet, there are no risks associated with the use of protein supplements (2*). The extra calories provided by the supplement are necessary, and the supplement should not be used to replace a meal.

Sources

1. Buse Maria G. and Reid, S. Sandra, "Leucine: A Possible Regulator of Protein Turnover in Muscle." *The Journal of Clinical Investigation*, 54 (1975): 1250-1261.

2*. Gibala, Martin J. Ph.D., "Dietary Protein, Amino Acid Supplements, And Recovery from Exercise." *Sports Science Exchange* 87, Vol 15, No. 4. (2002).

3. Interview with GNC employee, Nov. 1, 2006, GNC of Beloit, WI

4. Koopman, Rene et al, "Co-ingestion of protein and leucine stimulates muscle protein synthesis in young and elderly lean men." *The American Journal of Clinical Nutrition*, 84 (2006): 623-632.

5. Rasmussen, Blake B. et al. "An oral essential amino acid-carbohydrate supplement enhances muscle protein anabolism after resistance exercise." *Journal of Applied Physiology*. (1999): 386-392.

(*these source is a commercial publication)