

The Effects of Whey Supplementation and Natural Diet on Protein Synthesis and Muscle Hypertrophy

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Introduction

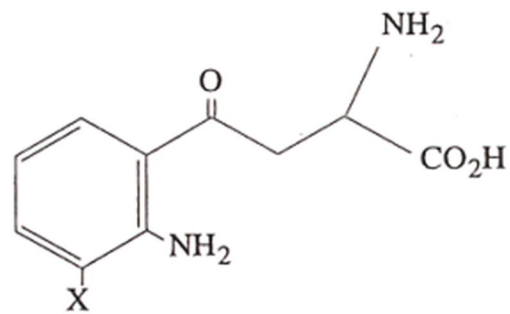
Protein is commonly known among athletes as the nutrient responsible for muscle tissue growth and repairs after their muscles have been broken down by exercise. Countless research studies have been conducted that attempt to explore exactly what affects different types and sources of protein have on the rate of growth of muscles. Protein supplementation in the United States alone is a \$25 billion a year industry, fueled by the average American's desire to build muscle and recover faster than they could naturally. But do these supplements really cause greater increases in muscle mass in a shorter amount of time than natural sources of protein from diet alone? This chapter examines multiple sources of protein from natural foods and compares their effects on the rate and magnitude of muscle tissue anabolism to that of supplemental protein sources.



www.gainmusclesize.net/protein-supplements/

What is Protein?

Proteins are groups of molecules called amino acids bound together by peptide bonds; each protein molecule contains an amino group (NH₂), an acid group (COOH), and a unique side chain.



www.biology.unm.edu

There are two main classes of amino acids: essential, meaning they must be obtained from the diet, and nonessential, amino acids that can be formed naturally in the body. In all, there are twenty amino acids that proteins can be assembled from, nine essential and eleven nonessential. Below is a table listing all twenty amino acids and is organized by essential-nonessential status.

Table 1.1 Amino Acids: The Building Blocks of Life

Essential Amino Acids	Non-Essential Amino Acids
Histidine	Alanine
Isoleucine	Arginine
Leucine	Asparagine
Lysine	Aspartic Acid
Methionine	Cysteine
Phenylalanine	Glutamic Acid
Threonine	Glutamine
Tryptophan	Glycine
Valine	Proline
	Serine
	Tyrosine

Protein Synthesis, the process in which proteins are assembled from individual amino acids, occurs in the ribosomes of cells throughout the body; it is this process that most protein supplements target in an attempt to raise the rate at which proteins are created after a workout. Synthesis is triggered by several different stimuli, such as exercise, stress, and injury. If proteins are not created to help aid the recovery of broken down muscles, little to no growth will occur; it is for this reason that nutrition plays a crucial role in the development of muscle tissue.

Common Sources of Quality Protein

Pure Protein Sources

Table 1.2 (6) Comparing size of pure protein sources to amount in grams

Food	Serving Size	Calories	Protein (g)
Whey Protein	One Scoop	100	24
Egg Whites	6	102	24
Turkey Breast	3 oz	90	20
Tuna	4 oz	120	26
Ground Turkey	3 oz	110	24
Chicken Breast	3 oz	90	18

The percentage of protein to calories is high, making these sources the most 'pure protein' sources

Quality Protein Sources

Table 1.3 (6) Comparing size of quality protein sources to amount in grams

Food	Serving Size	Calories	Protein (g)
Salmon	2 oz	100	14
Eggs	1	75	6
Sardines	2 oz	120	11
Peanuts	1 oz	90	4
Sunflower Seeds	1 oz	140	6
Almonds	1 oz	170	6

Great sources for people looking for high protein foods with healthy fat. These protein choices offer healthy sources of Omega 3's and Omega 6's. The Omega 3's in foods aid your body in storing carbohydrates as muscle glycogen, which is beneficial for fueling muscles.

Great Muscle Building Foods

- Omega-3 Eggs
 - Cholesterol found in the yolks of eggs serves as the scaffolding for steroid hormones which provides your muscles with power and energy
- Nuts
 - Nuts provide a blend of protein, fats, and fiber. Helpful for weight lifters who are wanting to increase their caloric intake to add muscle weight

Different Types of Protein



www.thegreenforks.com

We receive all necessary amino acids from animal protein



Fruits, vegetables, grains, nuts and seeds, lack one or more essential amino acids

www.harmongrocery.com

What is the Ultimate Muscle Building Protein Found in Food?

Many looking to build muscle have one question in common: what is the most beneficial source of protein out there to gain muscle? Although there are many different types of protein available, **eggs** seem to lead the way. It is known that without protein, your muscles will not grow, and those looking to build muscle need to take their protein intake very seriously. Eggs contain about 6 grams of high quality protein and their protein levels are so high that they are now used as the standard by which other foods are measured. Eggs are also rich in other areas, including vitamins A, E and K, riboflavin, folic acid, and a range of B vitamins, including B12. Eggs also contain **all nine** essential amino acids needed for optimal muscle recovery and building beneficial minerals like calcium, zinc, and iron (2).

Many have the assumption that eggs aren't all that great, that they contain high levels of cholesterol and contain a lot of fat. Although many believe this to be true, eggs are not all that scary. The white part of the egg actually contains zero fat and the yolk contains about 5 grams of fat, but only a small portion of this fat is saturated (about 1.6 grams). Those looking to gain muscle do in fact need fat to bulk up as well as to provide energy while doing so. Eggs are also easily digested and absorbed, so eating eggs will not get in the way of getting a good workout in (2).

Example:

6 Egg Whites and 2 Yolks in the Morning Will Provide the Body With:

- 26.5g of protein
- 0 Carbohydrates
- 5.23g fat (2.7g unsaturated fat)
- 153 calories

How much protein should I be getting?

Proteins are digested in the stomach with the aid of several pancreatic enzymes, such as protease and trypsin, which break the long protein strains into their constituent amino acids. These singular amino acids are then absorbed in the small intestine and shipped to ribosomes throughout the body, where they will be used to construct new proteins when necessary.

The Food and Drug Administration recommends that the average adult receives 0.8 grams of protein per kilogram of their body weight on a daily basis. This means that for an adult who weighs 175 pounds, they should be getting 64 grams of quality protein per day in order to maintain healthy body function.

Protein and Exercise

Protein Needs for Athletes

Nutrition plays an important role in the promotion of training adaptations. According to The Institute of Medicine, 10-35% of daily calories for an average adult should come from protein, so active adults should be between 25-35%. The amount of protein that an athlete needs depends on a few factors: athletic status of the individual, their weight, intensity of exercise, and the nature of their sport or activity. The FDA suggests that elite endurance athletes consume 1.2-1.4 g/kg body weight daily to ensure proper muscle rebuilding and structural maintenance of tissues. Weight lifters and bodybuilders require an even higher amount of protein; the FDA recommends that they receive 1.7 g/kg body weight. A study done by Moore and colleagues suggest that the largest amounts of muscle protein synthesis occurs when ingestion of 20 grams of high biological value protein (8610 g essential amino acids) is ingested no more than 566 times daily. Timing of consumption also seems to affect protein synthesis; athletes are also encouraged to eat rapidly-digested protein meals in close proximity to their exercise training, especially during and after exercise (1).

Whey Protein: Good for Building Muscle?

It is common knowledge that whey protein is an easy way to add protein into the diet; just one scoop mixed with whatever you please for a quick pre/post workout meal. But is whey protein just an easy way out of the lifestyle required for someone looking to build muscle, or are there actually long term benefits to this popular supplement?

Many people are unaware of what whey protein actually consists of. Have you ever opened a yogurt container and there is a clear liquid built up on the top? That is whey protein. Whey protein is also found in cow milk. Whey is extracted and isolated, and is then filtered to remove all of the fat and carbohydrates. The more it is filtered, the purer the protein becomes. Whey protein is undoubtedly the king of protein supplements. There is an enormous body of research suggesting that whey protein effectively stimulates muscle protein synthesis-the process that ultimately produces bigger and stronger muscles, and is in first place compared to its competition, soy or casein supplements (3).

In 1997, researchers in France published a study about whey protein's ability to stimulate protein synthesis; they found that participants' protein synthesis increased by almost 70% while consuming a whey protein drink. This study also tested another form of protein supplement, Casein. The participants drinking the casein protein drink had only a 30% increase in protein synthesis, showing that whey protein is much more effective. Also, whey protein is shown to boost blood flow to muscle tissue, which is the secret to its protein-synthesis power. Increased blood flow enhances the delivery of nutrients, including glucose for energy, amino acids, and oxygen. These nutrients support muscle growth and spur recovery after a workout (3).



www.doyoueven.com

Whole Foods vs Whey Protein

Nutrition, when followed correctly, has the ability to greatly enhance the adaptations that exercise induces in the body, and protein is an important part of that. Protein supplement use is reportedly higher in athletes than sedentary individuals, with particularly high use seen in weightlifters and bodybuilders. Liquid meal supplements that are high in protein boost total energy and specific nutrient intake at a time when one's appetite is often suppressed (1). But do these supplements, specifically whey, lead to greater protein synthesis and ultimately more rapid muscle growth?

A Deeper Look at Whey Protein

Society today is constantly on the go, leaving little room to fully cook and prepare healthy meals for themselves. Our culture often looks for a quick fix, which is one reason why whey protein has caught the attention of those looking to build up muscle in a short period of time; a very appealing aspect of protein supplements is the convenience that they offer. A whey protein shake takes almost no effort and very little time out of a busy and hectic day; one scoop of this supplement added to a beverage of your choice and you have yourself a drink loaded with protein in seconds. Now the question to ask yourself is are these supplements really what your body needs for optimal muscle growth or should you be getting our protein elsewhere?

These supplements contain complete proteins with all the essential amino acids that you need for good health (4). Although they do contain many beneficial ingredients, they also lack a few important nutrients your body craves. Whey protein, an isolated protein product, lacks other nutrients that naturally accompany proteins found in meat, fish, dairy products or whole grains (4). For example, yogurt contains good sources of calcium, salmon provides healthy sources of fat, and lean beef offers iron, which is extremely important for athletes and weight lifters. Protein supplements do not include any of those aspects that natural, whole foods offer, all of which are needed for those looking to gain muscle.

Also, the U.S. Food and Drug Administration does not regulate any protein supplements that are on the market; therefore the supplement labels may not be the most accurate description of what you are actually putting into your body and failing to reveal impurities in the product.

100% WHEY ISOLATE

Advanced full-spectrum amino acid profile.

26G AMINOS

25G PROTEIN High biological value protein for maximum muscle gain.

5.6G BCAAs Supports new muscle growth & prevents muscle breakdown.

4.8G GLUTAMINE Speeds muscle recovery after workouts.

www.nurtabio.com/products/whey-protein-isolate.htm

Whole Foods

Looking at whole foods for quality protein intake, it is important to look at the entire nutritional value of that food. Certain foods contain nutrients that are necessary for not only muscle recovery but more importantly for the body to function properly. If your body does not get the nutrients needed, then it won't matter how much protein you get; you will not build

quality muscle (5). One of the many benefits from getting protein from whole foods is that they contain both carbohydrates and healthy fats that your protein powder will not provide. While trying to build muscle, it is necessary that you are feeding your body with enough carbohydrates to fuel your body with the energy needed to get to the gym. Carbohydrates are also beneficial in building muscle, so eating an adequate amount after a workout is important.

Along with protein supplements, complete proteins found in whole foods can also contain all the amino acids your body cannot produce on its own, which is desired for many weight lifters. In addition to whole foods, they offer many minerals, vitamins, carbohydrates, and healthy sources of fat that are unavailable in any protein supplement on the market. Another benefit to eating whole foods is educating oneself about the importance of living an overall healthy life. Supplements are short-term answers to those looking to build muscle. It is simply unrealistic to rely on whey protein to keep your body healthy and strong for the rest of your life, whereas whole foods can and will get you to where you want to be in the long run.

Conclusion

Protein is an essential part of the diet, and necessary in the process of protein synthesis in the human body. For those who are trying to build a large amount of muscle mass through weight lifting, protein consumption can be a key concern. There are several ways to get protein, and each has its own benefit.

Whey protein is convenient, tastes good, and delivers a large amount of protein in a small form. Both whey protein and whole foods are good sources of protein that deliver high amounts of all the necessary amino acids. A natural diet, however, offers a wide range of food options, contributing a variety of flavors, nutrients, and phytochemicals to the diet. These food options are more cost effective than whey protein and can be found in any market or grocery store, instead of a specialty health store. More research should be done on the subject of whey protein and its benefits before it should be ruled out as a lesser form of protein. The authors do not discourage the use of whey supplements, as they appear to be a safe way to increase protein intake. They do however, recommend that the vast majority of all calories, protein included, come from a healthy, balanced diet of lean meats, fruits, vegetables, and whole grain carbohydrates and believe that following these guidelines will provide optimal conditions to promote protein synthesis and build muscle in an efficient manner.



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