shake it up with protein

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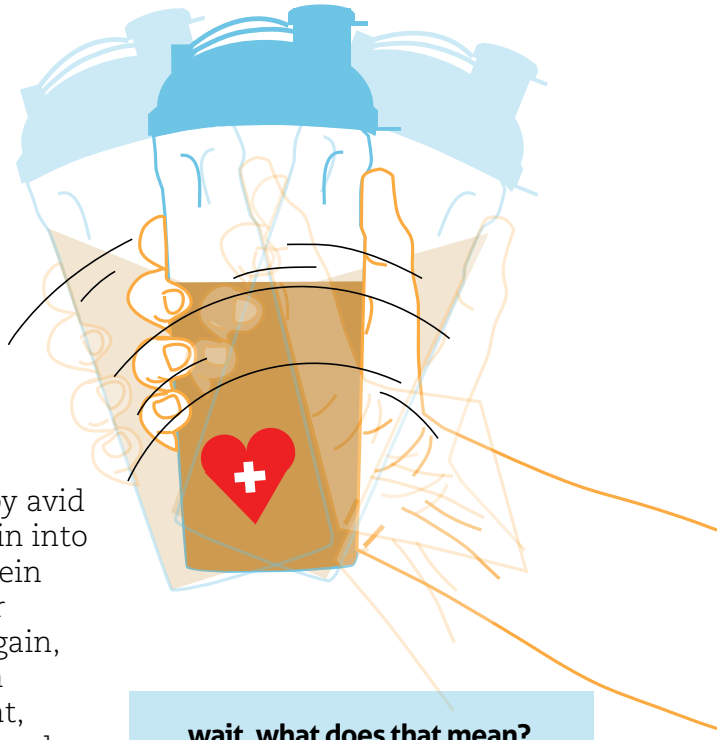
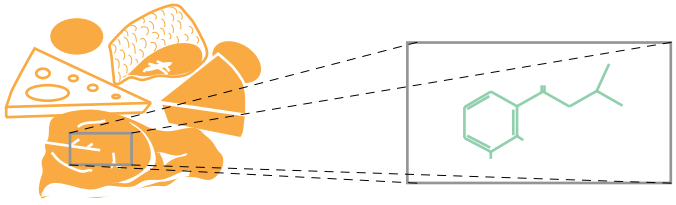


The phrase "protein shake" might be thrown around by avid gym-goers who are looking to incorporate more protein into their diets. On a deeper level, however, the use of protein shakes is multifaceted. From being labeled as whey or casein or soy to being used for weight loss or muscle gain, protein shakes, in all their varieties and purposes, can be difficult to decipher and understand. It is important, therefore, for consumers like you to learn how to use and choose different sorts of protein supplements in order to better meet your health and wellness goals.

what is protein?

Protein is a biological macromolecule composed of building blocks known as amino acids that is responsible for building and maintaining various parts of the body, including bones, skin, and muscle.[1] The various amino acids that make up proteins may be deemed **essential amino acids** if the body must acquire them from outside sources such as food or drink, or nonessential if the body can produce the amino acids itself. Different sources of **complete protein**, or protein sources that supply all of the essential amino acids, include meat, eggs, fish, and dairy products.[2] Vegetarians need not worry! Soy is the only complete vegetable source of protein, but by combining various plant sources such as legumes, beans, nuts, and whole grains, the full complement of essential amino acids can be obtained. And plant proteins come with the added benefits of fiber as well as additional vitamins and minerals.[3]



why do some people use protein shakes?

The use of protein shakes does not necessarily have to be reserved for competitive bodybuilders or Olympic athletes. A 2004 study published in the *International Journal of Sport Nutrition and Exercise Metabolism* surveyed individuals 18 and over who exercised regularly at a gym in New York. Results of the survey revealed that 84.7% of typical gym-goers took supplements, 42.3% of whom drank protein shakes at least 5 times a week. It was found that those age 45 and younger consumed protein shakes to build muscle while older participants opted for a multivitamin to ward off future illness.[7] Overall, protein intake keeps the body in positive nitrogen balance so that the body is able to rebuild itself after physical stress. Getting adequate amounts of amino acids is crucial to supporting the body's muscles and preventing excessive protein catabolism, or breakdown, which may hinder one's health goals. All in all, there are plenty of other reasons that people use protein shakes, from meal replacements when they are trying to lose weight to supplements in order to gain weight.

wait, what does that mean?

> whey concentrate:
whey is one of two proteins found in milk (the other is casein) and whey concentrate is the dried material left behind after liquid milk is filtered and strained; contains lactose

> protein isolate:
further processing of concentrate; peptides may be broken down into individual amino acids

> nitrogen balance:
a way of expressing the amount of nitrogen taken into the body via protein sources and the amount that is excreted

- **positive nitrogen balance:** occurs when the body retains more nitrogen than is excreted, and occurs during periods of growth, such as childhood, pregnancy, and when an individual is building muscle

- **negative nitrogen balance:** nitrogen loss is greater than nitrogen intake; nitrogen is drawn away from both muscle and vital organs and the body begins to break down; offten occurs during illness

> equilibrium:
nitrogen intake and loss are equal; this is the usual state for many people [5]

> branched chain amino acids (BCAAs):
the essential amino acids leucine, isoleucine, and valine; help prevent fatigue and maintain muscle mass and strength; stimulate release of insulin to prevent muscle breakdown [6]

ORIGINAL ILLUSTRATIONS BY KRISTEN SADAKANE

naming proteins: more wheys than one

whey

One type of protein found in protein supplements is whey, which is derived from the liquid part of milk that is left after the majority of it has been processed to manufacture cheese. **Whey is known as the "king of protein" because of its high levels of both essential and branched chain amino acids, or BCAAs ("branched" referring to the chemical structure of amino acids such as leucine, isoleucine, and valine).** Whey protein is not only rich in vitamins and minerals, but it is also rapidly digested and absorbed.[8]

Whey protein itself comes in two main forms: concentrate and isolate. To produce whey concentrate, substances including water, lactose, ash, and some minerals are removed in order to increase its concentration of biologically active peptides, which compose proteins and efficiently aid in muscle recovery. Whey's isolate form, on the other hand, is one of the purest protein sources available with protein concentrations of 90% or higher due to the significant removal of fat and lactose. It is important to note, however, that many of the proteins within isolate may be denatured due to manufacturing.[8] For example, a 2013 study in *Food Chemistry* showed that two methods of processing whey protein isolate, heating or drying, denatured the proteins up to 90% and 68.7% respectively. Although some researchers argue that this may in turn reduce its efficacy within the body, denaturing proteins does not make them less effective.[9]

casein

In addition to whey, **casein is the other major protein found in bovine milk and it is what gives milk its white color.** The biologically active peptides in casein protein aid in the uptake of nutrients and vitamins in the body. More importantly, it is a complete protein and is able to form a gel in the stomach that can provide a sustained slow release of amino acids. The gel takes longer to digest inside the stomach, which not only maximizes protein absorption and provides an efficient supply of nutrients, but also can be more filling. This attribute may not only maintain a prolonged positive nitrogen balance in the body, but also help improve satiety and stave off hunger.[8]

soy

Soy protein, a widely used vegetable protein, is complete and provides a high concentration of BCAAs, like those found in whey protein, that can fuel working muscles during exercise. Like whey protein, it is available both as a concentrate and as an isolate. Soy concentrate contains about 70% protein, mostly from defatted soybeans; the soy isolate form, similar to that of whey, contains a superior concentration of protein around 90%. However, compared to whey, soy protein is an appealing option for those looking for non-animal protein sources as well as those who are lactose intolerant and have a tough time finding lactose-free whey options.[8]

what if I am a vegan or a vegetarian?

Because proteins from vegetable sources may lack one or two essential amino acids, it is suggested that vegetarians consume a variety of vegetables, fruits, grains, and legumes to cover all their bases.[8] That is not to say, however, that all proteins contained in these foods are incomplete. An example of a non-animal or plant-based source of complete protein is soy. A wide array of foods including quinoa, buckwheat, spirulina, hemp, and chia seeds can also offer a full complement of essential amino acids.[4] The minimum amount of daily protein recommended by the Institute of Medicine, an organization that serves as an adviser to improve health in America, is 0.8 g/kg body weight (55 g for a 150 lb. individual) for adults to prevent the slow breakdown of tissues.[3] **Vegetarians may need more protein than omnivores to account for the fact that plant proteins are somewhat less digestible.** Nonetheless, as long as one's diet is rounded and manages to incorporate complete proteins from a range of sources, supplements such as protein shakes may only be necessary as a means of acquiring protein conveniently should one's diet be lacking.

what if I am trying to lose weight?

could using protein shakes help me lose weight?

When it comes to weight loss, i**t has been shown that casein and soy protein can both be effective.** A 2007 study published in *Metabolism* analyzed weight-loss efficacy in 43 obese women after the incorporation of casein or soy meal replacement protein shakes into their diets. Researchers were able to conclude that body fat losses for the group using casein protein shakes were comparable to those of the group using soy protein shakes, namely that they observed a 22% to 24% body fat loss in both groups.[10]

can shakes act as meals?

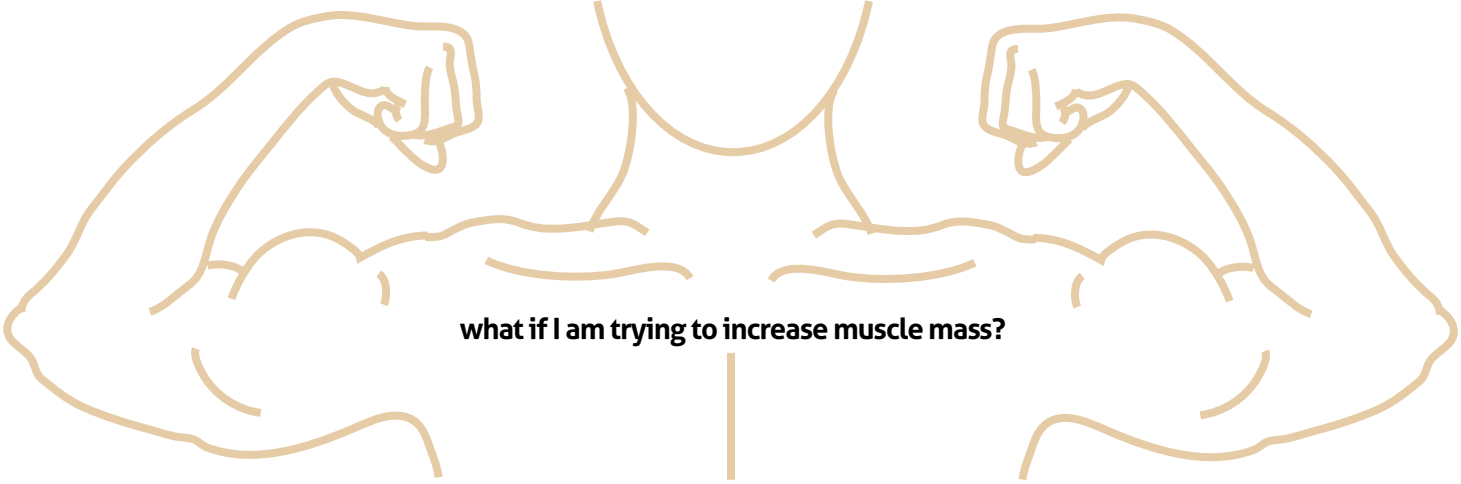
Meal replacement shakes have become a primary method for lowering obesity rates around the world. **It has been noted that a high intake of protein may be associated with greater chances of achieving weight loss.** In a 2008 study in *Nutrition Journal*, 85 obese men and women were treated with meal replacement shakes enriched with a soy and whey protein powder twice daily for 12 weeks that supplemented either a high-protein (2.2 g/kg of body weight) or standard-protein (1.1 g/kg of body weight) diet as well as 30 minutes of aerobic exercise daily. It was concluded that while both groups reported relatively similar weight loss, individuals given the meal replacement shake with a higher protein diet experienced significantly more fat loss.[11] Should protein shakes be used as meals, however, make sure you are still meeting your body's daily need for calories and nutrients.

how much is enough?

One possible goal for those who want to be active may be to shed a few pounds, and naturally, they may get curious not only about how to exercise their bodies, but also what to put in them to help them achieve their goals. A 2000 study published in the *Journal of the American College of Nutrition* indicated that **physically active individuals may require higher daily protein intake than sedentary individuals**, namely 1.2 to 1.4 g/kg body weight (82 g to 95 g for a 150 lb. individual) for regular endurance exercise and 1.6 to 1.8 g/kg body weight (109 g to 123 g for a 150 lb. individual) for strength exercises.[2] When looking for supplements to facilitate weight loss, **it may be best to find shakes composed primarily of protein, preferably greater than 50%, with relatively fewer carbohydrates and fat content** in order to limit overall calorie intake from fats and carbohydrates while still being satiated and energized from proteins.

I'm always hungry on diets...

One possible obstacle for working towards weight loss may include constant bouts of hunger due to low-fat and energy-restricted diets. However, **it has been found that satisfaction in dieting is actually greater in those consuming a high-protein diet than in those consuming a lower-protein diet.** Although not entirely specific to weight loss, one possible upside to increased protein intake via shakes may be improved satiety compared to counterparts consuming lower-protein diets.[12]



what if I am trying to increase muscle mass?

shake before or after a workout?

So maybe someone is looking to get big, strong, and macho or maybe just wants to carve out some muscle tone. **Any sort of activity involving strength training, especially bodybuilding, can create an increased bodily demand for protein as a result of increased muscle fiber breakdown.**[13] In a 1998 study published in the *Journal of Applied Physiology*, it was found that **consuming a liquid supplement composed of carbohydrates and protein before and after workouts induced measurable metabolic and hormonal responses within the body.** These changes were responsible for both synthesizing glycogen to restore and maintain energy as well as providing protein to rebuild muscle mass broken down during a workout.[14] A different study published in 1995 in the *American Journal of Physiology Endocrinology and Metabolism* found that **during recovery after resistance exercise, muscle protein turnover increases due to accelerated synthesis and degradation.**[15] Thus, **if you plan on taking on a high-intensity daily strength training regimen, it may be advantageous to use a protein shake both before and after a workout to maintain energy** over the long run. On the other hand, **if you are planning on more intermittent workouts, a protein shake simply after your workout may be more efficient** because a greater amount of amino acids in the body after exercise may both synthesize and integrate more protein in the body.

what if I just exercise for fun?

Even without a strictly vegan or vegetarian diet or definite health goals, protein shakes can still be incorporated into a fitness regimen. For example, it has been shown that using a protein supplement after exercise improves muscle soreness. In a 2003 study, published in the *Journal of Applied Physiology*, 387 healthy male US Marines were assigned to 3 groups that were provided with nutrient supplements post-exercise. Those supplemented with protein, in comparison to those who were not, had an average of 33% fewer medical visits, 28% fewer visits due to bacterial or viral infections, 37% fewer visits due to muscle or joint problems, and 83% fewer visits due to heat exhaustion. However, it is worthwhile to keep in mind that basic training for these marines included up to 10-mile hikes, running 1 to 3 miles, sit-ups, push-ups, pull-ups, and even martial arts training. It is suggested that post-exercise protein supplementation, such as that through protein shakes, may both enhance muscle protein deposition and positively impact health, muscle soreness, and tissue hydration during long periods of intense exercise.[17] Granted, if you are not exercising at the same hardcore level as these marines, it may not be necessary to use protein shakes to ward off muscle soreness. In other words, **if you are not really working out that hard or not burning a significant amount of calories during your workouts, consuming a recovery drink may actually lead to weight gain.** After gauging your own personal level of activity, you may find that simply sticking with a well-rounded diet is a fine solution by itself.

carbs, protein, or both in a shake?

On the other hand, it may not be necessary to couple carbohydrates with protein in order to supplement muscle mass growth. In 2007, in the *American Journal of Physiology Endocrinology and Metabolism*, a study suggested that **as long as sufficient amounts of protein are ingested after resistance training exercises, co-ingesting carbohydrates may not be necessary to maximize muscle synthesis.** However, the study does concede that because muscle glycogen stores can be depleted after resistance training, consuming simple carbohydrates may still be preferred in the attempt to quickly restore muscle glycogen.[16] Therefore, in order to avoid feeling completely exhausted after a hard workout or if you have other physically-demanding activities scheduled for later in the day, taking in some simple carbs, such as the glucose and fructose sugars that are in fruit, with that protein shake may do a body good.

can protein shakes hurt?

Beyond the previously mentioned potential health benefits is the added finding that **protein-enriched meal replacement shakes do not adversely affect the liver, kidneys, or bone density in people with normal liver and kidney function.** A 2010 study published in *Nutrition Journal* analyzed the effects of meal replacement protein powders on subjects undergoing a weight management program and reached the conclusion that the utilization of protein supplements does not necessarily tax certain organs within the body.[18] When in doubt, listen to the age-old mantra of moderation and don't go overboard on using protein shakes if you can naturally meet your body's protein demand through your diet.

conclusion/bottom line

A diet of whole foods, all in all, will likely provide a sufficient amount of protein to meet daily requirements. However, protein supplements, such as those found as protein shakes, may be used as a convenient source of protein to round out a vegan or vegetarian diet, to foster weight loss, or to aid in building muscle. Shakes can also be useful when hectic or unpredictable days cause meals to be missed or daily activity to increase. In the end, the decision to incorporate protein shakes into one's lifestyle is a personal one. That is, should protein shakes be used, individuals should take into account how different sorts of protein supplements might affect their bodies. The important thing to keep in mind is that nutrients from whole foods should come before those found in supplements. After all, they are only meant to be supplemental.

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