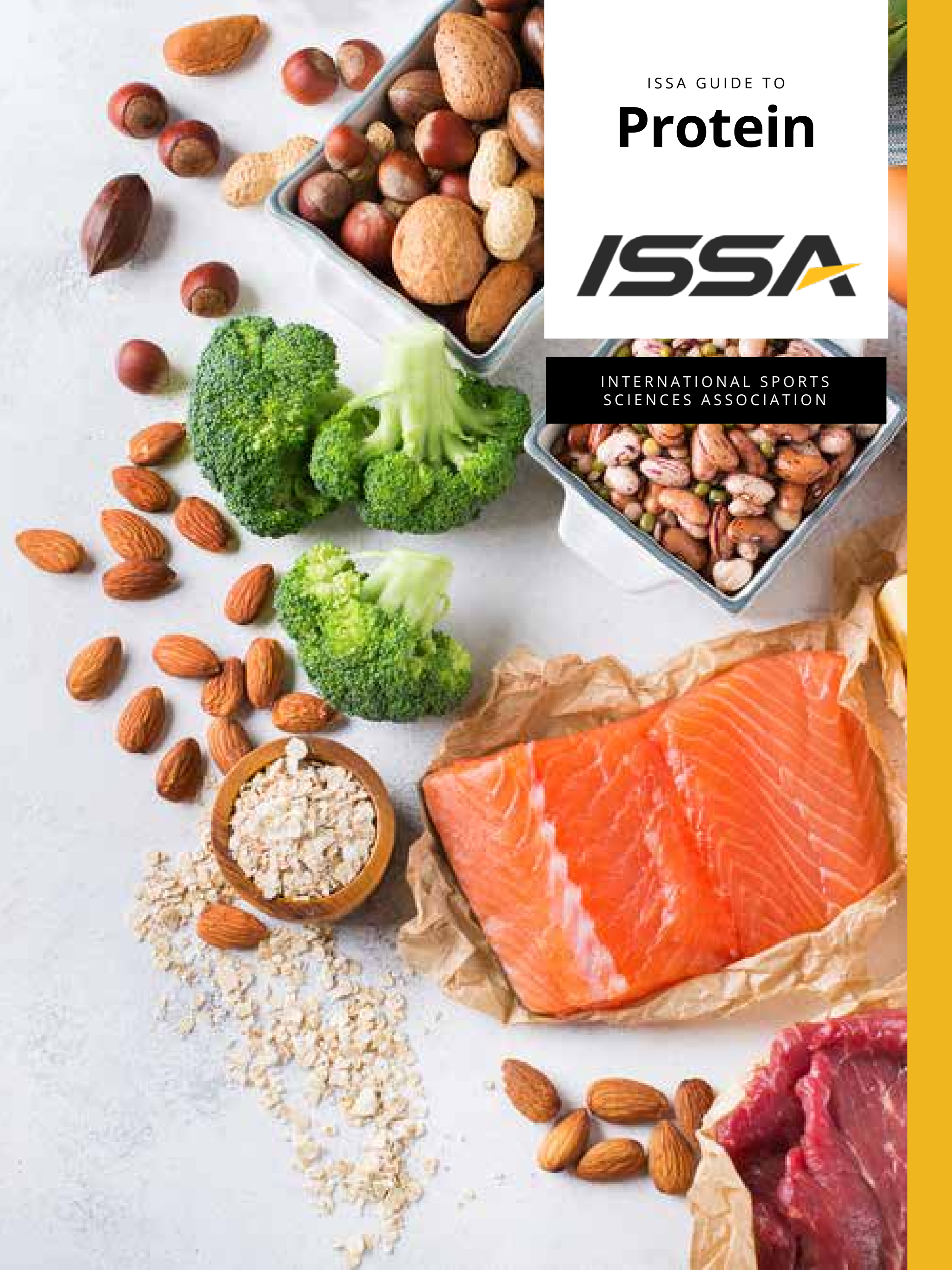


ISSA GUIDE TO
Protein



INTERNATIONAL SPORTS
SCIENCES ASSOCIATION



Contents

You Have Questions...We Have Answers

Protein Supplements Vs. Protein Foods!

Best time to Consume Protein?



BY PAUL HOVAN JR.

You have questionsWe have answers

Paul Hovan Jr answers your most common questions about protein.

When calculating total protein requirements, is it dependent on total body weight or just lean body mass?

In most cases, protein requirements are given on a “per pound” basis, meaning total body mass. So if a trainer tells you, “I’ve been eating 1 gram of protein per pound of my body weight and I weigh 200 pounds,” that means he is eating 200 grams of protein. He is not taking into account his lean body mass, which is less than 200.

For the general population, calculating protein intake per pound of total body mass is probably reasonable, but for specific populations, it isn’t as reliable. There have been studies showing that the leaner an athlete is, the more protein he or she needs to maintain muscle mass. A study in 2011 found that the leaner the athlete was, the more protein she required to prevent muscle loss (1).

Another study, from 2013, also found that protein requirements for maintaining muscle mass increased in individuals who became leaner through caloric restriction (2). This study suggests that while dieting, lean athletes need 2.3 – 3.1 grams of protein per kilogram of lean body mass (LBM).

It’s also important to remember that overweight or obese individuals need to consider protein

requirements on a “per kilogram of lean body mass” basis. If a person weighs 350 pounds, but most of that is fat tissue, there is no reason for them to eat 350 grams of protein per day; that would be overkill.

So, to summarize, if you are in the “specific populations” category, such as an extremely lean athlete, or dieting to achieve a very low percent body fat, or are heavily overweight or obese, consider calculating your protein requirements according to your lean body mass, not total body weight.

To find out your lean body mass, you need to first measure your body fat. You can have a professional trainer measure it with skin fold calipers or use a handheld electrical impedance monitor—although these aren’t the most accurate. If you have a university nearby and are willing to spend a few bucks, you can see if they have a BodPod device, which uses air displacement for better accuracy. (These are very accurate—DEXA is the gold standard).

Once you know your body fat percentage, you can easily determine how much of your body weight is lean mass and how much is fat mass. For example, if you weigh 200 pounds and you find out that you have 20% body fat, you have 40 pounds of fat. Subtract 40 pounds from 200, and you have 160 pounds of lean body mass.

If I eat too much protein, will the excess be turned into body fat?

First let's assume that your maintenance amount of calories—the number of calories you need to eat per day to maintain your current body weight—is 2,000 calories. Let's also assume that you have met your 2,000 calorie goal by the end of the day, with a mix of protein, fat, and carbohydrates. Before bed, you decide to have a protein shake consisting of 50 grams of whey isolate. What will happen to those 200 Calories (50 g protein x 4 calories/gram) that are now in excess, since you've already met your maintenance level of calories?

If your body has used all the protein it needs for growth, recovery, catalyzing chemical reactions, transporting molecules, and all the other physiological functions proteins are used for, the excess will be broken down into amino acids and then converted into glucose by a process called gluconeogenesis.

Once the amino acids have been converted into glucose, your body will either: a) use that glucose for immediate energy, b) store that glucose as glycogen to be used as energy at a later period, or c) store the glucose as body fat in the adipose tissue since all glycogen stores are maxed out. (The liver can store about 100 grams of glucose in the form of glycogen and the muscles can store about 500 grams.)

A study done in 2012 by Bray et al concluded that the extra calories from protein ingested by research participants were used to build new lean body mass, although all three groups gained the same amount of body fat. According to the study author, "calories alone contributed to the increase in body fat. In contrast, protein contributed to changes in lean body mass, but not to the increase in body fat." (3)

We can reasonably state that the additional protein the participants ingested was, indeed, needed for growth and recovery (shown by the increase in lean mass). However, if no additional protein was needed for these actions, the body would either use the protein as immediate energy once the amino acids were converted into glucose, store the converted glucose as glycogen for later use, or store the converted glucose in the adipose cells (fat tissue), since all glycogen stores were full.

Does the type of protein I consume matter (plant protein powder VS whey VS whole food)?


Personally, I am an advocate of whole food over protein powders. This is how I eat and how I train my clients. I only use powders for convenience or quick substitutes for the clients who have crazy schedules. I believe that the less processed something is, the better it is for your body. With that said, I'll briefly touch on the differences.

- **Whey protein concentrate.** This is usually the most basic form of protein powder. The protein supplement labeled as a concentrate, by law, must be at least 35% to 80% protein by weight. It's a simple procedure to process a whey concentrate,

PROTEIN 101

- Whole foods are best.
- Only use powders for convenience or a quick substitute.
- The less processed something is, the better it is for your body.

WHEY PROTEIN CONCENTRATE	<ul style="list-style-type: none"> • At least 35%-80% protein • Comes in different flavors • May contain artificial ingredients • Inexpensive (you get what you pay for)
WHEY PROTEIN ISOLATE	<ul style="list-style-type: none"> • At least 90% protein • More pure than whey protein concentrate • A little more expensive
WHEY PROTEIN HYDROLYSATE	<ul style="list-style-type: none"> • Treated with enzymes and acids to reduce particle size and eliminate the quaternary protein structures • The fastest digesting protein powder
SOY PROTEIN	<ul style="list-style-type: none"> • Heat treated before it is sold, destroying enzymes in the soy • Isoflavones can present a hormonal impact in men (increasing estrogen)
PLANT BASED PROTEIN	<ul style="list-style-type: none"> • Perfect choice for vegans and vegetarians • Not complete protein sources • Lacks some of the essential amino acids, but can be made up by combining certain food sources.



which is why, most of the time, whey concentrates are the cheapest, and you get what you pay for.

- **Whey protein isolate.** This is a purer protein powder. By law, whey isolates must be at least 90% protein by weight. The filtration process of isolates is completely up to the supplement company manufacturing the protein, but the biggest difference between concentrate and isolate is the percentage of protein per scoop. Isolates are more expensive and it's up to you to decide they are worth the money, based on the protein to calorie ratio.
- **Whey protein hydrolysate.** This is significantly different from concentrates and isolates when it comes to processing. Hydrolysate proteins are treated with enzymes and acids to reduce particle size and eliminate the quaternary protein structures. This is why whey protein hydrolysate is the fastest digesting protein powder; the need for gastric digestion has been eliminated.

- **Soy protein.** This type of protein is heat treated before it is sold, destroying enzymes in the soy, cleansing the powder of trypsin inhibitors. The soy isoflavones contained in the powder aren't a "huge" concern, but they can present a hormonal impact in men—by increasing estrogen. However, most of the concerns about soy are overblown.
- **Plant-based protein.** This is the perfect choice for vegans and vegetarians. The only issue with plant-based proteins is that most are not complete protein sources, meaning they lack some of the essential amino acids. You can make up for this lack by combining it with certain other foods.

Can too much protein cause kidney stones?

As I mentioned in our previous article, excess protein can boost levels of uric acid, which has been shown to contribute to kidney stones. However, there is no evidence that elevated protein intake in healthy people will cause kidney damage.

Only when a person already has problems with their kidneys is caution needed. If you have had kidney stones before, you are more likely to get them again. Most kidney stones occur when calcium combines with either oxalate or phosphorous. I'm not a doctor, but to quote Dr. Melanie Hoenig, an assistant professor of medicine at Harvard-affiliated Beth Israel Deaconess Medical Center, some of the best ways to prevent kidney stones are:

"Drink plenty of water (drinking extra water dilutes the substances in urine that lead to stones), ensure sufficient calcium intake (too little in your diet can cause oxalate levels to rise and cause kidney stones), limit animal protein (a high-protein diet can reduce levels of citrate, the chemical in urine that helps prevent stones from forming), and avoid stone-forming foods (such as beets, chocolate, spinach, rhubarb, tea, and most nuts – which are rich in oxalate.)" (5)

Do vegetarians and vegans need more protein?

This was a great question, but I think you'll going to be surprised at how simple the answer is:

Vegans or vegetarians don't need any more protein than a person following a "meat heavy" diet. The recommended dietary allowance (RDA) is 0.8 grams of protein per kilogram of bodyweight—and that's for EVERYONE—vegans, vegetarians, and meat-eaters.

I have read recommendations that vegetarians and vegans should eat 10 percent more protein than meat-eaters, but this is based on the flawed idea that because they aren't eating animal protein the complete sources of protein—that they need more total protein.

Just because your diet doesn't consist of any meat, doesn't mean you need more protein than the person eating chicken, eggs, and red meat every day. A vegan athlete's protein needs can range from 0.36 to 0.86 grams per pound of body weight (6). The RDA is definitely on the safe side and as I mentioned in our previous article, athletes and resistance exercisers will need more total protein than the average, sedentary individual.

Total protein intake can easily be achieved while following a vegan or vegetarian diet. Nearly all beans, vegetables, grains, and nuts contain protein. Although they may not be complete sources of protein, you can combine foods, such as rice and beans, to create a complete protein meal.

I recommend that vegans and vegetarians eat a diet with a variety of unrefined grains, legumes, nuts, seeds, and vegetables so that if one of your food choices is low in amino acids, the other will make up for that deficit. Please look back at our first question of this article to determine how you should calculate your daily total protein needs.

References

1. Journal of Sports Sciences: Dietary Protein for Athletes: From Requirements to Optimum Adaptation
2. Journal of Sports Nutrition and Exercise Metabolism: A Systematic Review of Dietary Protein During Caloric Restriction in Resistance Trained Lean Athletes: A Case for Higher Intakes
3. Bray GA, Smith SR, de Jonge L, Xie H, Rood J, Martin CK, Most M, Brock C, Mancuso S, Redman LM: Effect of dietary protein content on weight gain, energy expenditure, and body composition during overeating: a randomized controlled trial. JAMA 2012, 307:47-55.
4. <http://www.bornfitness.com/what-is-the-difference-between-protein-powders/>
5. <http://www.health.harvard.edu/blog/5-steps-for-preventing-kidney-stones-201310046721>
6. <http://www.vrg.org/nutrition/protein.php>

Know It All

—
ISSA's Fitness Nutrition Certification
—

Everything you need to know to deliver life-changing results for yourself and your clients by mastering the art and science of nutrition coaching.

issaonline.edu



BY PATRICK GAMBOA

Protein Supplements Vs. Protein Foods!

Many aspiring bodybuilders are hoping that this is the year that their bodies will transform into the bodies of their dreams. Unfortunately, bodybuilders love for protein puts them at the mercy of protein manufacturers and vulnerable to protein manufacturers marketing ploys. Fledgling bodybuilders may not know as much as veteran bodybuilders but they inevitably know that protein plays a role in their future bodybuilding success. Where should this protein come from? To answer this question, we will look at the role of protein in foods versus protein supplementation.

Protein Manufacturers

Pick up any publication devoted to health and fitness and you will be inundated with articles on protein. Protein manufacturers are notorious for throwing around words like cross flow microfiltration, oligopeptides, ion exchange, protein efficiency ratio, biological value, nitrogen retention and glycomacropetides as a way to convince potential buyers. It sure sounds convincing, especially when scores of scientific references are cited. Like most aspects of bodybuilding (and the supplement industry in general), marketing hype rather than physiological reality drives the issue of protein.

Many nutrition "experts" (people who sell supplements), state that there are distinct advantages of protein supplements: powders and amino acid tablets over whole foods. There are many different methods of determining protein quality, including biological value (BV), Protein efficiency ration (PER), Net Protein Utilization (NPU), and protein digestibility corrected amino acid score (PDCAAS).

Protein Quality

BV is one of the most commonly used and is arguably, the best measure of a protein's quality. BV is based on how much of the protein consumed is actually absorbed and utilized in the body. The higher the amount of protein (nitrogen) that is actually retained, the greater the BV. If a protein has a BV of 100, it means that all of the protein absorbed has been utilized with none lost. Whole eggs score the highest of all foods with a BV of 100, while beans have a BV of only 49.

Protein quality is certainly an important issue, but it is one that has been enormously overstated and even distorted for marketing purposes. Whey protein is truly an excellent protein with a biological value at or near 100. Many advertisements will have you believe that their whey is between 104 –157 on the BV scale. In "Advanced Nutrition and Human Metabolism", BV is defined as "a measure of nitrogen retained for growth and/or maintenance that is expressed as a percentage of nitrogen absorbed." When a protein supplement is listed as having a BV over 100, the company has intentionally manipulated the number for marketing purposes. The companies are usually making reference to the chemical score of the protein. Chemical score is a comparison of the amino acid pattern in an ideal reference protein to a test protein and therefore the number can exceed 100.

Most bodybuilders and strength athletes already consume more than enough protein, so the importance of BV to these athletes who are already consuming enough protein has been overplayed. Even though whey has a higher BV than chicken breast, fish, or milk protein, if the total quantity of protein you consume is sufficient, then it is not likely that substituting whey for food proteins will result in any additional muscle.

For the purposes of developing muscle, the only guidelines for protein that you must follow are: (1) consume a source of complete protein with every meal, (2) eat at frequent intervals approximately three hours apart, (3) consume a minimum of 0.8 grams to 1 gram per pound of bodyweight.

Whey Powder

Because whey protein does have a high BV, it probably offers the most benefits when you are dieting on very low calories. When your energy intake and correspondingly, protein intake is reduced, whey protein could help you get greater utilization of the smaller amount of protein that you are taking in. Whey protein also provides a way to get high quality protein without the fat.

It has been suggested that whey may have other advantages besides high protein quality. These benefits include enhanced immunity, increased antioxidant activity and quick absorption. Several studies in "Clinical and Investigative Science" by Dr. Gerard Bounous of Montreal have shown that whey protein provides anti carcinogenic properties, protection from infections, and other enhanced immune responses. Whey has also been shown to raise levels of Glutathione, an

important antioxidant that can offer protection from free radical oxidative damage. While such findings are very promising, all these studies were done on mice, so it is unclear how well the results extrapolate to humans.

Protein Absorption

Another acknowledged benefit of whey protein is its fast absorption rate. Although there is not any evidence that protein supplements digest more efficiently than whole foods. They are definitely digested faster. This is most important after a training session when the rates of protein synthesis and glycogen re-synthesis are increased. Even in considering post workout nutrition, there is still little proof that a liquid protein-carb complex will actually produce better muscular growth than whole foods, as long as complete whole foods are consumed immediately after the training session and every three waking hours for a period of 24 hours thereafter.

Amino Acids

What about amino acid pills? Amino acids are simply predigested protein. Proponents of amino acid supplementation claim that because the amino acids are predigested, the body will absorb them better, leading to greater improvements in strength and muscle mass. It sounds logical, but this is a gross underestimation of the body's capacities and actually the reverse is true. The human digestive system was designed to efficiently process whole foods; it was not designed to digest pills and powders all day long. Amino acids are absorbed more rapidly in the intestine when they are in the more complex di and tri-peptide molecules. Your body gets better use of the amino acids as protein foods are broken down and the amino acids are absorbed at just the right rate for your body's needs. In "Exercise Physiology; Energy Nutrition and Human Performance," authors Katch and McArdle state that "amino acid supplementation in any form has not been shown by adequate experimental design and methodology increase muscle mass or significantly improve muscular strength, power, or endurance."

Furthermore, consuming predigested protein when you are seeking fat loss is not necessarily advantageous because it shortchanges you of the thermic effect of real food. Whole foods have a major advantage over protein supplements; they stimulate the metabolism more. This is known as the "thermic effect". Protein has the highest thermic effect of any food. Including a whole protein food with every meal can speed up your metabolic rate as much as 30% because of the energy necessary to digest, process, and absorb it. This means that out of 100 calories of a protein food such as chicken breast, the net amount of calories left over after processing it is 70. In this respect, the fact that protein foods digest slower than amino acid tablets is actually an advantage.

Value of Source

A final argument against amino acid supplements is the cost. Amino acids are simply not cost effective. One popular brand of "free form and peptide bonded amino

acids," contains 150 1000mg. Tablets per bottle and costs \$19.95. One thousand mg. of amino acids is equal to 1 gram of protein. This would mean that the entire bottle contained 150 grams of protein. Dividing the price of the bottle by the total grams we get the price per gram, which is 13.3 cents. Now lets t compare that to a chicken breast. At the local supermarket I can buy a pound of chicken breast for \$2.99. According to Corinne Netzer's "Complete Book of Food Counts," there are 8.8 grams of protein in each ounce of chicken, so one pound of chicken (16 oz) has about 140 grams of protein. That would be \$2.99 divided by 140 grams which would come out to 2.1 cents per gram. The amino acids cost six times more than the chicken.

The Bottom Line

The biggest advantage of protein supplements is not that they can build more muscle than chicken or egg whites or any other whole food protein, the biggest advantage is convenience. It is easier to drink a protein shake than it is to buy, prepare, and cook whole foods. Consuming small frequent meals is the optimal way to eat, regardless if your goal is muscle gain or fat loss. To keep your body constantly in positive nitrogen balance, you should consume a complete protein every three hours. For many people, eating this often is nearly impossible. That is when a high quality protein supplement is the most helpful.

Aside from the convenience, the truth about protein supplements is that they offer few advantages over protein foods. There is no scientific evidence that you cannot meet all of your protein needs for muscle growth through food. As long as you eat every three hours and you eat a complete protein such as eggs, lean meat or dairy products with every meal, it is not necessary to consume any protein supplements to get outstanding results. Whey protein does have some interesting and useful properties and supplementing with a couple of scoops a day is not a bad idea, especially if you are on a low calorie diet for fat loss. Aside from that, focus on real food and do not believe all the hype you read.

References

1. Groff, James, et al, Advanced Nutrition and Human Metabolism, West Publishing company, 1995.
2. Fruhbeck, Gema. Slow and fast dietary proteins. Nature, 391: 843-844
3. Boirie, Y. et al. Slow and fast dietary proteins differently modulate postprandial protein accretion. Proc National Acad Sci, 94: 14930-14935, 1997
4. Lemon, Peter, Protein and Exercise: update, Medicine and Science in Sports and Exercise, Vol 19, No. 5, S179-S190, 1987
5. Carraro, F., et al, Effect of exercise and recovery on muscle protein synthesis in human subjects. Amer Jpurnal of physiology, 259: E470, 1990
6. Bounous, G., et al, The immunoenhancing property of dietary whey protein concentrate. Clinical and Investigational Medicine, 11: 271-278. 1988
7. Sadler, R., The benefits of dietary whey protein concentrate on the immune response and health. S Afr. J Dairy Sci, 24: No 24, 1992
8. Netzer, Corinnine. The Complete Book of Food Counts. Dell Publishing, 1997
9. Katch, Katch & McArdle, Exercise Physiology; Energy, Nutrition and Human Performance, Williams and Wilkins, 1996



BY ERIC BRODY

Best Time to Consume Protein?

Does Protein Timing Maximize Strength and Hypertrophy?

There's no question that adequate protein intake is essential for building and strengthening muscle tissue. But, is timing of protein intake important for maximizing these gains? Experts don't always agree on the question of whether hypertrophy and strength can be affected by precise timing of protein (before, during, or after training).

The results of studies have been mixed.

In 2013 a group of sports science researchers gathered the best existing research on this common question. They conducted a meta-analysis of over 40 studies involving hundreds of participants to determine if timing protein intake has any effect on strength and hypertrophy.

Studies Involved in the Meta-Analysis

The researchers chose a variety of studies to analyze based on specific requirements. These requirements included:

- Randomized with control groups.
- At least one treatment and one control group.
- Treatment groups consuming a significant amount of protein an hour before, or after, a workout.
- Measurable outcomes of strength or hypertrophy compared between both groups.

Conclusions on Protein Timing

The authors found *a significant effect of protein intake on hypertrophy and strength*, but only when using a simple analysis that did not control for important variables, like the resistance training experience level of the participants.

When the authors did control for several variables, they found that there was *no evidence that consuming protein within an hour before or after a workout caused any gains in hypertrophy or strength* when compared to control groups. Based on their results, the authors made these conclusions:

1. Existing evidence does not support pre- or post- workout protein consumption for hypertrophy or strength gains.
2. Total protein intake promotes gains in hypertrophy.
3. Gains found in hypertrophy or strength (with protein timing) are likely due to increases in total protein consumption.
4. There may be benefits to protein timing, but not conclusively at this time.

The researchers suggest more studies are needed to control for more variables in participants (age, training experience, total protein intake, etc.) to better assess the effects of protein timing.

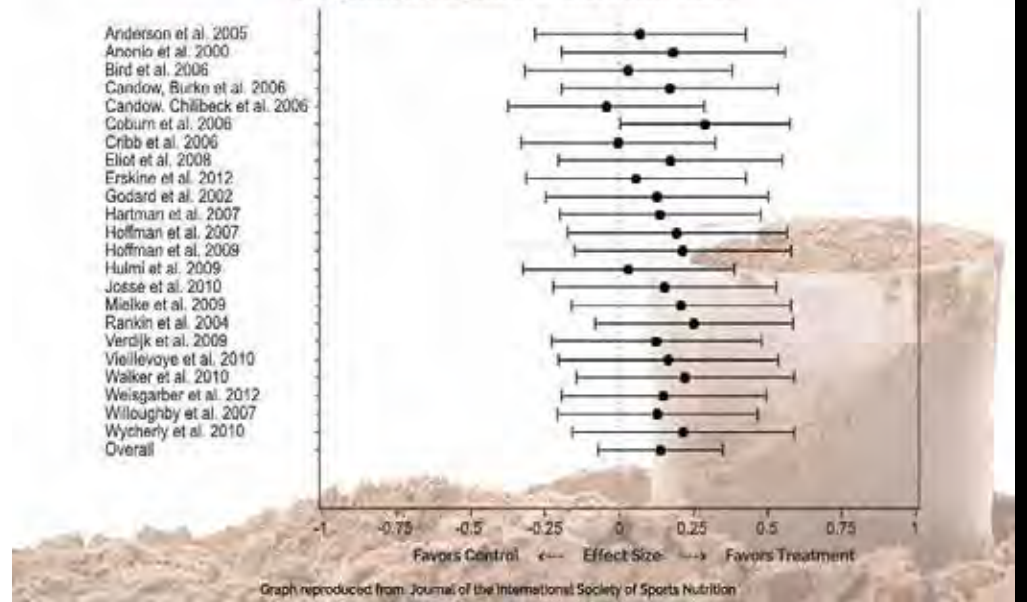
How to Coach Clients on Protein Intake and Timing

You know protein timing is still an unanswered question, so how do you advise your clients? Here are tips to keep in mind:

- Nutrition advice should take into consideration client's body fat percentage, daily activity level, and caloric ratio (protein, carbohydrates, and fat needs).
- Resistance athletes require no more than 1.2 - 1.7 g of protein per kg of body weight per day for muscle repair and 0.5 and 1.0 g of carbs per kilogram of body weight before and after workouts.
- For moderately to extremely active athletes, more protein—2 to 3 g per kg of body weight per day—and carbs are needed.

TOTAL PROTEIN INTAKE

Schoenfeld et.al., 2013 study showed impact of protein timing on hypertrophy, adjusted for total protein intake.



- Always advise your clients to seek professional recommendations from a nutritionist or physician before dieting.
- Warn clients about the risks of consuming too much protein and that long-term over-consumption can sabotage health.
- Remind clients to be wary of fad diets and marketing hype.
- Suggest clients keep a daily food journal to track eating habits and their impact on goals.

The ISSA recommends 1.0 - 1.5 grams of protein per kilogram of body weight as a general guideline for daily protein needs. Further, this number should be higher for more active clients. For more information or to help your clients sort out protein consumption, check out other ISSA articles.

References

<https://jissn.biomedcentral.com/articles/10.1186/1550-2783-10-53>