Protein Update: How Much Protein is Enough?

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This is the first of a three-part series on research updates surrounding the macronutrients.

Athletes routinely focus on protein as the primary macronutrient that will help them to gain size, improve body composition, and promote optimal performance. Unfortunately, research to date has not shown protein to do all that. While the functions of protein remain clear (see table 1), the question of optimal intake remains controversial – if not still unknown.

The Dietary Reference Intakes (DRI) specifies that the requirement for dietary protein for all individuals aged 19 years and older is 0.8 g protein per kg. This Recommended Dietary Allowance is cited as adequate for all persons, yet this amount of protein would be considered by many athletes as the amount to be consumed in a single meal, particularly for strength-training athletes (6). In their defense, published data does suggest that individuals habitually performing resistance and or endurance exercise require more protein than people who are sedentary (6).

How Much Protein is Appropriate is Dependent on Many Factors

First off, the training and competition goals of the individual athlete (i.e. weight loss or muscle mass gain) will likely mean a different endpoint. For example, an endurance athlete, such as a marathoner, would likely focus on taking in enough protein to perform optimally, to maintain lean body mass, and to meet increased energy demands. On the other hand, a strength athlete, such as a weightlifter, might consider his protein requirement to be that which will increase muscle mass, strength, or power.

Secondly, the usual recommendations athletes hear from health professionals is to consume 1.2 – 1.8 g/kg body weight. These have been determined largely based on nitrogen balance studies (which is largely used to establish the RDA's as well) (6). According to researchers, this is not the only method available for evaluating protein needs, but in fact it may not be the best method to determine an athlete's needs. In addition to nitrogen balance studies, researchers have evaluated the question of optimal intake using another method involving tracer-derived estimations.

When researchers took into account both methods of analysis, they concluded that novices (those most likely to have an increased protein requirement) retain more protein from the exercise stimulus and therefore do not need any additional protein (due to a protein conserving mechanism). Furthermore, according to the research involving these orally consumed tracers, which estimate protein turnover, exercise seems to lower —not raise—protein requirements (6) for all athletes.

In addition to the amount of protein ingested, factors such as the composition of the protein and amino acids, timing of ingestion, and other nutrients ingested along with the protein all influence the utilization of ingested protein and amino acids. Thus, for any given protein intake, factors important to an athlete's performance may vary depending on what is ingested and when it is ingested (9).

The Right Balance

Protein supplements, although convenient, are not necessary for most resistance athletes (5,7,9). Landmark studies have clearly demonstrated that energy intake may be as, if not more, important than protein intake in determining nitrogen balance. What these early studies show is that even when no protein

is consumed, increasing energy intake improves nitrogen balance. Conversely, even when consuming relatively high protein intakes, positive nitrogen balance is not possible until energy balance is positive. However, it is important to note that exercise seems to serve as a modifier and can actually increase nitrogen balance, even in the face of a low energy intake (7).

Too Much Protein

There is no evidence to suggest that protein supplements are more effective than consumption of high-quality protein from standard dietary sources (7). A suggested maximum protein intake based on bodily needs, weight control evidence, and avoiding protein toxicity is approximately 25% of energy requirements at approximately 2 to 2.5 g per kg, corresponding to 176g protein per day for an 80kg individual on a 12,000kJ/diet (2). This is well below the theoretical maximum safe intake range for an 80kg person (285 g/d) (2). See Table 2 for potential risks of excessive protein consumption.

Any such diet with an elevated protein intake should also contain a wide range of whole grain cereals, fresh vegetables, and fruits, rich in micronutrients and potassium alkali salts. These are needed to reduce the potential renal acid load and subsequent urinary calcium loss that can occur due to the acidic nature of protein-rich diets (2).

Table 1. Functions of protein (1,3)

- Supporting Growth and Maintenance
- Building enzymes, hormones, and other compounds
- Building antibodies
- Maintaining fluid and electrolyte balance
- Maintaining acid-base balance
- Clotting of blood
- Providing energy and glucose

Functions specific to athletes

- Repair exercise induced microdamage to muscle fibers
- Serve as an energy source during exercise
- Support gains in lean tissue mass

Table 2. Potential consequences of excessive protein (2)

(defined as when protein constitutes > 35% of total energy intake)

- hyperaminoacidema,
- hyperammonemia,
- hyperinsulinemia,
- nausea,
- diarrhea,
- and even death

Bottom line: What is the right amount?

To date, the best guide is still the joint position statement from the ACSM and the Dietitians of Canada. This position statement suggests 12% to 15% of energy from protein or 1.2 to 1.4g/kg for endurance athletes and 1.4 – 1.8 g/kg for strength athletes (1) as illustrated in various research studies (4).

What research currently points to is this: given sufficient intake, lean body mass (and optimal performance) can be maintained within a wide range of protein intakes (9). Remember that 35% of calories (or too much protein) could result in the displacement of dietary carbohydrates (well below the 6 – 10 grams per kg recommended), which could result in suboptimal athletic performance (6). First determine regular intake and then compare with individual requirements before adding additional protein from food (see table 3) or supplements.

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Table 3. Protein content of selected foods (8)

Food	Protein (grams)
½ cup black beans	8
1 cup skim milk	8
1 ounce cheese	7
3 ounces chicken	26
3 ounces fish	12
1 slice bread	5
1 egg	6
2 Tbsp hummus	6
2Tbsp peanut butter	8
¼ cup almonds	8
½ cup whole wheat pasta	4
½ cup broccoli	1.5

About the Author

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