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How much protein do I need?

Experts weigh in on whether the Recommended Dietary Allowance for highly physically active people is adequate.

Controversy exists among medical experts regarding the role protein plays in maintaining optimal health. They debate about when to consume it, how much to consume, and what type is best, especially for athletes and highly active people.

The Recommended Dietary Allowance (RDA) for protein, 0.8 g/kg of body weight per day, is designed to maintain nitrogen balance in the body for the average adult; a negative nitrogen balance indicates that muscle is being broken down and used for energy. (RDAs for protein in children are higher on a gram-per-body-weight basis than for adults. RDAs also are greater for women who are pregnant [1.1 g/kg/day] or lactating [1.3 g/kg/day]).1

While maintaining nitrogen balance is critical for health, studies now suggest that the RDA may not be the amount of protein needed to promote optimal health. To achieve that, they say, more protein is needed, and studies now suggest that athletes, active people, and older individuals require even more.

Dietary proteins are in a constant state of flux in the body, being broken down into amino acids, transformed into other compounds, and sometimes reassembled into other proteins. They also are used for energy, a mechanism that increases when energy intake is low or when protein intake is inadequate. Muscle protein then becomes a source of energy, resulting in a negative nitrogen balance. This is a critical concern for athletes, who are regularly involved in energy-demanding activities.

It stands to reason then that athletes and active individuals would require more protein, and high-quality proteins, on a daily basis than those who spend their days sitting at a desk in front of a computer screen. (High-quality proteins contain all nine essential amino acids in amounts similar to amino acid requirements; animal proteins are higher quality than plant proteins.) While adequate high-quality protein is critical for good health and optimal athletic performance, the amount needed isn't the one-size-fits-all recommendation the RDA suggests.

Today's Dietitian spoke with experts to determine the latest protein requirements for athletes and highly active people.

How Much Is Enough?

While it's generally accepted that athletes need more protein than sedentary people, recommendations vary significantly depending on the type of athlete, current body weight, total energy intake, whether weight loss or weight gain is the goal, exercise intensity and duration, training status, the quality of the dietary protein, and the individual's age.2 The general rule of thumb is 1.2 to 1.4 g/kg of body weight for endurance athletes and 1.2 to 1.7 g/kg of body weight for strength and power athletes, says Christopher Mohr, PhD, RD, a nutrition consultant and writer and the co-owner of Mohr Results, a weight-loss company in Louisville, Kentucky. The greater the number of hours in training and the higher the intensity, the more protein is required.2 Other research has recommended as much as 2 g/kg of body weight to prevent muscle loss in athletes who have reduced their energy intake.3,4

While physical activity increases protein needs, it also increases the efficiency with which muscles use dietary protein, even in older individuals. One study found that a moderate increase in physical activity among a group of older subjects enhanced the response to protein intake, suggesting that increased exercise may help prevent and treat muscle loss that occurs with aging.5

What about the recreational athlete, otherwise known as the weekend warrior? "The research shows that most people would benefit from added protein, from increased satiety to increased muscle synthesis," Mohr says. "People generally consume only around 15% to 16% of total calories as protein, so there's certainly room to increase protein intake." Some have suggested that recreational athletes should aim for daily intakes closer to 1.1 to 1.4 g/kg of body weight per day, 38% to 75% greater than the current RDA.2 Endurance athletes, such as marathon runners, should be in the range of 1.2 to 2 g/kg of body weight, and strength athletes, such as weight lifters, should be in the range of 1.4 to 2 g/kg of body weight.2

According to Nancy Clark, MS, RD, CSSD, a sports nutrition counselor and the author of Nancy Clark's Sports Nutrition Guidebook, different protein recommendations aren't needed for men vs. women. "[They're] based on grams per kilogram of body weight," she says. In addition, active people shouldn't focus on protein alone. "Have protein/carbohydrate combinations, protein to build and repair muscle tissue and carbs to fuel." The ratio of protein to carbohydrate can vary greatly, depending on protein intake.

Unlike endurance training, single sessions of resistance exercise, regardless of workout length or intensity, don't appear to increase protein use during the workout itself. However, amino acid uptake after a resistance training session does increase, indicating that the amino acids are being used for muscle repair and construction. Protein utilization appears to be higher for individuals who are less fit.

When beginning endurance training, nitrogen balance may be negative for the first two weeks, and protein requirements may be higher in the first week of strength training to support new muscle growth. After one to two weeks of training, however, typically the body adapts and the protein utilization decreases. In general, adequate calorie and carbohydrate intake reduces the need for amino acid oxidation for energy and spares dietary protein and muscle tissue. Protein sparing is based on the concept that if adequate energy is consumed from carbohydrate and fat then dietary protein is available for protein-unique functions (ie, protein synthesis [tissue, hormones, neurotransmitters, enzymes, etc]). To protect muscle protein, consider counseling athletes to temporarily increase protein intake when starting a new training program or entering a new training phase.2

Type of Protein to Consider

The International Society of Sports Nutrition recommends that high-quality proteins be consumed. It highlights milk-derived whey protein isolate and casein and egg white and soy protein isolate as proteins that provide essential amino acids that are readily taken up by muscle to optimize nitrogen balance and muscle protein synthesis.6

Research suggests that of all the essential amino acids, leucine may be the limiting factor in initiating muscle protein synthesis, and that leucine-rich proteins may be the best way to boost muscle protein synthesis after intense physical activity.7 Some researchers suggest that protein quality based on leucine content is important when consuming small meals or when the total amount of protein consumed is less than optimal.7

The mixture of proteins in the American diet averages about 8% leucine. The range of protein thought to stimulate muscle protein synthesis after a meal is about 2.5 to 3.5 g.7 Dairy products, beef, poultry, seafood, pork, peanuts, beans, lentils, and soybeans are among the foods richest in leucine.8

What about protein powder supplements? “They’re not necessary,” Mohr says. “[But] are they convenient for those on the go looking for a quick, quality meal? Absolutely. Blend with a little milk, veggies, and nuts or nut butter and you have a great meal to go.”

When to Eat Protein

Just as important as the amount and type of protein athletes should eat is when they should eat it. As a result of physical activity, muscle breaks down. If protein intake is low, that muscle isn’t replaced. Those who are acclimated to regular exercise experience less muscle protein breakdown.9 However, protein needs are greater during intense bouts of training. The general consensus is that protein ingestion after exercise, when muscle is most sensitive to nutrient intake, will boost muscle protein synthesis and recovery.10,11

Athletes aside, “Most people eat only about 10% to 15% of total protein in the morning, about 20% or so in the afternoon, and the remainder at dinner. Since our bodies don’t store protein, spreading that intake more evenly throughout the day would be beneficial,” Mohr says.

“Research has shown that adults need at least 30 g of protein at two or more meals to maintain healthy muscles,” says Donald Layman, PhD, professor emeritus in the department of food science and human nutrition at the University of Illinois at Urbana-Champaign. “Small meals, such as breakfast or lunch, often contain less than 15 g of protein and provide no benefit to muscle health.”

A study recently published in the Journal of Nutrition found that muscle protein synthesis was 25% higher when protein was evenly distributed across breakfast, lunch, and dinner compared with a more typical pattern, when most protein was consumed at the evening meal, even when total protein intake was the same.12 Protein that’s evenly distributed throughout the day may be especially important for older, physically active adults, as older individuals experience a resistance to muscle protein synthesis in response to meals containing less protein; in other words, the protein threshold to trigger muscle protein synthesis is higher in older individuals.12

According to Douglas Paddon-Jones, PhD, an associate professor at the University of Texas Medical Branch at Galveston and a protein researcher, “The same basic model of consuming a moderate amount of high-quality protein three times a day applies to different aged athletes. But moderate for different sized people might range from 15 g to 40-plus grams per meal.”

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High-Protein Diets

Since added protein intake is critical for athletes and physically active people, should they consume a high-protein diet? Instead of recommending protein as grams per kilogram of body weight, the Institute of Medicine established an acceptable macronutrient distribution range for protein at 10% to 35% of total calories for adults older than 18.1 The Institute of Medicine defines the acceptable macronutrient distribution range as a range of intake associated with reduced risk of chronic diseases while providing adequate intakes of essential nutrients. The average protein intake in the United States of 15% of total calories is well within the acceptable macronutrient distribution range but well below recommended intakes for most athletes. 1,13 Even the 95th percentile of protein intake for US adults doesn't come close to the highest acceptable macronutrient distribution range for protein at 35% of total calories.14 Higher intakes of high-quality protein recommended for athletes would still be well within the acceptable macronutrient distribution range.14

Frequently, concerns are expressed about the possible negative health effects of high-protein intakes; however, an upper limit for protein intake hasn't been established, though the Dietary Reference Intakes warn against exceeding the acceptable macronutrient distribution range.1 It's important to bear in mind that if calories are limited, high protein intake may displace other important nutrients.

Probably the most common concern expressed is that high-protein intakes may impair renal function. It's true that protein intake, beyond that which supports nitrogen balance, promotes urea formation, and can increase glomerular filtration rate and kidney nitrogen load. There's little evidence that the change in glomerular filtration rate can cause problems in healthy people, as the clearance of urea becomes more efficient with higher protein intakes.15 However, lower protein intakes, based on an individual's weight and the severity of their condition, are recommended for those with impaired renal function.

For healthy people, a recent study suggested a maximum intake of 2 to 2.5 g/kg of body weight per day, totaling 176 g of protein per day for an 80-kg (176-lb) individual consuming approximately 2,900 kcal daily.16 This translates to about 25% of calories from protein within the range of 10% to 35% recommended by the 2010 Dietary Guidelines for Americans and the maximum of 35% by the acceptable macronutrient distribution range.

A recent study of overweight and obese individuals with type 2 diabetes consuming a diet containing 90 to 120 g of protein per day found no effect on renal function compared with those consuming 55 to 70 g/day, suggesting that higher intakes aren't harmful.17

However, increased dietary protein can result in elevated urinary calcium, which may contribute to bone loss and the subsequent development of osteopenia and osteoporosis. Yet the role protein plays in bone health is complex. A recent systematic review found that the evidence was inconclusive regarding a significant relationship (either positive or negative) between protein intake and bone health, but that protein likely provided a small benefit to bone health.18 Moreover, evidence shows an association between dietary protein and increased peak bone mass in both young and older adults.19,20

An interaction exists between calcium and protein intakes; when calcium intakes are low, a high-protein diet could be detrimental to bone. When calcium intakes are higher, protein appears to be beneficial. It has been suggested that protein intakes of greater than 2 g/kg of body weight per day should be avoided if calcium intake is below 600 mg/day.21

High-protein diets that consist of excessive intakes of 200 to 400 g/day can exceed the liver's ability to convert excess nitrogen to urea and lead to nausea, diarrhea, and even death.12 "I think the biggest message is to avoid the absurd—30-oz steak dinners or carrying around a gallon container of a protein drink all day," Paddon-Jones says.

Recommendations

Developing an individualized nutrition plan for athletes should take into account the individual's health history, the sport he or she plays, weekly training regimens, time of competition, access to food, and travel schedules. When working with athletes, dietitians must gauge a person's readiness for change before offering guidance. Moreover, sports nutrition professionals should discuss the athletes' goals and concerns, answer questions, and ask for the athletes' participation in their meal planning.

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Protein-Rich Foods and Supplements

- Beef tenderloin steak, lean only (3.5 oz): 29 g
- Salmon (4 oz): 29 g
- NOW Pea Protein Powder (33-g scoop): 24 g
- Swanson Whey Protein Powder (23-g scoop): 20 g
- Solgar Whey to Go Powder (25-g scoop): 20 g
- Lentils (1 cup): 18 g
- BOOST High Protein Drink (8 oz): 15 g
- Greek yogurt (5 oz): 14 g
- Kashi GOLEAN cereal (1 cup): 13 g
- Skim milk (8 oz): 8 g
- Tofu, firm (3.5 oz): 7 g
- Egg, large (1 large): 6 g
- Beneprotein Instant Protein Powder (7 g scoop): 6 g