NebGuide

Nebraska Extension

Research-Based Information That You Can Use

G2336
Issued July 2021

Protein Needs of an Athlete

Georgia Jones, University of Nebraska-Lincoln (UNL) Extension food specialist

Cindy Brison, UNL Extension nutrition educator

Note: This publication is intended to provide general information on the nutritional needs of teenage athletes.

Sports Nutrition

Nutrition is important for sports performance for young athletes to attain proper growth and perform optimally in sports (Purcell, 2013). There is a growing interest in foods with a functional benefit in sports performance and in products and foods which can enhance recovery post-exercise and therefore support a faster return to training. Dietary strategies, which enhance recovery from the negative effects of exercise, can help promote more effective physiological adaptations, muscle reconditioning post-exercise and enable a faster return to training (Reid, 2013).

Supplements vs. Food

The International Olympic Committee (IOC) advised that use of supplements does not compensate for poor food choices or an inadequate diet. Furthermore, there is no scientific evidence that protein or amino acids in supplements are more effective than ordinary food in meeting the protein requirements for muscle growth and repair. Emphasis was also placed on the promotion of good food choices to supply a range of essential nutrients rather than rely on dietary supplements for nutritional enhancement (Reid, 2013).

The World Anti-Doping Agency and the IOC have advised national governing bodies and athletes to limit or avoid using dietary supplements and seek natural food solutions where possible. In most cases, the same nutrients and physiological benefits can be obtained through readily available foods, often at a fraction of the cost.

Nutrition plays a critical role in athletic performance, and athletes, coaches, and parents need to realize that making wise food choices can increase the chances of optimal athletic performance. By making informed food choices, athletes will have an advantage over those who choose to ignore the role that food plays in human performance (Anon., 2015).

Carbohydrate and Nutrition

A diet rich in carbohydrates increases both endurance and intermittent high-intensity performance because of the extra store of carbohydrates in the muscles and liver, called glycogen. During periods of intense training or competition, athletes need to replenish carbohydrate stores in the body. Consuming carbohydrates during workouts lasting more than one hour can also benefit performance and delay onset of fatigue. This is because carbohydrates are the most efficiently broken down and metabolized form of energy for the body (Anon., 2015). Good sources of carbohydrates include whole grains, vegetables, fruits, milk and yogurt (Purcell, 2013).

Protein and Nutrition

Protein quality is important to the gain and maintenance of muscle mass. Dietary protein is a mechanism to assist with muscle protein synthesis. Muscle protein syn-

thesis benefits from the consumption of protein-rich foods following exercise (Devries and Phillips, 2015). Athletes need to consume a wide variety of high quality protein foods. While protein is necessary for rebuilding and repairing muscles, it is not the primary fuel, and consuming more protein than what the body needs is not going to produce larger and stronger muscles. Research does show that athletes have higher protein requirements, however, most athletes are already consuming more protein than the body can use (Anon., 2015). Good sources of protein include lean meat and poultry, fish, eggs, dairy products, beans and nuts, including peanuts.

How Much Protein Should I Consume?

The body continually breaks down and loses protein and cannot store amino acids, the building blocks for protein. Between 10 and 35 percent of one's calories should come from protein (Whitney and Rolfe, 2019). Based on a 1,800 calorie per day diet, the Dietary Guidelines for Americans recommend females between the ages of 14–18, consume 46 grams of protein. For males in the same age category, the recommendation is 52 grams of protein. (See tables below for protein content of various foods.) This is based on a 2,200 to 3,200 calorie diet (Dietary Guidelines, 2015–2020). As activity level increases the calorie and protein requirements also increase. Not every male between the ages of 14–18 require 3,200 calories per day. (https://health.gov/our-work/food-nutrition/2015-2020-dietary-guidelines/guidelines/appendix-7/).

Maximize Recovery and Muscle Reconditioning

Dairy proteins (casein and whey) are most effective in stimulating muscle protein synthesis and offer an anabolic advantage over soy protein. This is possibly because of the higher proportion of essential amino acids found in dairy proteins.

Milk and flavored milk drinks provided additional benefits for muscle recovery and reconditioning. Notably, milk also has a naturally high electrolyte content, which has been shown to aid fluid retention and have added benefits post-exercise as a rehydration drink.

Overall, the evidence increasingly shows milk to be an effective natural sports drink and as such there is great potential for the development of the role of dairy products in nutritional strategies for athletes. Furthermore, milk also provides positive nutrition and health benefits for active children and teenagers in terms of calcium intake and bone health, and could replace the consumption of sugar sweetened beverages, such as energy and sports drinks (Reid, 2013).

Milk

Milk is composed of two major proteins, casein and whey. Casein is about 80% of the protein and whey is about 20%. Casein is the major protein in cheese. Whey is the protein remaining after making cheese and Greek yogurt or it can be isolated through the filtration of milk (Devries and Phillips, 2015). Whey protein is a highly valued product rich in nutritional properties.

Nutrient Timing

Nutrient timing involves the purposeful ingestion of all types of nutrients at various times throughout the day to favorably impact the adaptive response to acute and chronic exercise. Much of the interest and available research center upon outcome related to those who are regularly competing in some form of aerobic or anaerobic exercise (Kerksick, et al., 2017).

The efficacy of nutrient timing is inherently tied to the concept of optimal fueling. Therefore the importance of adequate energy, carbohydrate, and protein intake must be emphasized to ensure athletes are properly fueled for optimal performance. Studies report that the consumption of high quality protein maximizes muscle protein synthesis rates for 3 to 4 hours after exercise (Kerksick, et al., 2017).

The general guideline for food consumption is consuming meals about 3 hours before an event to allow for proper digestion and minimize incidence of an upset stomach. Meals should include carbohydrate, protein and fat. For early morning events, have a snack or liquid meal 1 to 2 hours before the event followed by breakfast after the event (Purcell, 2013).

Protein Sources

Many foods contain protein, but high-quality protein comes from beef, poultry, fish, eggs, milk and dairy products. Plant based protein sources include soy and soy products, beans, nuts, and seeds. If you want to consume protein, but do not want to purchase specialty products, here are some options.

Eggs—one large egg contains 6 grams of protein.

2% Greek yogurt—One serving of 2% milk fat Greek yogurt contains 20 grams of protein.

Protein Sources of Some Common Foods (Castle, 2020)

Food	Serving Size	Grams of Protein
Chicken breast, cooked	3 ounces	24
Fish, salmon, cooked	3 ounces	21
Ground beef, cooked	3 ounces	22
Greek yogurt	1 cup	18 to 22
Yogurt	1 cup	12 to 14
Tofu, firm	½ cup	11
Milk	1 cup	8 to 11
Beans	½ cup	7 to 9
Nut butters	2 tablespoons	7 to 8
Cheese	1 ounce	5 to 7
Nuts	1 ounce	3 to 6
Eggs	1 large	6
Quinoa, cooked	½ cup	4

Oatmeal—one cup of oatmeal contains 7 grams of protein. Add ¾ cup of 1% milk and ½ cup of slivered almonds to get to 20 grams of protein.

Cottage cheese—Take 2 slices of bread and top each with ¼ cup of cottage cheese has 21 grams of protein.

Meat—One ounce of animal protein contains 5 to 10 grams of protein.

Peanut butter and Jelly—one slice of whole wheat bread with 2 tablespoons peanut butter has 13 grams of protein.

REFERENCES

Anon. 2015. Nutrition Guide: Fueling for Performance. https://www.usada.org/wp-content/uploads/Nutrition-Guide.pdf. Accessed October 9, 2020.

Castle, J. 2020. How teen athletes can build muscle with protein. https://www.eatright.org/fitness/sports-and-performance/fueling-your-workout/how-teen-athletes-can-build-muscles-with-protein. Accessed September 8, 2020.

Devries, M.C. and Phillips, S.M. 2015. Supplemental Protein in Support of Muscle Mass and Health: Advantage Whey. J Food Sci. 80(S1):A8-A15.

Dietary Guidelines. 2015 -2020. https://health.gov/our-work/food-nutrition/2015-2020-dietary-guidelines/guidelines/appendix-7/. Assessed October 29, 2020.

Kerksick, C.M., Arent, S., Schoenfeld, B.J., Stout, J.R., Campbell, B., & Aragon, A.A. 2017. International society of sports nutrition position stand: nutrient timing. J of the Int. Society of Sports Nutrition. 14:33. DOI: 10.1186/s12970-017-0189-4.

Purcell, L. K. 2013. Sport nutrition for young athletes. Paediatr Child Health. 18(4):200–202.

Reid, K. 2013. Performance Food: Promoting foods with a functional benefit in sports performance. Nutr. Bull. 38:429–437. DOI: 10.1111/nbu.12065.

Whitney, E. & Rolfes, S.R. 2019. Understanding Nutrition. 15th Edition. Cengage Learning. Stamford, CT.

This publication has been peer reviewed.
Nebraska Extension publications are available online at http://extension.unl.edu/publications.

Extension is a Division of the Institute of Agriculture and Natural Resources at the University of Nebraska–Lincoln cooperating with the Counties and the United States Department of Agriculture.

Nebraska Extension educational programs abide with the nondiscrimination policies of the University of Nebraska–Lincoln and the United States Department of Agriculture.

© 2021, The Board of Regents of the University of Nebraska on behalf of the University of Nebraska–Lincoln Extension. All rights reserved.