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The Effect of Protein on Sports Performance

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Abstract – Protein has become one of the most publicized nutrients for sports performance, because of its ability to stimulate muscle protein synthesis, thereby increasing muscle development. Beyond muscle growth, protein has several other functions critical to sports performance: cell regulation, muscle repair, immune function, neurological function, nutrient transport, and structural support. However, a notable limitation exists relative to the vast majority of nutrition studies completed to date on protein consumption – namely, studies have primarily focused on resistance-trained or power sport athletes .

Protein intake is one of the most hotly debated topics related to sports nutrition. Most athletes probably ingest more protein than they really require and there is a flourishing market for protein supplements, amino acid mixes and all kinds of protein-based 'power drinks' that promise athletes top performance and massive gains of lean muscle mass.

There is still a great deal to be learned about protein and its role in sports performance. There is a substantial body of literature that supports its use as a recovery aid for runners, if consumed in moderate amounts and shortly after long or intense exercise bouts.

Keywords: Immune Function, Neurological Function, Protein, Stimulate, Osteoporosis.

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INTRODUCTION

Protein has become one of the most publicized nutrients for sports performance, because of its ability to stimulate muscle protein synthesis, thereby increasing muscle development. Beyond muscle growth, protein has several other functions critical to sports performance: cell regulation, muscle repair, immune function, neurological function, nutrient transport, and structural support. However, a notable limitation exists relative to the vast majority of nutrition studies completed to date on protein consumption – namely, studies have primarily focused on resistance-trained or power sport athletes.

Protein intake is one of the most hotly debated topics related to sports nutrition. Most athletes probably ingest more protein than they really require and there is a flourishing market for protein supplements, amino acid mixes and all kinds of protein-based 'power drinks' that promise athletes top performance and massive gains of lean muscle mass.

Protein is not just an essential nutrient, but the largest component in the body after water, typically representing about 15% of body weight. Most of this protein mass is found in skeletal muscle, which explains the importance of protein to athletes. However, proteins also play an important role in the following Transport and storage of other nutrients, Catalyzing biochemical reactions, Control of growth and differentiation; Immune protection, providing our bodies with structural integrity.

Factors of protein requirements by athletes

- **How intensively the athlete exercises** - the greater the exertion and higher protein requirement.
- **How long the athlete exercises during training sessions and events** - long periods of training will increase protein requirement.
- **The type of exercise the athlete participates in** - endurance training (e.g. body building, weight lifting) leads to protein breakdown and increases the requirement.
- **The level of training the athlete has achieved** - highly trained athletes have a lower protein requirement than athletes who are starting their training. During rest periods, increased protein synthesis occurs in highly trained athletes.
- **The energy content of the diet** - athletes such as dancers, gymnasts and light weight

wrestlers, who tend to restrict their energy intake to maintain a low body weight, as well as vegetarian athletes, may have higher protein requirement.

- **Gender** - male athletes tend to burn fat preferentially and thus usually require less protein than female athletes who tend to burn more protein and carbohydrates - despite this physiological difference most male athletes ingest large amounts of protein.

Types of protein

Some common protein sources used by power sports athletes to enhance muscle tissue development and assist with repair after workouts are: proteins from milk, whey, soy, egg, and amino acids.

How much protein do athletes need?

The standard Recommended Daily Allowance (RDA) for protein in adult men and women is 70 g/day and 50 g/day respectively (which translates to about 1 g of protein per kg body weight per day). Experts working in the field of sports nutrition agree that the standard RDA for protein is too low for the requirements of most serious athletes.

SL. NO.	Protein intake by athletes	Protein per kg body weight per day
01.	Elite male endurance athletes	1.6 g
02.	Athletes who exercise at moderate intensity (about 4-5 times a week for 45 to 60 minutes)	1.2 g
03.	Recreational endurance athletes	0.80 to 1.0 g
04.	Rugby, football and other power sports	1.4 to 1.7 g
05.	Resistance athletes during early training	1.5 to 1.7 g
06.	Athletes training at altitude	2.2 g
07.	Resistance athletes who have reached steady state	1.0 to 1.2 g
08.	Female athletes - approximately 15% less protein than male athletes	

Key for protein intake

Protein intake appears to be the most important factor in achieving positive training adaptations, specifically for improving recovery from intense endurance training sessions. Protein consumed after exercise will provide amino acids for building and repair of muscle tissue. Nutrition for the distance athlete should be centered on refueling, rehydration, repair and adaptation, and preserving the immune system.

During both resistance training and intense exercise bouts, damage occurs in muscle. This damage can be three types: muscle soreness that occurs 24-48 hours after activity, acute damage from a minor or major tear in muscle fibers; or muscle soreness or cramp that happens during or immediately after exercise. The amount of muscle tissue damage may not be severe, but it does occur during and after exercise, so recovery is a very important part of training. The majority of research on protein intake timing is focused on the post-exercise period – often defined as the hour immediately following exercise. Protein consumption after exercise has been found to minimize protein breakdown, stimulate muscle protein synthesis, and building muscle tissue.

Maintaining optimum protein status

- An athlete has to move his or her body to perform, and this requires the muscles to generate force to accelerate body mass. As a rule of thumb, the greater an athlete's power-to-weight ratio, the faster he or she can move, and (to a lesser extent) the longer he or she will be able to maintain any given speed of movement. Since all force and movement is generated by muscles, most power athlete's benefit from maximizing muscle mass and strength, while minimizing the amount of superfluous body mass – i.e. fat.

- And while out-and-out muscle strength is less important for endurance athletes, maintaining sufficient muscle mass is critically important, not least because high training volumes are known to increase the rate of protein oxidation from the amino acid pool, potentially leading to delayed recovery, a loss of muscle mass and consequent loss of power and increased injury risk.

- Given that athletic training is known to increase the demands on the amino acid pool, many athletes, particularly bodybuilders and strength athletes, adopt high-protein diets to maintain a positive nitrogen balance, or at least prevent catabolism and loss of muscle tissue. However, even today there remains much debate about how much protein athletes really need to optimize and maintain performance.

Dangers associated with excessive protein intake

According to present-day experience, sports nutritionists believe that ingesting up to 2 g of protein per kg of body weight per day should not cause any negative effects in healthy athletes (those who do not suffer from raised blood fat levels or diabetes, or have kidney problems). Intakes exceeding this amount can, however, be potentially dangerous for the following reasons:

- High protein intakes are often associated with high intakes of animal fat (saturated fat and cholesterol), which can raise blood lipid levels and cause heart disease and certain types of cancer
- High-protein diets increase calcium excretion via the kidneys which can in turn lead to kidney stones and osteoporosis, particularly in female athletes who restrict their energy intake and suffer from amenorrhea (absence of menstruation)
- Susceptible athletes may develop kidney disease if their protein intake is too high
- Research with animals indicates that a high protein intake may damage the liver

CONCLUSION

There is still a great deal to be learned about **protein** and its role in sports performance. There is a substantial body of literature that supports its use as a recovery aid for runners, if consumed in moderate amounts and shortly after long or intense exercise bouts.

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