Factors affecting protein requirement of athletes.

- Amino acids are used to repair muscle trauma that results from repeated muscle contractions and for the repairs of injuries to muscle fibres.
- To remodel muscle tissue in response to strength training, there is an increase in muscle bulk due to resistance training. Protein requirements of the beginner strength athletes to maintain nitrogen balance appear to be at the higher end of the range compared to that of elite strength athletes. Research shows that those who are adopted to strength training may not need a very high intake of protein.
- Prolonged exercise increases oxidation of amino acids for fuel. Protein use as an energy substrate increases during high intensity, long duration endurance activity. Protein makes a greater contribution to total energy production during endurance exercise when muscle glycogen levels are low.
- Protein intake equal to 15-20 per cent of total calories will meet the protein requirements of most athletes. ICMR, recommends 10–15 per cent of total energy requirements and upper limit could be placed at 2g/kg body weight. Consuming more protein than 2.0g/kg body weight results in increased protein oxidation, urea formation, diuresis and can increase risk for dehydration.
- The type of sport and total calorie intakes influence protein requirements. Eating sufficient foods to meet high energy requirements ensures that athletes will meet their protein requirements. High protein diets increase the water requirement necessary to eliminate nitrogen through the urine. In addition, an increase in metabolic rate lead to an increased oxygen consumption.
- Endurance exercise does increase the protein needs of atheletes by 150 per cent of the RDA. Athletes participating in events requiring strength rather than endurance usually experience only a slight increase in protein need. There is no evidence that eating more protein can increase metabolic efficiency or lead to enhanced strength or endurance.
- Increased muscle mass can only be achieved by long-term training. Without a training programme extra dietary protein is converted to storage fat. There is no reason to use protein supplements.

When an individual begins a training programme a situation called sports anaemia, a transient decrease in red blood cells and haemoglobin level may drop. During the initial two or three weeks of training programme, blood proteins, including erythrocytes may be utilised to increase the myoglobin concentration, mitochondrial mass and enzymes that are part of the training adaptation. An increased intake of dietary protein may minimize the destruction of red blood cells, promote their regeneration and provide the protein needed for the other training adaptations to occur.

Guidelines

The consensus of current evidence suggests that strength and speed athletes may need to consume 1.2-2.0 g/kg of protein which should be possible within the recommended 15 per cent of total calorie intake.

Individuals involved in resistance training, such as weightlifters, powerlifters, body-builders, football players, sprinters and wrestlers, strive for increased muscular strength and/or hypertrophy. Training of this type typically increases protein in the muscle fibres. This increased muscle protein probably results in the endogenous protein breakdown and an increased protein synthesis from amino acids.

A small increase in the intake of dietary protein 1.2–1.4 g/kg is recommended for high ...tensity, long duration aerobic endurance training. Individuals training at less than 50 per ...ent VO_2 max for 20–60 min/day do not need to increase their protein intake above the RDA.

The acceptable macronutrient distribution range has an upper limit of 35 per cent protein of total energy.

After exercise is the ideal time to consume protein.

High quality protein sources are preferred for muscle growth. Ten to twenty grams of high quality protein is enough. More is not better.

Protein utilization and deposition are dependent on intake of adequate energy. Adequate non-protein energy from carbohydrate and fat is essential for dietary amino acid to be utilised for protein synthesis and for amino acid related functions in the body.

Protein energy (PE) ratio changes with the energy intake. Protein requirement is constant at different levels of activity while the energy requirement changes. Due to this the PE ratio changes and becomes higher with reducing energy requirement. This is important, since the required level of protein in the food will depend on the activity levels. PE ratio only indicate the total amount of protein in the diet.

With a constant protein requirement this drop in energy requirement will lead to an increased PE ratio of the required diet. However, even in these circumstances the PDCAAS - adjusted PE ratio will not rise beyond 13-14 per cent. By increasing physical activity, energy needs raise and PE ratio is reduced.

SUPPLEMENTS AND HIGH PROTEIN DIETS

Athletes use milk protein, whey protein, soy protein, egg protein and amino acids as supplements.

Vegetable protein sources do not score as high in ratings or biological value, as animal proteins and may require supplementation. These recommended protein intakes can generally be met through diet alone, without the use of protein or amino acid supplements.

All of the constituents of whey protein provide high levels of the essential and branched chain amino acids and bioactive components. Whey is most recognized for its applicability in sports nutrition.

One of the major concerns for individuals on high protein, low carbohydrate diets is the potential for the development of metabolic ketosis. As carbohydrate stores are reduced, the body relies more upon fat as its primary energy source. The greater amount of free fatty acids that are utilized by the liver for energy will result in a greater production and release of ketone bodies in the circulation.

In strength/power athletes who consume high protein diets, a major concern is the amount of food being consumed that is high in saturated fats. Consumption of meats, dairy products and eggs without regard to fat intake, there is likely be an increase in consumption of saturated fat and cholesterol. Another concern is that high protein diet may over-stress the kidneys.

The effect of protein on bone health is still unclear.

Several studies have demonstrated greater gains in lean body mass in individuals supplementing with bovine colostrum than whey but no changes in endurance or strength performance. However, when performance was measured following prolonged exercise (2 hour side) supplement dosages of 20-60g/day were shown to significantly improve time trial performance in competitive cyclists. These results may be related to an improved buffering capacity following colostrum supplementation.

Studies have shown that skim milk resulted in higher muscle retention/accretion than soy protein drink particularly in the first 30 min post-work out.

It is likely that a combination of different proteins from various sources may provide optimal benefits for performance.

In athletes supplementing their diets with additional protein, casein has been shown to provide the greatest benefit for increases in protein synthesis for a prolonged duration.