FACT SHEET

Protein for Athletes

What is Protein?

Athletes' interest in the association between protein intake and sports performance dates back to ancient Greek times. Proteins continue to capture the attention of modern day athletes in regards to recovery, fat loss and adaptation to the training stimulus, or influencing muscle size and strength. Proteins and the amino acids they are built from are found in a wide variety of both animal and plant foods. By consuming dietary protein we obtain the building blocks to make a range of body proteins with essential structural (e.g. muscles) and functional roles (e.g. immune cells and hormones). Protein can also be used as an energy source, particularly when carbohydrate reserves are low.

Table 1: Dietary sources of protein - animal and plant (each serve contains 10g protein). These foods have low to moderate fat content and provide other important nutrients.

Animal	Plant
35 g beef, pork, lamb or chicken (cooked)	3-4 slices wholemeal bread
40 g fish (including canned e.g. tuna)	2 cups breakfast cereal
2 small eggs	½ can (220 g) dried beans
35 g reduced fat hard cheese	2 cups cooked pasta
3 Tbsp cottage cheese	2 cups cooked rice
1 cup low fat milk	125 g tofu
Tub of yoghurt (200 g)	50-60 g nuts or seeds
150 ml liquid meal supplement	1 cup soy milk

Each protein is made up of a unique combination of amino acids. Of the twenty amino acids that make up all of the proteins in our diet, nine are considered "essential". That is, our bodies can't make them, so they must come from the diet. Protein from animal food contains all essential amino acids while plant protein does not. By combining a wide variety of protein-containing food into eating plans, both vegetarians and non-vegetarians can obtain adequate amounts of essential amino acids. While meat (red meat, seafood, poultry), dairy products (milk, cheese, yoghurt) and eggs are especially good sources of protein, many plant foods (including legumes, soy products, nuts and some grains) also contain significant amounts of protein and can contribute a large proportion to total daily protein intake (see Table 1).

Does exercise increase protein requirements?

Body proteins are constantly being built and broken down. While some of this protein is recycled, a proportion is also metabolised by the body, creating a daily need for protein in the diet. The recommended daily protein intake in the general population is just under 1g/kg body mass daily. However, both strength and endurance athletes have greater protein needs - perhaps as much as 50-100% above their sedentary counterparts (Table 2) because of increased protein used to fuel exercise plus the promotion of growth and repair of muscle following exercise. Fortunately, the high food intake of most athletes ensures these increased protein needs are easily met. Dietary surveys of strength athletes indicate an intake within the range of 2g/ kg body mass while endurance athletes achieve an intake of about 1.2-1.8 g/kg body mass with females typically on the lower end of that range.

Table 2: Protein needs for different groups of athletes*

Type of athlete	Protein Requirements	
	(g/ kg body mass/day)	*Absolute (g) e.g. 70 kg athlete*
Sedentary	0.8	56
'Regular exercise'	1.0	70
Endurance (general training)	1.2-1.6	84-112
Endurance (heavy training)	1.6-2.0	112-140
Strength	1.2-1.7	84-119
Adolescent or strength athlete at start of training	1.5-2.0	105-140

*Protein needs of female athletes are ~ 10-20% lower than males.

Aside from training load, a number of other factors influence protein needs, including the type and timing of proteins ingested, and daily energy intake. A sports dietitian can help to refine your daily food intake to maximise the value of your protein consumption. The following meal plan is an example of a well considered intake. It incorporates good quality protein sources throughout the day, including pre and post training snacks, while also achieving needs for other important nutrients like carbohydrates, vitamins and minerals.

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Meal		Protein (g)
Pre-training	**1 cup low fat milk**	**13**
Training	**Water**	
Breakfast	2 cups of cereal with low fat milk	**22**
	2 slices toast with marg. and jam	
Morning Tea	Tub flavoured yogurt + cereal bar	**14**
Lunch	Ham, cheese and salad roll	**26**
	Orange juice	
Afternoon Tea	Milk based fruit smoothie	**10**
Training	Water and sports drink	**0**
Post training	Small tub creamed rice	**8**
Dinner	Palm size serve of lean steak	
	2 cups steamed rice and vegetables	**39**
Supper	Reduced fat custard and banana	11
Total		**140 g (1.75 g/kg)**

Timing of protein intake

Eating a snack providing a good source of protein and carbohydrate both before and immediately after resistance exercise will help fuel training and promote training adaptations by increasing production of anabolic hormones, reducing protein breakdown and increasing protein building. Post-training snacks rich in carbohydrate with a small amount of protein will promote recovery of fuel stores and repair of damaged tissue and thus should be planned after all training sessions. These goals can be achieved with an intake of just 10-20 g of protein and therefore are achievable for almost all athletes, irrespective of their energy budget. Larger amounts of protein do not further stimulate training adaptation; it merely increases protein use as a fuel. Suitable pre and / or post training snacks with a good mix of carbohydrate and protein include a tub of yoghurt, glass of milk, a fruit smoothie or lean meat sandwich.

Too little protein

While most athletes easily achieve their increased protein needs, some are at risk of eating too little protein. Athletes in weight-category sports and over-zealous dieters or "picky" eaters are most at risk of failing to achieve daily protein needs. This can promote loss of muscle mass, slow recovery and compromise other body functions like immunity - all of which can compromise exercise performance. The skills of a sports dietitian can help an athlete to design an eating plan that meets needs for protein, carbohydrate and all other nutrients within the desired energy budget. Clever food selection means that protein-rich foods can also supply valuable amounts of other important nutrients like calcium (e.g. dairy foods) and iron (meat, seafood, poultry).

High protein diets

Some athletes intentionally consume very large amounts of protein, believing this will enhance muscle size and strength. Such extreme diets are neither necessary nor beneficial. Consuming protein above needs simply increases the use of protein as a fuel – extra protein alone does not stimulate muscle growth. While a high protein diet does not cause kidney disease in otherwise healthy athletes, such diets may promote calcium loss from the body and displace other important nutrients from the diet. Protein-rich foods are also generally expensive (especially protein supplements) and some can lead to an unhealthy intake of saturated fats. The recent trend to follow high-protein, low-carbohydrate diets to assist in weight loss is not suitable for athletes. See the fact sheet on Low Carb Diets for Weight Loss in Athletes for more information.

Protein Supplements

The modern athlete is confronted by a wide array of protein supplements with emotive claims promoting improved recovery, less fatigue and increases in strength and muscle mass. There is no scientific evidence that protein supplements offer advantages over everyday protein-rich foods. In fact, most dietary sources of protein also provide valuable amounts of other important nutrients like carbohydrate, vitamins, minerals and antioxidants. However, there may be a role for the convenience of liquid meal supplements - 'protein powders' that also contain carbohydrate, vitamins and minerals, in the meal plan of busy athletes. These products provide important nutrients in a low-bulk, easily prepared and portable form and as such are excellent pre and post training snacks 'on the go'. They can also be a practical solution among athletes who struggle to eat enough food to meet increased energy needs for training or weight gain. If time is on your side, the following home made shake offers the same benefits of a commercially available product.

High energy drink

250 ml low-fat milk
3 Tbsp. skim milk powder or Sustagen sport powder
1 banana
1 Tbsp honey
1 scoop reduced fat ice cream
Blend all the ingredients together
Approximate analysis: 2000 kJ; 26 g protein; 7 g fat; 82 g Carbohydrate

Amino Acid Supplements

Supplements containing amino acids, either singularly or in combination, are also popular among both strength and endurance athletes. Unlike protein supplements which assist in increasing protein intake, most amino acid supplements are promoted with specialised claims – for example, growth hormone promotion, fat loss, enhanced immune function, and stimulation of energy release and recovery. However, these claims and the resultant performance gains, remain unproven. Additionally, many common food items provide equivalent amounts of specific amino acids at a fraction of the cost of supplements.

Summary

- Protein requirements of both strength & endurance athletes are greater than inactive people.
- In most cases, the extra protein needs of athletes are easily achieved by an increase in overall food intake that accompanies regular exercise.
- Rather than consuming large amounts of protein at any one meal, focus on including small serves of protein rich food at each meal and snack, including pre and post training feeds.
- Protein intakes well above recommendations do not further stimulate muscle building or recovery.
- Liquid meal supplements and 'protein powders' containing valuable amounts of carbohydrate and other nutrients can form part of an eating plan when everyday foods are impractical. These products provide a compact source of additional nutrients in a high energy diet or a convenient recovery snack at a sporting venue.
- Amino acid supplements are unproven and not recommended.

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