

Diet For Sport Performance & Active Lifestyle

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Meeting energy needs is the first priority for athletes or active individuals. Specific nutrient requirements can vary depending on many factors, including type of sport participation, food preferences, body weight, and body composition goals.

Carbohydrate requirements

Carbohydrate is a critical fuel for strenuous exercise; however, the body's ability to store carbohydrate, primarily in the form of glycogen in the muscles and liver, is limited. Exercise intensity is a particularly important consideration since higher exercise intensities are associated with an increased reliance on carbohydrate as a fuel.

Most recreationally active individuals can maintain their glycogen stores by consuming approximately 55-60% of total daily energy from carbohydrate. However, for extremely active individuals who participate in endurance sports, it is often preferable to express carbohydrate recommendations in absolute terms instead of a proportion of daily energy. Whereas recreationally active individuals can replenish their glycogen stores by consuming 5-6 g of carbohydrate per Kg body weight per day, elite cyclists competing in long stage races (e.g., Tour de France) may require up to 12 g per Kg per day (which is equivalent to 840 g for a 70 Kg athlete or approximately 48 slices, or 3 loaves, of whole wheat bread!)

Protein requirements

It remains controversial whether protein requirements are higher in habitually active individuals. The current Dietary Reference Intake for protein is 0.8 g per Kg of body weight per day (56 g per day for a 70 Kg person) and makes no allowance for physical activity.

However, several leading organizations, including the American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada, have concluded that protein requirements are higher in very active individuals. They suggest that endurance athletes should consume 1.2 to 1.4 g per Kg per day, whereas resistance-trained athletes (weightlifters) may need as much as 1.6 to 1.7 g per Kg per day.

Endurance athletes may need more due to high training volumes, whereas resistance-trained individuals may need more due to chronically elevated rates of protein synthesis (formation of new muscle proteins). Very few athletes are at risk

of protein deficiency provided that their intake is sufficient to maintain body weight and that sound nutrition practices are followed. However, strict vegetarians and athletes who participate in weight category sports may need to monitor their food choices carefully to ensure that their protein requirements are satisfied.

Fat requirements

Fat is an important fuel for active individuals and, depending on the exercise intensity, may contribute more than half of the energy to fuel muscle contraction. Fat is also more energy dense than carbohydrate or protein, which means less is needed on a per weight basis in order to meet the dietary requirement.

There are three main types of dietary fat: unsaturated, saturated, and trans. Unsaturated fats, which include polyunsaturated and monounsaturated varieties and tend to be in liquid form at room temperature, are often referred to as "good fats". They include vegetable oils (olive, sunflower, corn) as well as nuts and have been shown to reduce the risk for some chronic diseases such as cardiovascular disease. Saturated fats, which tend to be hard at room temperature, are mainly derived from animal sources and include the fat in meats and dairy products. Consuming high amounts of saturated fats has been linked to an increased risk for some chronic diseases. Finally, consumption of trans fats, which are synthetically derived and used to improve the shelf life of processed foods, should be avoided.

Fluid requirements

Exercise performance is optimal when athletes maintain fluid balance during exercise; conversely, exercise performance is impaired by dehydration. The general rule is that athletes should drink enough to minimize the loss of body weight, but prevent weight gain from excess drinking before and during training and races.

Optimal hydration can be achieved by drinking 150 to 350 ml of fluid every 15-20 minutes during exercise. Beverages containing a dilute (4-8%) amount of carbohydrate are recommended for intense exercise lasting longer than 1 hour. Consuming carbohydrate this way can extend endurance performance by helping to maintain blood sugar (glucose) levels and spare body stores of carbohydrate. Ingesting a small (5 g/litre) amount of sodium in a sport drink is also recommended to replace sodium lost in sweat.

Electrolyte imbalances can occur in athletes either because of dehydration or overdrinking water without replacing sodium. Endurance athletes are more likely to suffer from dehydration than from overhydration, although hyponatremia (low blood sodium concentrations) in marathon runners who overdrink is not uncommon.

Simple Ways to Monitor Daily Energy Requirements

Even if you are not very active, it is important to have an estimate of your daily energy requirement in order to manage body weight. Here are some simple guidelines:

How Much?

1) Minimum daily basic requirement, the Resting Energy Expenditure (REE) is approximately 1 Calorie (Cal) per Kg of body weight per hour.

For example, the REE for a 70 Kg person is:

$70 \text{ Kg} \times 1 \text{ Cal} \times 24 \text{ h} = 1680 \text{ Cal}$ (For conversion from lbs to Kg, divide lbs by 2.2)

2) Daily energy requirement can be estimated by multiplying REE by an "activity factor" based on habitual level of physical activity.

-mainly sedentary = 1.2

-recreationally active = 1.5 to 1.7

-vigorous physical activity = 2.0 or higher

Another general rule is that moderately active individuals require approximately 40 Cal per Kg of body weight per day.

What Type?

Most leading public health organizations recommend that people should derive approximately 55% of their daily energy from carbohydrates (breads, cereals, fruits, and vegetables), no more than 30% from fats (and no more than 10% as saturated fats), and 15% from protein (meat, eggs, dairy products, or alternatives such as legumes).

Carbohydrate and protein provide 4 Cal of energy per gram, and fat provides 9 Cal/g. Thus, for a 70 Kg person whose daily energy requirement is approximately 2800 Cal the recommended composition is:

- $2800 \times 55\%$ carbohydrate
=1540 Cal / 4 Cal per g
=385 g of carbohydrate
- $2800 \times 15\%$ protein
=420 Cal / 4 Cal per g
=105 g of protein

- 2800 x 30% fat
=840 Cal / 9 Cal per g
=93 g of fat

More information on food energy intake/output, weight management calculations, common physical activities and their respective calorie burning rates, and food metabolism, refer to WellnessOptions issues 9, 10, 16 and the body sections and nutrition sections various issues.

References:

American College of Sports Medicine, American Dietetic Association. and Dietitians of Canada. (2000) Joint Position Statement Nutrition and athletic performance. Med Sci Sports Exerc, 32: 2130 - 2145.

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Dietary Reference Intakes (DRIs) established by Canadian and American scientists through a process overseen by the National Academy of Sciences can be viewed online at the National Academy Press at <http://lab.nap.edu/napcgi/discover.cgi?term=dietary%20reference%20intakes&restric=NAP&ref=NAP>

Canada's Food Guide to Health Eating is being revised and the process is expected to complete by spring 2006 Current guide can be viewed online at http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html

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