

LUCOZADE SPORT SCIENCE:

VITAMINS, MINERALS & ANTIOXIDANTS

KEY POINTS

- Vitamins, minerals and antioxidants – micronutrients - are an important component of the five major food groups, specifically fruit and vegetables.
- Micronutrients are required for energy production, maintenance of bone health, adequate immune function and the protection of body tissues from oxidative damage.
- Compared to sedentary individuals, exercise increases the need for micronutrients in the diet. This is largely met by a varied, balanced, high carbohydrate diet.
- However, it should be recognised that not all individuals match their requirement for micronutrients in the diet, including vegetarians or those restricting energy intake.
- The most important micronutrients include; iron, zinc, calcium, and vitamins A, C, E, B6 and B12.

INTRODUCTION

A well balanced diet, including the five major food groups, is a pre-requisite for those exercising or competing at sport. Vitamins, minerals and antioxidants – micronutrients - are an important component of these food groups, specifically within fruit and vegetables. Micronutrients are required in the diet for the proper functioning and maintenance of health, including energy production, maintenance of bone health, adequate immune function and the protection of body tissues from oxidative damage. The most important micronutrients include; iron, zinc, calcium, and vitamins A, C, E, B6 and B12.

THE IMPACT OF EXERCISE

Compared to sedentary individuals, exercise increases the need for micronutrients in the diet. This is primarily to help aid repair and regeneration of muscle tissue after exercise, as well as counteract a decreased absorption in the gastrointestinal tract, increased excretion in sweat, urine and faeces and increased turnover. In general an individual's requirement is largely met by the normal diet, assuming it is varied, balanced and high in carbohydrate.

INDIVIDUAL'S AT RISK

It should be recognised that not all individuals match their requirement for micronutrients in the diet. Those predominantly at risk include:

- Individual's who restrict energy intake, use severe weight-loss practices, eliminate one or more food groups from their diet, or consume low micronutrient density food choices.
- Individuals following a vegetarian diet who eliminate animal products such as meat, fish, poultry, and dairy products.
- Individuals undertaking a prolonged period of travel, particularly to countries with an inadequate or otherwise limited food supply
- Individuals with a heavy competition schedule, recovering from injury, or with a specific micronutrient deficiency.

It is important to note that there is no evidence that an increased supply of specific vitamin and minerals will enhance performance except in those cases where a pre-existing deficiency exists.

KEY MICRONUTRIENTS

Iron

Iron is required for the formation of haemoglobin and myoglobin, which bind oxygen in the body, and for enzymes involved in energy production. Low iron stores are one of the most common nutrient deficiencies seen in athletes, especially females, endurance athletes and vegetarians. If this condition progresses to iron deficiency anaemia, exercise performance can be negatively affected. Excellent sources of iron include; red meat, especially liver and kidney, oily fish, breakfast cereals fortified with iron, dried fruits, green leafy vegetables, pulses, beans, lentils and red kidney beans. Iron taken in combination with vitamin C will also help absorption.

Calcium

Calcium is important for the formation and repair of bones and teeth, especially in adolescents and female athletes. Within the body there is a continual process of calcium being deposited in the bone and removed. Consequently, it is important to ensure an adequate calcium intake. The best sources of calcium include dairy produce. Every athlete should aim to include at least 3 servings of these foods in their daily eating plans (milk, cheese, carton of yoghurt), whilst additional servings are required during growth spurts in childhood, adolescence and pregnancy.

Zinc

Zinc is important for the development of the immune system. More than 100 metalloenzymes have been identified as zinc-dependent, including those involved in the transcription of DNA and synthesis of proteins. The body contains 2-3 g of zinc; however, because there are no specific storage sites for zinc, a regular supply in the body is required. Zinc is present in a wide variety of foods, particularly in association with protein based foods. Good sources include: dairy product, beans and lentils, yeast, nuts and seed and wholegrain cereals.

Vitamin D

Vitamin D is required to aid calcium absorption and the promotion of bone health. One of the primary sources of Vitamin D is its synthesis by ultraviolet conversion in the skin. Consequently, individuals who live at northern latitudes or who train primarily indoors throughout the year – such as gymnasts and figure skaters – may be at risk for poor vitamin D status. Vitamin D is found in a small number of foods. Good choices include oily fish and eggs as well as fortified foods such as margarine and breakfast cereals.

B-complex Vitamins

The B-complex vitamins have two major functions directly related to exercise. Thiamin (B1), Riboflavin (B2), Niacin (B3), Pantothenic Acid (B5), Pyridoxine (B6) and Biotin (B7) are involved in energy production, whereas Folic Acid (B9) and Cyanocobalamin (B12) are required for production of red cells, protein synthesis, tissue repair and maintenance. The data available suggest that exercise may slightly increase the need for these vitamins, about twice the Recommended Daily Allowances (RDAs).

Antioxidants

Vitamin A, E, and C, carotenoids, and selenium play an important role in protecting the cell membranes from oxidative damage. Exercise increases oxygen consumption by 10- to 15-fold. Therefore, it is hypothesized that chronic exercise produces a constant “oxidative stress” on the muscles and other cells. Athletes in greatest risk for poor antioxidant intakes are those with limited dietary intakes of fruits and vegetables. More specifically to Vitamin C, a diet low in vitamin C could lead to impaired immune response with altered resistance to infections.