

## Vitamins and minerals and the athlete

### **Vitamins - what are they?**

Vitamins are organic compounds that help regulate fat, carbohydrate and protein metabolism in the body. They cannot be made by the body and have to be provided by the food we eat - fortunately we only need tiny amounts of these vitamins.

Vitamins are not an energy source, but they play a vital role in releasing the energy stored in the other foods we eat. In addition, our enzyme, nervous, hormonal and immune systems are dependent on vitamins for regulation and control. Because of this vitamins are essential for good health, wellbeing and growth.

### **Minerals - what are they?**

Minerals are inorganic elements that have many roles in the body's functioning. Apart from their more well-known roles in the formation of strong bones and teeth, they also help to control the nervous system, fluid balance in tissues, muscle contractions, some hormonal functions and enzyme secretion.

Minerals are as essential as vitamins and, just like most vitamins, they cannot be made in the body. All our bodies' mineral needs have to be supplied from our diets.

### **Where do we get our vitamins and minerals from and what role does each play?**

<b>Vitamins</b>	<b>Function</b>	<b>Food sources</b>
Vitamin A (found in two forms: retinol and beta carotene)	Necessary for vision in dim light, for healthy skin. In addition, it prevents infections and is necessary for the immune system	Fish liver oils (for example cod or halibut liver oil), liver, carrots, fortified margarine, cheese and dark green leafy vegetables
Vitamin D (found in two main forms: cholecalciferol and ergocalciferol)	For the growth and maintenance of bones and teeth	Oily fish, eggs, milk, fortified breakfast cereals and fortified margarine. Also created in the body by action of sunlight on the skin
Vitamin E (found as a group of compounds called tocopherols)	Protection of cell membranes and fats from oxidative damage; protection of vitamin A, immune system and nervous system	Vegetable oils, eggs, whole grains, green vegetables and nuts
Vitamin K (covers a number of compounds, including phylloquinone)	Is necessary for normal blood clotting and energy metabolism	Dark green leafy vegetables, liver, meat, potatoes and cereals
Vitamin B1 (thiamin)	For energy metabolism, especially from carbohydrates	Bread, potatoes, milk, meat (especially pork), offal, whole grain cereals and fortified breakfast cereals

Vitamin B2 (riboflavin)	Essential for the utilisation of energy from foods, especially fats and proteins	Milk, meat (particularly liver) and eggs
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Vitamin C (found as a group of compounds, including ascorbic acid)	Necessary for the maintenance of connective tissues (including tendons, ligaments and cartilage). In addition, it helps wound healing, production of hormones, the immune system and protects vitamins A and E	Fresh fruit, especially citrus fruits and vegetables (particularly potatoes)
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<b>Minerals</b>	<b>Function</b>	<b>Food sources</b>
Sodium	Helps regulate body fluids and is involved in energy release, functioning of nerves and muscle contraction. Increases blood pressure	Salt, bread and cereal products, bacon, ham, shellfish, smoked fish, soy sauce and foods that have been preserved by using salt
Potassium	Is used in the body's fluid balance and is involved in membrane functions, muscle function and reduces blood pressure	Potatoes, vegetables, greens, pork, dairy products, fruit (especially bananas) and juices
Calcium	For bones and teeth, blood clotting, hormone secretion, muscle and nerve function	Milk, cheese, bread and flour, green leafy vegetables and small oily fish with bones
Magnesium	Involved in muscle tone and activates enzymes	Milk, bread, potatoes and vegetables
Iron	Necessary for the manufacture of haemoglobin in blood (red cells) oxygen transport and transfer to tissues, activates enzymes	Red meats, liver, flour and cereal products, potatoes and vegetables
Zinc	For growth, bone metabolism, activation of enzymes, release of vitamin A from liver, immune system, taste and insulin storage	Meat, liver, seafood (especially oysters) milk, bread and cereals
Copper	Essential for enzyme function, especially blood formation, bone metabolism, immune system, nerve function and energy metabolism	Oysters, mussels, whelks, liver, brewer's yeast, whole grains, nuts and cocoa

Note: These are not all the vitamins and minerals– if you want to know more – check out the web. These are perhaps the ones you need to know about at the moment.

## **Am I getting enough?**

A balanced diet should provide you with all the vitamins and minerals you need. This is provided you eat a variety of foods from each of the food groups and, of course, in sufficient quantity.

## **Athletes - do they have different requirements?**

- Athletes should get all the vitamins and minerals from their diet.
- Because athletes use up more energy than inactive people, they probably eat more too, and so any increased requirement for vitamins or minerals should be met by their increased food intake (providing the diet is balanced).

## **Key Points:**

- Most vitamins and all minerals cannot be made by the body, so need to come from your diet
- A balanced diet should provide you with all vitamins and minerals you need
- If you are well nourished already, supplements will not improve performance
- If you are slightly deficient in some nutrients, a supplement may benefit performance
- Calcium and Iron are very important for the young athlete especially girls

## **Article from Bupa Sports Nutrition Section ([www.bupa.co.uk](http://www.bupa.co.uk))**

### **Carbohydrate and the athlete**

Carbohydrates are made up of sugars and starch and they should be the major energy providers in your diet. Current recommendations aimed at the entire population state that carbohydrate should provide a minimum of 47 per cent of your total dietary energy (calories) with most of this coming from starchy carbohydrates.<sup>1</sup>

Starch is a highly important nutrient in the diet and is the body's favourite "fuel". It is important because it provides most of our glucose, which is the only fuel the brain can use. In addition, starchy carbohydrates contain fibre and are very good at satisfying our appetites.

### **Carbohydrate and the athlete**

A diet high in carbohydrates is particularly important for the athlete. We store very little glucose in the body so it is vital to have a regular intake of starch. This is because starch is converted to glycogen and stored in the liver and muscles. This glycogen is then used to meet muscles' energy needs by being converted back to glucose when the muscles exercise.

If the muscles run out of glucose they can also burn body fat, but fat is not as efficient an energy source as glucose. Therefore high levels of glycogen will help you exercise at your optimum level. On the other hand, low levels will result in early fatigue and reduced exercise intensity.

Good Sources of starch

- Bread
- Cereals
- Porridge Oats
- Potatoes
- Beans
- Lentils
- Rice
- Pasta
- Noodles

## **Sugars**

Sugar is available in many forms:

- Glucose - found naturally in fruit and vegetable juices
- Fructose - occurs naturally in fruit and vegetables and especially in honey
- Lactose and galactose - found in milk
- Sucrose - occurs naturally in sugar cane and sugar beet
- Maltose - available from fermented grain products.

You might want to experiment with this approach during training.

## **Carbohydrate intake while exercising**

It is likely that for longer exercise sessions - say, more than an hour - you are going to deplete your supplies of glycogen and, therefore, run low on glucose.

Probably the best way to top up while actually exercising is with an isotonic sports drink

An intake of between 30 grams to 60 grams of carbohydrate an hour is recommended. This is about the maximum your muscles can take up from the bloodstream during exercise. Greater amounts have no further benefit.

## **Carbohydrate intake after exercise**

How long does it take to restore glycogen levels after exercise? This depends on:

- How depleted your stores are after the exercise session
- Your fitness level
- The amount of carbohydrate you eat
- The extent of muscle damage

It is best to replenish depleted stores of glycogen by taking in carbohydrate as soon as possible after your exercise session. - During the first two hours IF POSSIBLE.

Restoring your glycogen levels as quickly as possible is very important, particularly if you train every day or every other day. This will help you avoid fatigue and get the best out of your training.

#### Key points

- For the athlete, carbohydrates should provide 60 per cent to 70 per cent of total dietary energy (calories). Most of this coming from starch
- Simple sugar is not a good source of energy as it can upset the body's metabolism
- Starchy carbohydrates are the body's favourite fuel
- Glucose is the only fuel the brain can use and is the favourite for muscles
- Glucose is not stored in the body
- Glycogen, which is stored in the liver and muscles, is converted to glucose to provide energy for physical activity
- Depleted muscle glycogen stores should be replaced as soon as possible after exercise, ideally within two hours.