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A LITTLE EXTRA HELP

Only a healthy, balanced diet can provide the nutrients required by the body. As no single food can provide all the essential nutrients, variety is essential to meet our nutritional needs with vitamins, minerals and antioxidants. So the question is: are vitamins and minerals really that important?





In this chapter you will find out:

- A wide range of vitamins and minerals are necessary for good health
- An athlete requires a wide variety of foods to help ensure the quota of micronutrients are met, but generally do not need extra vitamins and minerals
- Excessive intake of some micronutrients can be harmful
- Micronutrient supplementation does not enhance performance – unless it is being taken to correct a pre-existing deficiency

It is generally accepted that an adequate supply of a wide range of vitamins, minerals and trace elements is necessary for good health, and that our dietary intake needs to meet our body's requirement for all these micronutrients.

However, it should be noted that exercise does not particularly increase the need for vitamins and minerals. Providing you are eating a healthy, balanced diet, that meets your energy needs as well as including a wide variety of foods, you should have no problem getting all the vitamins and minerals you need.

As an athlete, if you are training and competing and not restricting your energy intake, then you will need to eat more food to meet the increased energy demand of your training. Providing it's a varied mixture, you will also be getting more vitamins and minerals. Although strenuous and prolonged exercise stresses the body, the right diet will help ensure good health is maintained. Therefore, even elite athletes do not usually need extra vitamins and minerals.

VITAMINS

Vitamins are a unique and diverse collection of chemicals. The amounts we require them in are very small quantities – usually only a few micrograms (μg) or milligrams (mg) per day – but are essential for many processes carried out in the body. However, as we are unable to create most vitamins, they need to be supplied in adequate amounts by the diet to prevent any deficiencies.

Vitamins are generally classified in relation to their solubility in fat or water. The

	Fat-soluble vitamins A, D, E and K	Water-soluble vitamins B group and C
Risk of deficiency	Very low fat diets and conditions where fat absorption is impaired	Diets lacking in variety
Stability in foods	Robust to heat and light	Varies, often unstable when exposed to heat and light
Storage in body	Can be large and long-term	Often small, so frequent regular intakes required
Risk of toxicity	High	Low, as high intakes are usually excreted in urine

Table 10 - Characteristics of vitamin groups

fat-soluble vitamins are A, D, E and K and the water-soluble vitamins are the B group of vitamins and vitamin C. This classification gives us an indication of food sources, function and distribution in the body, and potential toxicity. Table 10 above outlines some vitamins and their characteristics.

MINERALS

Minerals and trace elements are, like vitamins, only required by the body in very small quantities, but nonetheless remain essential for normal body function. Those required in milligram (mg) quantities (sometimes several hundred milligrams) tend to be referred to as minerals and those required in smaller amounts (micrograms (μg) quantities) are usually called trace elements. Table 11 lists some minerals and trace elements essential for humans.

Minerals	Trace elements
Calcium	Copper
Phosphorus	Chromium
Magnesium	Manganese
Sodium	Molybdenum
Potassium	Selenium
Iron	Iodine
Zinc	

Table 11 - Essential minerals and trace elements



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ANTIOXIDANTS

Athletics training and competing can result in an increased production of radicals (oxidants) and other forms of reactive oxygen species in the working muscles. Therefore, when the muscle contracts there can be oxidative damage, which in turn could result in muscle fatigue or injury.

Muscle cells utilize a network of antioxidants to protect themselves against the risk of oxidative stress and damage. There is some evidence for an adaptive increase in antioxidant status in response to regular exercise, and so this may help protect against further damage.

Common dietary antioxidants are glutathione, vitamin E, vitamin C, lipoic acid, carotenoids, uric acid, bilirubin and ubiquinone. Several minerals also play important, but indirect roles in providing antioxidant protection in the cells. The minerals and trace elements involved in antioxidant related functions include iron, zinc, copper, manganese and selenium. However, not all antioxidants

are created equal and so they may often benefit from working as a network.

In summary

- There is limited evidence that supplementary dietary antioxidants could improve exercise performance
- It is also not known whether high training levels require antioxidants beyond what you would get from a balanced diet with plenty of fruit and vegetables
- Therefore dietary supplementation is not recommended to athletes at this time
- It is more advisable to adapt the diet to include dietary sources of antioxidants than experiment with supplements
- “mega-dosing” may actually impair muscular performance – too much of a good thing is not necessarily a good thing!

Exceptions are

Supplementation with dietary antioxidants may be justified if there is an increase in training stress. Increased training levels, training at altitude, exercising in polluted areas or in a hot environment. All micronutrients – vitamins, minerals and antioxidants – are best sourced from a varied and wholesome nutrient-rich diet high in carbohydrates and based on vegetables, fruit, beans, legumes and grains, as well as meats and oils.

Factsheet 7 lists nutrient-rich food sources for the key micronutrients.

HOW MANY FRUIT AND VEG?

It is recommended that we eat at least five portions of fruit and vegetables per day, as they are nutrient-packed and a good source of antioxidants and soluble fibre. Regardless of whether they are fresh, frozen, canned, dried, or juiced (although fruit juice can only count as one portion a day), variety is the key.

In the UK most of us are only managing three portions a day – some individuals don't even manage that. It is essential we try to reach these targets, and even more so if you are an athlete.

One of the suggestions is that people do not know what constitutes a “portion”. Table 12 shows how the size of the fruit/vegetable determines a portion.

MICRONUTRIENT DEFICIENCIES

Athletes who are undergoing regular strenuous training will need to be eating a high energy diet, and providing it is reasonably varied, will provide micronutrients (vitamins and minerals) in excess of the recommended intake levels for general health. Therefore, the recommendation is that there is no need for you, as an athlete, to take vitamin and mineral supplements.

Unless needed to correct a pre-existing deficiency, supplementation with vitamins and minerals is not proven to

What is a portion of fruit and vegetables?

- 1 large slice of a very large fruit, e.g. melon, pineapple
- or 1 whole medium fruit, e.g. apple, pear, orange
- or 2 small fruits, e.g. plums, satsumas, kiwi fruit
- or 1 cupful of a very small fruit, e.g. grapes and berries
- or 2-3 tablespoons of fruit salad – fresh, stewed or canned
- or 1 tablespoon of dried fruit
- or 1 glass (150ml) of fruit or vegetable juice
- or 2 tablespoons of vegetables – fresh, frozen or canned
- or 1 dessert bowl of salad

Table 12 - Portion of fruit and vegetables

enhance exercise performance. Yet even a small deficiency, with only a minor impact on body function, may impair exercise performance. Whilst in theory, it is possible to be deficient in any micronutrient, it is generally uncommon with the exception of calcium and iron. It should also be noted that in the case of vitamins, minerals and antioxidants – more does not mean better. Excess intakes of certain micronutrients, particularly the fat-soluble vitamins (A, D, E and K) and iron, can be toxic. Fat-soluble vitamins can accumulate in the body tissues, so if recommended amounts are exceeded over a long period then they may reach toxic levels. The water-soluble vitamins (the B group and C) are simply passed out in the urine if consumed in excess of requirements.

Other deficiency risks:

Athletes on restricted diets may put themselves at risk of inadequate micronutrient

intakes. The following lists common dietary situations where there is a higher risk of nutrient deficiencies.

- Diets low in energy for weight loss – especially if followed for a long period
- Diets which omit foods or food groups – likes/dislikes – vegetarians and vegans
- Diets lacking in a particular type of food – allergy or intolerance
- Diets that are erratic and unbalanced – restricted food intake – disordered eating

Athletes should always consult with a sports nutrition professional before considering supplements. If food intake cannot be sufficiently improved, e.g. travelling to foreign countries where there is a limited supply of 'safe' food, then a low-dose multi-vitamin and multi-mineral supplement may be necessary. However, single, targeted, nutrient supplements should only be taken under medical

supervision for an established nutrient deficiency.

Strict vegetarian diets, although high in carbohydrate and therefore great for providing energy fuel, could potentially lead to micronutrient deficiencies in iron, calcium, iodine, zinc and vitamin B12. Therefore, a vegetarian athlete should seek nutritional advice from a sports nutrition professional, as to whether supplementation is necessary.

Some athletes, e.g. menstruating females, vegetarians and endurance runners may have a greater tendency to develop an iron deficiency – however it is not advisable to routinely take iron supplements.

Unexplained fatigue and a fall in performance needs to be fully investigated by a medical professional such as a sports medicine doctor and/or a sports dietitian. Untreated, low iron stores can progressively lead to problematic iron deficiency. Athletes at a high risk of iron deficiency should routinely undergo assessments of their iron levels.

It is always better to adapt the diet than resort to taking a supplement. Taking a supplement does not make a bad diet better. For more information relating to the considerations for a vegetarian athlete, see the Question and Answer section in chapter nine.