

# PANTOTHENIC ACID

**Other names** Calcium pantothenate, panthenol, pantothenol, vitamin B<sub>5</sub>

## Availability

Pantothenic acid, calcium pantothenate, and panthenol are available without prescription in a variety of multivitamin and mineral preparations.

## Actions on the body

Pantothenic acid plays a vital role in the activities of many enzymes. It is essential for the production of energy from sugars and fats, for the manufacture of fats, corticosteroids, and sex hormones, for the utilization of other vitamins, for the proper function of the nervous system and the adrenal glands, and for normal growth and development.

## Dietary and other natural sources

Pantothenic acid is present in almost all vegetables, cereals, and animal foods. Liver, kidney, heart, fish, and egg yolks are good dietary sources. Brewer's yeast, wheat germ, and royal jelly (the substance on which queen bees feed) are also rich in the vitamin.

## Normal daily requirement

No recommended daily amount (RDA) for pantothenic acid has ever been established, but adult requirements are met by a 3–7mg intake daily.

## When supplements are helpful

Most diets provide adequate amounts of pantothenic acid. Any deficiency is likely to occur in malnutrition together with other B vitamin deficiency diseases such as pellagra (see niacin), beriberi (see thiamine), or with alcoholism, and will be treated with B complex supplements. There is no firm evidence that large doses help, as some believe, in the prevention of greying hair, nerve disorders in diabetes, or psychiatric illness.

## Symptoms of deficiency

Pantothenic acid deficiency is unlikely to occur unless a person is suffering from malnutrition. However, deficiency produced under experimental conditions can cause malaise, abdominal discomfort, and burning feet.

## Dosage range for treating deficiency

Usually 5–20mg per day.

## Symptoms and risks of excessive intake

In tests, doses of 1,000mg or more of pantothenic acid have not caused toxic effects. The risk of toxicity is considered to be very low, since pantothenic acid is a water-soluble vitamin that does not accumulate in the tissues. Any excess is eliminated rapidly in the urine. However, very high intakes of 10–20g can cause diarrhoea.

# POTASSIUM

**Other names** Potassium acetate, potassium chloride, potassium citrate, potassium gluconate

## Availability

Salts of potassium in small doses are available in a number of multivitamin and mineral supplements. They are available at higher doses in prescription-only drugs given as dietary supplements and in some diuretics given to offset the loss of potassium in the urine. Potassium salts are also widely available in sodium-free or low-sodium salt (used as a salt substitute). However, these salt substitutes should be avoided by people with impaired kidney function and those taking drugs that cause potassium retention, such as potassium-sparing diuretics.

## Actions on the body

Potassium works together with sodium in the control of the body's water balance, conduction of nerve impulses, contraction of muscle, and maintenance of a normal heart rhythm. Potassium is essential for maintenance of normal blood sugar.

## Dietary and other natural sources

The best dietary sources of potassium are leafy green vegetables, tomatoes, oranges, potatoes, and bananas. Lean meat, pulses, chocolate, coffee, and milk are also rich in the mineral. Many methods of food processing may lower the potassium levels found in fresh food.

## Normal daily requirement

The recommended daily amount (RDA) for potassium are: 0.8g (birth–3 months); 0.85g (4–6 months); 0.7g (7–12 months); 0.8g (1–3 years); 1.1g (4–6 years); 2g (7–10 years); 3.1g (11–14 years); 3.5g (15 years and over). There are no extra requirements in pregnancy or breast-feeding.

## When supplements are helpful

Most diets contain adequate amounts of potassium, and supplements are rarely required in normal circumstances. However, people who drink large amounts of alcohol or eat lots of salty foods may become marginally deficient. People with a condition called diabetic ketoacidosis or with certain types of kidney disease may be deficient in potassium, but the most common cause is prolonged treatment with diuretics. Long-term use of corticosteroids may also deplete the body's potassium. Prolonged vomiting and diarrhoea also cause potassium deficiency, so people who abuse laxatives may be affected. Supplements are usually advised only when symptoms suggest deficiency, or for people at particular risk.

## Symptoms of deficiency

Early symptoms of potassium deficiency may include muscle weakness, fatigue, dizziness, and mental confusion. Impairment of nerve and muscle function may progress to cause disturbances of the heart rhythm and paralysis of the skeletal muscles and those of the bowel, which leads to constipation.

## Dosage range for treating deficiency

Depends on the preparation, the individual, and the cause and severity of deficiency. In general, daily doses equivalent to 2–4g of potassium chloride are given to prevent deficiency (for example, in people treated with diuretics that deplete potassium). Doses equivalent to 3.0–7.2g of potassium chloride daily are used to treat deficiency.

## Symptoms and risks of excessive intake

Blood potassium levels are normally regulated by the kidneys, and any excess is rapidly eliminated in the urine. Massive doses cause serious disturbances of the heart rhythm and muscular paralysis. In people with impaired kidney function, excess potassium may build up and the risk of potassium poisoning is increased. People on haemodialysis treatment need to take a carefully controlled low-potassium diet.