BIOTIN

Other names Coenzyme R, vitamin H

Availability
Biotin is available without a prescription, alone and in a wide variety of multivitamin and mineral preparations.

Actions on the body
Biotin plays a vital role in the activities of several enzymes. It is essential for the breakdown of carbohydrates and fatty acids in the diet for conversion into energy, for the manufacture of fats, and for excretion of the products of protein breakdown. People with Type 2 diabetes often have low levels of biotin, and supplements may help to control blood sugar levels.

Dietary and other natural sources
Traces of biotin are present in a wide variety of foods. Dietary sources rich in this vitamin include liver, nuts, peas, beans, egg yolks, cauliflower, and mushrooms. A large proportion of the biotin we require is manufactured by bacteria in the intestine.

Normal daily requirement
A recommended daily amount (RDA) has not been established, but a daily dietary intake of 10–200mcg is safe.

When supplements are helpful
Adequate amounts of biotin are provided in most diets and by the bacteria living in the intestine, so supplements are rarely needed. However, deficiency can occur with prolonged, excessive consumption of raw egg whites (as in eggnogs), because these contain a protein – avidin – that prevents absorption of the vitamin in the intestine. The risk of deficiency is also increased during long-term treatment with antibiotics or sulphonamide antibacterial drugs, which may destroy the biotin-producing bacteria in the intestine. However, additional biotin is not usually necessary with a balanced diet.

Symptoms of deficiency
Deficiency symptoms include weakness, tiredness, dry skin, poor appetite, hair loss, and depression. Severe deficiency is rare but may cause eczema of the face and body, and inflammation of the tongue.

Dosage range for treating deficiency
Depends on the individual and on the nature and severity of the disorder. Dietary deficiency can be treated with doses of 150–300mcg of biotin daily. Deficiency of biotin resulting from a genetic defect that limits use of the vitamin by body cells can be treated with very large doses of 5mg given once or twice daily.

Symptoms and risks of excessive intake
None known.

CALCIUM

Other names Calcium carbonate, calcium chloride, calcium citrate, calcium glubionate, calcium gluceptate, calcium gluconate, calcium lactate, calcium phosphate

Availability
Oral forms are available without a prescription. Injectable forms of calcium are available only under medical supervision.

Actions on the body
The most abundant mineral in the body, calcium makes up more than 90 per cent of the hard matter in bones and teeth. It is essential for the formation and maintenance of strong bones and healthy teeth, as well as blood clotting, transmission of nerve impulses, and muscle contraction.

Dietary and other natural sources
The main dietary sources of calcium are milk and dairy products, sardines, dark green leafy vegetables, beans, peas, and nuts. Calcium is also present in drinking water in hard water areas.

Normal daily requirement
The recommended daily amounts (RDA) for calcium are: 525mg (birth–1 year); 350mg (1–3 years); 450mg (4–6 years); 550mg (7–10 years); 1,000mg (males aged 11–18 years); 800mg (females aged 11–18 years); and 700mg (19 years and older). Daily requirements of calcium do not increase markedly during pregnancy, but rise by 550mg during breast-feeding.

When supplements are helpful
Unless a sufficient amount of dairy products is consumed (a pint of milk contains approximately 600mg) the diet may not contain enough calcium, and supplements may be needed. Breast-feeding women are especially vulnerable to calcium deficiency because breast-feeding demands large amounts of calcium, which may be extracted from the skeleton if intake is not adequate. Osteoporosis (fragile bones) has been linked to dietary calcium deficiency in some cases, but may not be helped by supplements in all women. Hormone replacement therapy or other treatment is usually necessary (see Drugs for bone disorders, p.80).

Symptoms of deficiency
When dietary intake is inadequate, the body obtains the calcium it needs from the skeleton. Long-term deficiency of calcium may lead to increased fragility of the bones. Low levels of calcium in the blood cause abnormal stimulation of the nervous system, resulting in cramp-like spasms in the hands, feet, and face. Vitamin D deficiency is the main cause of the bone-softening diseases rickets and osteomalacia.

Dosage range for treating deficiency
Vitamin D is needed for treatment of rickets and osteomalacia (p.80), but oral supplements of calcium of up to 800mg daily may be advised for children with rickets, and 1,000mg or more daily may be given for osteoporosis and osteomalacia. Low blood calcium levels are treated in hospital by intravenous injection of calcium.

Symptoms and risks of excessive intake
Excessive intake of calcium may reduce the amount of iron and zinc absorbed and may also cause constipation, confusion, and nausea. There is an increased risk of palpitations and, for susceptible people, of calcium deposits in the kidneys leading to kidney stones and kidney damage. These symptoms do not usually develop unless calcium is taken with large amounts of vitamin D.