

Overview of the main dietary minerals

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USFDA defines dietary supplements in part as product taken by mouth that contain a “ dietary ingredients”. Dietary ingredients comprise vitamins, minerals, amino acids and herbs or botanicals, in addition to other substances that can be considered to supplement the diet. Market is flooded with various dosage forms of dietary supplements such as capsules, tablets, powders, energy bars, liquids etc. These include:

1. Vitamins and minerals
2. Herbal Products containing extracts from herbs as well as algae and fungi
3. Enzyme supplements
4. Essential amino and fatty acids.

Mineral includes inorganic nutrients. They are substances present in our diet and are required for proper growth and development. Commonly known minerals essential for human beings include water, sodium, potassium, chloride, calcium, phosphate, sulfate, magnesium, iron, copper, zinc, manganese, iodine, selenium and molybdenum and cobalt. Some of the minerals such as chromium, boron and other inorganic elements are also considered to be nutrients but their role is still to be investigated. These minerals are required for proper functioning of the body, building strong bones and teeth and for regulating various metabolic processes.

Sulfur

Sulfur is a chemical element that is naturally present in the body. It is necessary for the synthesis of essential amino acids which contain sulfur like cysteine and methionine. It is the third most important mineral in the body

after calcium and phosphorus. It helps maintains the elasticity of skin maintaining the shape of muscles, skin and bones.

Daily Requirement: There is no recommended daily allowance (RDA) for sulfur. However, RDA for methionine (combined with cysteine) is approximately 14mg/kg. body wt. /day.

Deficiency: Sulfur deficiency causes arthritis, weak nails, hair fall, convulsions, memory impairment and fatigue. Inadequate sulfur may lead to mental as well as skeletal impairment.

Dietary Sources: Sulfur is found in almost all protein sources, but the best source of sulfur includes meat, fishes, garlic, onions, sprouted grams, egg, milk and cabbages. Seaweeds, turnip, kale and nuts also contain sulfur.

Potassium

Mineral potassium is considered crucial for sustenance of life. It is involved in normal physiological functioning of organs particularly heart and kidney.

Daily requirement: In an adult the requirement of potassium is 4. 7g/day but increases in lactating mother to about 5. 1mg/kg.

Deficiency: Deficiency of potassium is evident by weakness and fatigue because potassium regulates contraction of muscles. In addition to weakness it will cause cramps and spasm of muscles. Many digestive problems particularly related to churning of food arise apart from bloating and constipation. Other deficiency symptoms include palpitation, tingling and numbness, breathing difficulties, mood swings and depression.

Dietary sources: Bananas, avocados, nuts like peanuts and almonds, citrus fruits, green leafy vegetables, milk and potatoes are rich sources of potassium.

Copper

Copper is essential trace mineral found in all body tissues and plays a role in erythrocyte maturation. It also regulates nerve cells and immune system. It is involved in collagen formation and absorption of iron. Copper is mostly found in liver, brain, kidney, heart and skeletal muscles.

Daily Requirement: The RDA for copper is around 900µg/day for adults.

Deficiency: Although deficiency of copper is rare, but it can occur in individuals having genetic defects in copper metabolism or its absorption. High intake of Zinc and vitamin C also induces copper deficiency as these compete with copper for absorption in intestine. The copper deficiency leads to anemia, loss of skin pigmentation, fractures, hypothermia and osteoporosis.

Dietary Sources: Oysters, green leafy vegetables, whole grains, beans, potatoes, dried fruits, black peppers, meat, cashews and almonds are rich sources of copper.

Molybdenum

Molybdenum is an essential mineral in the body which is present in soil and gets transferred to our diet when we consume plants. It is vital for many processes in body as it acts as a cofactor for importance enzymes like sulfite oxidase, xanthine oxidase and mitochondrial amidoxine reducing

component. Xanthine oxidase is an important enzyme involved in metabolism of purines and conversion of xanthine into uric acid.

Daily requirement: RDA for children up to 8 yrs is suggested to be 22µg/day and in adults it is approximately 45µg/day. Pregnant and breast feeding women require 50µg/day.

Deficiency: Molybdenum cofactor deficiency causes brain abnormalities, developmental delays and can also lead to death of infants. In northern china the occurrence of esophageal cancers has been linked to low molybdenum content in the soils.

Food sources: leguminous plants like beans, lentils and peas are the richest source of molybdenum. It is also present in minute quantities in animal products, fruits and vegetables. The molybdenum content of plants depends on the soil molybdenum content.

Calcium

Calcium is the most important and abundant mineral found in the body. Most of the calcium is present in bones and teeth. It is also present in nerve cells, blood, body tissues and body fluids. It is important for maintaining healthy bones and teeth. It regulates blood clotting, nerve signals, hormonal secretions and heart rate. It is also involved in muscular movements.

Daily Requirement: Calcium needs vary with age and gender. For men and women under 18 years the RDA is 1.3g/day and above 18 to 50 yrs it is 1g/day. In pregnant and breast feeding mothers it is 1.3g/day.

Deficiency: Calcium deficiency is known as hypocalcaemia and results in increased risk of disorders like osteoporosis and osteopenia. Hypocalcaemia results from poor intake of calcium in diet during childhood or its decreased absorption or storage. Children suffering from hypocalcaemia cannot attain full potential height as adults. Hypocalcaemia may also arise in women due to hormonal changes particularly after menopause (due to decrease in estrogen levels). It is also linked to genetic factors. Other important cause of calcium deficiency includes low levels of vitamin D, medications like anti-epileptics, pancreatitis, renal failure, chemotherapeutic drugs, septic shock and hyperphosphatemia. Symptoms of hypocalcaemia includes confusion, memory loss, muscle spasms, depression, numbness in hands, feet and face, muscle cramps, easy fracture bones and brittle nails.

Dietary Sources: Milk, yogurt, cheese and other dairy products are the richest source of calcium. In addition to this kale, broccoli, fishes, cabbages and green leafy vegetables, tofu, cereals, juices also contain high calcium levels.

Cobalt

Cobalt is necessary for synthesis and is an integral part of vitamin B12. This is the reason vitamin B12 is called Cobalamine. Cobalt has same functions as vitamin B12 in human body i. e. production of red blood cells. It also participates in Krebs cycle regulating metabolism and energy requirement.

Daily Requirement: In infants upto 6 months, the RDA is 0. 4µg/day while in children from 7-12 yrs it is 0. 5µg/day. In adolescent and adults the RDA is 2.

4µg/day. WHO has recommended a 2. 4µg of vitamin B12 is equivalent to 0. 1µg of cobalt.

Deficiency: Symptoms of cobalt deficiency includes anemia particularly macrocytic or megaloblastic anemia as evident by fatigue and weakness, weight loss, appetite loss, disturbances in thyroid function and roughness of hair.

Dietary Sources: Chocolates contain highest amount of cobalt. The major sources of cobalt include organ meat, egg and milk. It is also present in green leafy vegetables, coffee and nuts.