

Minerals in Human Nutrition

Role of Minerals in Human Nutrition

Calcium

Is present mainly as hydroxyapatite in bones and teeth with phosphorus at a ratio of 2:1, it reduces neuromuscular excitation, important for heart conduction system, essential for blood coagulation system and prevention of colorectal carcinoma.

The richest **sources** are milk and dairy products, also leafy green vegetables, pulses and salmon.

Deficiency results in osteomalacia, osteoporosis, rickets, increased neuromuscular irritability, tachycardia, increased blood clotting and increased carcinoma of colon.

Excess intake results in renal insufficiency, vascular and soft tissue calcification, hypercalciuria and kidney stones. Children need 2-4 times more calcium per kg body weight than adults, higher intake recommended during preadolescence, puberty, pregnancy, lactation.

Requirement- 800mg/day.^[1]

Phosphorus

Together with calcium it forms phospholipids, phosphoproteins, nucleic acids, enzymes and macroergic bonds (ATP). Its best **source** is milk, dairy products, egg yolks and pulses.

Its **deficiency** is very rare but secondary deficiency may be due to use of antacids.

Excess increases the risk of osteoporosis. With advanced age renal function declines, and high phosphate intake can increase risk of bone demineralisation.

Requirement: Infants 400mg, children 900-1200mg, pregnant women 1500mg, lactating women 1800mg/ day^[1].

Magnesium

Role in all biosynthetic processes: glycolysis, formation of cyclic AMP, energy dependant membrane transport and transmission of the genetic code. Activates more than 300 enzymes. Reduces neuromuscular excitation and effects protein, nucleic acid and cholesterol synthesis. Best dietary source is chlorophyll (green plants, pulses, nuts).

No **deficiency** in people consuming natural diets.

Excess causes diarrhea and bradycardia.

Requirement Infants 10mg/kg, children 250mg, adults 350mg, pregnant and lactating women 450mg^[1].

Sodium

Role in osmotic pressure, acid base balance, acid and nerve irritability.

Source - table salt and salty food, also meat, eggs, meat.

Deficiency - hyponatremia (<145mmol/l), muscle weakness, paralysis and impaired heart function.

Excess intake leads to hypernatremia e.g. from dehydration or kidney failure.

Requirement: Salt (NaCl) intake should not exceed 6g/day^[1].

Potassium

Essential for muscle activity, particularly of heart.

Source - soya, beans, apricot, potato, tomato, carrot, banana.

Deficiency - develops after vomiting, diarrhoea, perspiration, high protein diet - irritability, muscle weakness, tachycardia.

Excess - dehydration, shock with decrease urinary output - inhibited cardiac activity, weakness, pins and needles in legs, confusion, difficulty breathing and speaking, nausea.

Requirement - children 0.5- 4.5g, adults 1.8-5.6g.^[1]

Sulphur

Sulphur is a component of amino acids such as methionine and cysteine, it plays a role in the detoxification process as a component of glutathione. It is found in protein foods and its deficiency does not occur.

Links

Related articles

- Trace Elements in Human Nutrition
- Food Contaminants

References

1. LENER, J, et al. *Medical hygiene*. 1. edition. Prague : Karolinum, 1997. ISBN 80-7184-260-5.

Bibliography

- BENCKO, Vladimír, et al. *Hygiene and epidemiology : selected chapters*. 2. edition. Prague. 2008. ISBN 80-246-0793-X.
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