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MEDICAL BIOCHEMISTRY

1. OUTLINE THE TOXICITY VALUES AND DEFICIENCY MANIFESTATIONS OF THE FOLLOWING MINERALS
2. Potassium

Toxicity value: blood potassium level higher than 6.0mmol/L can be dangerous and usually requires immediate treatment

Deficiency: potassium deficiency also known as hypokalemia, is a rare condition and typically occurs because of excessive losses of potassium from the body rather than from inadequate potassium intake. Hypokalemia appears to be the most common source of electrolyte imbalance. The major cause of low potassium is the use of diuretics. Prolonged use of laxatives and steroid medications may also lead to potassium deficiency. In addition, diarrhea, vomiting and severe dehydration often cause a rapid loss of potassium. Other conditions associated with potassium deficiency include eating disorders, low-calorie diets, kidney disorders, alcoholism, diabetic acidosis and colon polyps.

Symptoms of low potassium; usually include fatigue , appetite loss, nausea, muscle cramps and muscle weakness, and irregular heart beats or decreased heart rate. The most severe cases of hypokalemia can be fatal.

1. Calcium

Toxicity value: 2.63mmol/L or 10.5mg/dl

Deficiency: because of the high amount of calcium in bones, deficiency is rare. Hypocalcemia(low serum calcium levels in blood) can result in tetany( involuntary muscle contractions). In addition, calcium deficiency in children can lead to rickets which is a vitamin d deficiency. While not a deficiency, low calcium intake can lead to decreased bone mineral density and the conditions osteopenia and osteoporosis.

1. Magnesium

Toxicity value: magnesium toxicity usually develops after serum concentrations exceed 1.74-2.61mmol/L

Deficiency: nausea, vomiting, loss of appetite, fatigue, weakness, hypocalcemia, hypokalamia, numbness and tingling in the extremities, cramps and muscle contractions, seizures, abnormal heart rhythms, coronary spasms.

1. Chloride

Toxicity value: Chlorine levels up to 4 milligrams per liter (mg/L or 4 parts per million (ppm) are considered safe in drinking water. At this levelExternal , no harmful health effects are likely to occur.

Deficiency: excessive fatigue, muscle weakness, breathing problems, frequent vomiting, prolonged diahrrea, excessive thirst, high blood pressure.

1. Iron

Toxicity value:Toxic effects begin to occur at doses above 10–20 mg/kg of elemental iron. Ingestions of more than 50 mg/kg of elemental iron are associated with severe toxicity. In terms of blood values, iron levels above 350–500 μg/dL are considered toxic, and levels over 1000 μg/dL indicate severe iron poisoning.

Deficiency:

Eyes: Blue sclera (sclera is a tough fibrous tissue that covers the white of the eye, blue sclera has an abnormal degree of blueness).Immune system: Reduced resistance to infection.Nervous/muscular systems: Reduced work productivity, reduced physical fitness, weakness, fatigue, impaired cognitive function, reduced learning ability, increased distractibility, impaired reactivity and coordination.Skin: Itching, pale nail beds and palm creases, concave nails, hair loss, impaired wound healing.General: Reduced resistance to cold, inability to regulate body temperature, pica (clay eating and ice eating).

If absorption cannot compensate for losses or low dietary intakes, and body stores are used up, then iron deficiency sets in. Because so much of the body’s iron is in the blood, iron losses are greatest whenever blood is lost. Bleeding from any site incurs iron losses. Active bleeding ulcers, menstruation and injury result in iron losses.

Women are especially prone to iron deficiency during their reproductive years because of repeated blood losses during menstruation. Pregnancy places iron demands on women as well because iron is needed to support the added blood volume, the growth of the fetus and blood loss during childbirth. Infants and young children receive little iron from their high milk diets, yet extra iron is needed to support their rapid growth. The rapid growth of adolescence, especially for males, and the menstrual losses of teen females demand extra iron that a typical teen diet may not provide.