MINERALS

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Mineral nutrients are inorganic elements found in food which the body cannot synthesis.

Mineral nutrients are essential and vital components of all living cells and are involved in the metabolism of the body.

About 4% of the weight of the human body.

Group of minerals.

- Macro minerals
  - required in larger quantities (generally more than 50mg per kg of the body weight).

- Trace elements or micro minerals
  - needed in smaller quantities (less than 50mg per kg of the body weight).
INTRODUCTION

• Mineral nutrients for many functions
  - composition of body substances (bones, muscles)
  - maintenance of enzymatic activities

• Major minerals (7) : larger amounts in the body.
  - Calcium
  - Phosphorus
  - Potassium (kalium)
  - Sulfur
  - Sodium (natrium)
  - Chloride
  - Magnesium

• Trace minerals (6) : requires the trace minerals in small quantities.
  - Iron
  - Zinc
  - Copper
  - Manganese
  - Iodine
  - Selenium
The role of mineral nutrients

- Mineral nutrients are components of the skeleton and teeth. They strengthen the bones.

- Mineral nutrients, in a dissolved form as electrolytes, influence vital characteristics of the bodily fluids e.g. maintenance of the osmotic pressure.

- Mineral nutrients are essential elements of organic bonds in the body.
  - Iodine is an element of the thyroid gland
  - Cobalt from vitamin B12
  - Iron from hemoglobin
Foods usually provide more sodium than the body needs.

**Sodium, potassium, and chloride** are the body's electrolytes
- exist in ion form in the fluids of the body.

Role of sodium
- Sodium is principal *cation in extracellular fluid*.
- Helping regulate fluid volume in the body
- Sodium helps to maintain acid-base balance
- Playing essential role to nerve transmission and muscle contraction.
Fluids are found within the cells (intracellular) or outside the cells (extracellular). Extracellular fluids include plasma (the fluid portion of blood in the intravascular spaces of blood vessels) and interstitial fluids (the tissue fluid that fills the intercellular spaces between the cells).
Body fluid that is not contained in cells. It is found in blood, in lymph, in and channels of the brain and spinal cord, and in muscular and other body tissues.

High concentration of sodium and low concentration of potassium.
SODIUM

- **Sodium recommendations**
  - minimum sodium requirement for adults is set at 500 mg

- **Common food sources**
  - Processed foods are the primary sources.
    - meats and vegetable juices
    - cereals, salad dressings, and baked goods,
    - sodium present in local water supplies

- **Percent sodium in diets**
  - 75% of sodium comes from salt added to foods by manufacturers
  - 15% from salt added in cooking and at the table
  - 10% comes from the natural content in foods.
SODIUM AND HYPERTENSION

- High sodium intake was primary factor responsible for high blood pressure.
- Salt (sodium chloride) has a greater effect on blood pressure than either sodium or chloride alone.
- People have a salt sensitivity include
  - Chronic renal disease,
  - Diabetes
  - Hypertension
  - Overweight people over 50 years old.
• Potassium is a positively charged ion

• Potassium is the body’s principal caution inside the body cells (intracellular- fluid within the cell).

• Potassium roles in the body:
  - Maintain fluid and electrolyte balance and cell integrity.
  - Potassium also affects nerve transmission and muscle contraction.
  - Help in many chemical reactions in the body, helps protect the body's cells, and has an effect on your heartbeat.
• **Recommendation**
  - There is no RDA for potassium. Adult minimum requirement is 2,000 mg/day.

• **Common food sources**
  - Fresh foods contain potassium.
    - milk and yogurt; meat, fish, and poultry; potatoes and other vegetables; whole-grain foods and legumes; coffee; and bananas, citrus juices, and other fruits.
• 99% of body’s calcium is in the bones and teeth

• Play important roles:
  
  – Integral part of bone structure (calcium bank)
  – Plays a critical role in brain function
  – Nervous system
  – Blood clotting
  – Muscle contraction
Absorption
- Adults about 30% of the calcium they ingest.
- Pregnant woman – 50%,
- Growing children – 50-60%.

Calcium sources
- Milk and milk products
- Cheese or yogurt.
- Vegetables, fruits or canned seafood and beans

Calcium deficiency
- Osteoporosis
  - A condition of older persons in which the bone become porous and fragile due to loss of minerals. Also called adult bone loss.
• **Body iron found in two proteins**
  - Hemoglobin (in red blood cells)
  - Myoglobin (in the muscle cells).

• **Roles of iron**
  - Carry and release oxygen.
  - Involved in the making of amino acids, collagen, hormones and neurotransmitters.

• **Iron absorption**
  - **heme iron**: found only in foods derived from the animals
  - **non-heme iron**: is found in both plant-derived and animal-derived foods.
  - Heme iron well absorbed that it contributes significant iron absorb -25% of heme iron is absorbed.
  - 10% non-heme iron is absorbed.
• Iron deficiency anemia (IDA).

• Vulnerable stages of life
  
  – Women during reproductive years - blood losses during menstruation.
  – Pregnancy
  – Infants, young children, adolescence receive little iron from their diets. Need extra iron to support their rapid growth.
  – Blood losses
    • Bleeding
      – Ulcer and parasitic infection of the GI tract. People donates blood regularly also incur losses.

• Need iron supplement.
• Men : 8 mg
• Women : 18 mg
• Average receive 12-13 mg/day.

• Sources
  - Rich in meat, fish and poultry, legumes and eggs.
  - Wholegrain and enriched breads and cereals provide more iron.
  - Broccoli and some fruits (dry) contribute some iron.
Roles of Iodine
- an integral part of thyroid hormone
- regulates body temperature
- metabolic rate
- reproduction,
- growth
- blood cell production
- nerve and muscle function

Iodine deficiency
- Goiter. Most have goiter because over consume plants of the cabbage family and other foods that contain anti thyroid substance (goitrogen).
- Pregnancy women, it impairs fetal development, causing cretinism.

Iodine toxicity
- Can enlarge the thyroid gland, damaging to the development of infants (during pregnancy).
A condition of severely stunted physical growth and mental development due to untreated congenital deficiency of thyroid hormones (hypothyroidism) or from prolonged nutritional deficiency of iodine.
• Seafood and plants that grown near the sea.

• The recommended intake of iodine for adults is a small amount.

• Can easily met by consuming seafood, vegetables grown in iodine-rich soil, and iodized salt.