



Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

MINERAL NUTRITION



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

MINERALS

- Inorganic substances that are classified as macro and micronutrients based on the amount needed by humans/day
- Macro minerals are vital to health and that are required in the diet by >100 mg/day and those by < 20 mg/day are micro-minerals
- **Essential** macro minerals are calcium, sodium, phosphorus, magnesium, sulphur, potassium, and chloride
 - Important micro minerals are iron, zinc, copper, cobalt, fluoride, manganese, chromium, iodine, and molybdenum



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Mineral	Function	Sources
Na	Required for fluid balance, nerve transmission, muscle contraction	Table salt, vegetables, processed meat, bread
Cl	Fluid balance	Table salt, processed meat, soy sauce, milk
K	Proper fluid balance, nerve transmission, muscle contraction	Whole grains, legumes, milk, fruits & vegetables
Ca	Required for healthy bones and teeth, immune system health, nerve functioning, blood pressure regulation	Milk & milk products, canned fish with bones, fortified soy and tofu, greens – broccoli
P	Required for maintaining acid-base balance, healthy bones	Meat, fish, and poultry, eggs, milk
Mg	Needed for making protein, muscle contraction	Nuts and seeds, legumes, leafy green vegetables
Sulfur	Present in protein molecules	Eggs, meat, milk, legumes, nuts



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Calcium and phosphorus

- Ca and P are present in the ratio of 2:1
- In skeletal system Ca and P are present in the form of hydroxyapatite (is a compound made of Ca and P that is deposited into the bone matrix to give rigidity) crystals
- **Functions of Ca** – Bone formation and proper calcification of bone
 - Tooth formation
 - Ca is essential for clotting of blood
 - Ca regulates permeability of the capillary walls and ion transport across cell membrane
 - Essential for contraction of heart and skeletal muscle



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

- Ca acts as an activator for enzymes renin and pancreatic lipase
- **Functions of P:** essential for the storage and release of ATP molecules
 - Phosphatases play an important role as buffers
 - Phospholipids are major components of cell membrane and intra cellular organelles
 - Phosphate is an essential part of DNA and RNA
- **Food Sources** – ragi, gingelly seeds, cumin seeds, drumstick leaves, milk and milk products, whole bengal gram
- Only 20-30% of Ca and P is absorbed and is facilitated by vitamin D



Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

Ca and P - Requirements

- Adult – 400, pregnant woman – 1000, children 0-15 years – 400-600 mg/day
- **Deficiency** – osteoporosis is a condition found primarily among middle aged and elderly woman (poor absorption and utilization, dietary inadequacy, decreased levels of oestrogen) where the bone mass of the skeleton is diminished
- Hyper parathyroidism
- Vitamin D deficiency
- Tetany – occurs when calcium in the blood drops below the critical level



Centurion
UNIVERSITY
*Shaping Lives...
Empowering Communities...*

MICROMINERALS

- Also known as trace elements
- Iron – total body iron is 4g in adults, exists in a complex form in our body, present as:
 - Iron porphyrin compounds – haemoglobin in RBC, myoglobin in muscle
 - Enzymes – peroxidases, cytochrome oxidase, succinase dehydrogenase
 - Transport and storage forms – transferrin and ferritin
- **Food Sources** – Heme iron (absorbed and utilized better) is obtained from animal tissues, and non-heme from plant foods – ragi, green leafy, jaggery, dried fruits, dates, enriched and fortified cereals and breads



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

Iron

- **Functions** – Iron forms a part of the protein
 - Forms a part of myoglobin
 - As part of enzymes iron catalyses many reactions – conversion of beta carotene to active form of vitamin A
 - Synthesis of carnitine, purines, collagen
 - Detoxification of drugs in the liver
- Deficiency due to poor intake and absorption leads to nutritional anaemia – occurs when levels fall below 12 g/dl, condition that results from the inability to maintain a normal haemoglobin concentration



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

NUTRITIONAL ANAEMIA

- Defects in the structure, function of the epithelial tissues
- Paleness of skin and the inside of the lower eyelid is pale pink
- Finger nails become thin and flat and eventually spoon shaped (Koilonychia)
- If not treated leads to cardiovascular and respiratory changes leading to cardiac failure
- Symptoms include fatigue, breathlessness, palpitations, dimness of vision, susceptibility to infection