

WEEK FIVE

Minerals

Minerals are inorganic elements that originate in the earth and cannot be made in the body. They play important roles in various body functions

They are necessary to sustain life and maintain optimal health, and thus are essential **nutrients**.

Most of the minerals in the human **diet** come directly from plants and water, or indirectly from animals.

However, the mineral content of water and plant foods varies geographically because of variations in the mineral content of soil from region to region.

The amount of minerals present in the body, and their **metabolic** roles, varies considerably.

Minerals provide structure to bones and teeth and participate in **energy** production, the building of **protein**, blood formation, and several other metabolic processes.

Minerals are categorized into **major** and **trace** minerals, depending on the amount needed per day.

Major minerals are those that are required in the amounts of 100 mg (milligrams) or more per day while trace minerals are required in amounts less than 100 mg per day.

The terms *major* and *trace*, however, do not reflect the importance of a mineral in maintaining health, as a deficiency of either can be harmful.

Some body processes require several minerals to work together. For example, **calcium**, magnesium, and **phosphorus** are all important for the formation and maintenance of healthy bones.

Some minerals compete with each other for **absorption**, and they interact with other nutrients as well, which can affect their **bioavailability**.

Mineral Bioavailability

The degree to which the amount of an ingested nutrient is absorbed and available to the body is called bioavailability.

Mineral bioavailability depends on several factors:

Higher absorption occurs among individuals who are deficient in a mineral, while some elements in the diet (e.g., oxalic acid or oxalate in spinach) can decrease mineral availability by chemically binding to the mineral.

In addition, excess intake of one mineral can influence the absorption and metabolism of other minerals. For example, the presence of a large amount of **zinc** in the diet decreases the absorption of **iron** and **copper**.

On the other hand, the presence of **vitamins** in a meal enhances the absorption of some minerals in the meal. For example, **vitamin C** improves iron absorption, and **vitamin D** aids in the absorption of calcium, phosphorous, and magnesium.

In general, minerals from animal sources are absorbed better than those from plant sources. This is because minerals are present in forms that are readily absorbed and binders that inhibit absorption, such as **phytates**, are absent.

Major Minerals

The major minerals present in the body include:

Sodium,

Potassium,

Chloride,

Calcium,

Magnesium,

Phosphorus,

and Sulphur.

Functions

The fluid balance in the body that is vital for all life processes, is maintained largely by sodium, potassium, and chloride.

Fluid balance is regulated by charged sodium and chloride ions in the extracellular fluid (outside the cell) and potassium in the intracellular fluid (inside the cell), and by some other **electrolytes** across cell membranes.

Sodium plays an important role in the absorption of other nutrients, such as **glucose**, **amino acids**, and water.

Chloride is a component of hydrochloric acid, an important part of **gastric** juice (an acidic liquid secreted by glands in the stomach lining) and aids in food digestion.

Potassium and sodium act as cofactors for certain **enzymes**.

Calcium, magnesium, and phosphorus are known for their structural roles, as they are essential for the development and maintenance of bones and teeth.

They are also needed for maintaining cell membranes and connective tissue.

Several enzymes, **hormones**, and proteins that regulate energy and **fat** metabolism require calcium, magnesium and/or phosphorus to become active.

Calcium also aids in **blood clotting**. Sulphur is a key component of various proteins and vitamins and participates in drug-detoxifying pathways in the body.