WEEK SIX

TOXICITY

Toxicity from excessive dietary intake of major minerals rarely occurs in healthy individuals.
Kidneys that are functioning normally can regulate mineral concentrations in the body by excreting the excess amounts in urine.
Toxicity symptoms from excess intakes are more likely to appear with **acute** or chronic kidney failure.
Sodium and chloride toxicity can develop due to low intake or excess loss of water.

Accumulation of excess potassium in **plasma** may result from the use of potassium-sparing diuretics (medications used to treat high blood pressure, which increase urine production, excreting sodium but not potassium)
Magnesium intake from foods has no adverse effects, but a high intake from supplements when kidney function is limited increases the risk of toxicity.
The most serious complication of potassium or magnesium toxicity is cardiac arrest.
Adverse effects from excess calcium have been reported only with consumption of large quantities of supplements.
Phosphate toxicity can occur due to absorption from phosphate salts taken by mouth or in **enemas**.

Trace Minerals

Trace minerals are present (and required) in very small amounts in the body.
The most important trace minerals are iron, zinc, copper, chromium, fluoride, iodine, selenium, manganese, and molybdenum.
Some others, such as arsenic, boron, cobalt, nickel, silicon, and vanadium, are recognized as essential for some animals.
While others, such as barium, bromine, cadmium, gold, silver, and aluminum, are found in the body, though little is known about their role in health.

Functions of Trace Minerals

Trace minerals have specific **biological** functions.

They are essential in the absorption and utilization of many nutrients and aid enzymes and hormones in activities that are vital to life.

Iron plays a major role in **oxygen** transport and storage and is a component of **hemoglobin** in red blood cells and **myoglobin** in muscle cells.

Cellular energy production requires many trace minerals, including iron, copper, and zinc, which act as enzyme cofactors in the synthesis of many proteins, hormones, neurotransmitters, and genetic material.

Iron and zinc support immune function, while chromium and zinc aid insulin action.

Zinc is also essential for many other bodily functions, such as growth, development of sexual organs, and reproduction.

Zinc, copper and selenium prevent **oxidative** damage to cells.

Fluoride stabilizes bone mineral and hardens tooth enamel, thus increasing resistance to tooth decay.

Iodine is essential for normal thyroid function, which is critical for many aspects of growth and development, particularly brain development.

Thus, trace minerals contribute to physical growth and mental development.

Role in disease prevention and treatment

In addition to clinical deficiency diseases such as anemia and goiter, research indicates that trace minerals play a role in the development, prevention, and treatment of chronic diseases.

Iron, zinc, copper, and selenium have been associated with immune response conditions.

Copper, chromium and selenium have been linked to the prevention of cardiovascular disease.

Excess iron in the body, on the other hand, can increase the risk of cardiovascular disease, liver and colorectal cancer, and neurodegenerative diseases such as Alzheimer's disease.

Chromium supplementation has been found to be beneficial in many studies of impaired glucose tolerance, a metabolic state between normal glucose regulation and diabetes.

Fluoride has been known to prevent dental **caries** and osteoporosis

While potassium iodide supplements taken immediately before or after exposure to radiation can decrease the risk of radiation-induced thyroid cancer.