

Major Elements & Uses in the Human Body

- Boron (B) – assists and improves retention of calcium, magnesium, and phosphorus; necessary for brain function, memory and alertness as well as for the activation of vitamin D.
- Calcium (Ca) – found mainly in bones and teeth – important for membrane function, nerve impulses, muscle contractions, and blood clotting.
- Carbon (C) – found in all organic molecules.
- Chlorine (Cl) – important for membrane function and water absorption; chloride is the major anion in body fluids and part of hydrochloric acid (HCl) in gastric juices.
- Chromium (Cr) – master regulator of insulin; potent metabolic hormone in the metabolism of proteins, carbohydrates, and fats; assists neurotransmitters; helps with the function of the brain, thyroid, and hormonal balance.
- Cobalt (Co) – a vital part of vitamin B12; stimulates numerous enzymes; helps build red blood cells and with iron absorption.
- Copper (Cu) – involved in the synthesis of hemoglobin, melanin, and elastin; an enzyme cofactor; part of some cytochromes in cell respiration; assists in phospholipid synthesis, protein metabolism, vitamin C oxidation, and the formation of RNA.
- Germanium (Ge) – helps activate various organs to attract more oxygen; expels harmful pollutants and pathogens from the body; helps maintain a strong immune system by assisting in the production of killer cells and T-suppressor cells; assists in electron transmissions.
- Hydrogen (H) – a component of water and most other compounds in the body.
- Iodine (I) – a major component of thyroid hormones (thyroxine and T3); necessary for the metabolism of fats and such minerals as calcium, silica, and phosphorus; essential for spleen, liver, and brain function; neutralizes albumin.
- Iron (Fe) – essential for oxygen transport and energy capture; component of hemoglobin, myoglobin, and cytochromes in cell respiration.
- Magnesium (Mg) – required for activation of several enzymes; vital for strong bones and teeth; essential for brain and liver function; calms nerves; promotes cell growth; increases tissue elasticity; necessary for metabolism of ATP-ADP.
- Manganese (Mn) – cofactor for some enzymes; because it is found with lecithin, it is involved in the synthesis of fatty acids and cholesterol; strengthens nerves and thought processes; element in body linings and connective tissues; helps with eyesight; enhances body's recuperative abilities and resistance to disease.
- Nitrogen (N) – found in proteins, nucleic acids, and other organic compounds; 78% of the air we breathe is nitrogen but only 21% oxygen.
- Oxygen (O) – a component of water and other compounds; oxygen gas is essential for respiration.
- Phosphorus (P) – found in the nucleus of every cell in the body (including white blood cells), nucleic acids, high-energy compounds, and phosphate buffer system; a major component of outer bone; combines with such elements as iron, potassium, sodium, magnesium and calcium; necessary for the reproductive system and sexual function; necessary for muscle tissue and growth; an essential nutrient for the nerves.
- Potassium (K) - important for proper membrane function, nerve impulses, and muscle contractions; major cation in cytoplasm; a primary electrolyte and alkalizer; attracts oxygen to tissues; helps eliminate toxins from the body.
- Selenium (Se) – a powerful antioxidant; vital to the immune system; major part of apoptosis (normal cell death in the body); helps maintain cell integrity; supports heart function; helps slow the aging process; delays oxidation of polyunsaturated fatty acids.
- Sodium (Na) – stored in stomach walls, joints, and gallbladder; helps prevent blood clotting; important for membrane function, nerve impulses, and muscle contractions; major cation in body fluids; contributes to the alkalinity of the lymph and blood; works with the bicarbonate buffer system in the digestive tract to prevent hydrochloric acid from burning stomach walls; helps retain calcium and cholesterol liquid in the body; helps with excretion of carbon dioxide (CO₂).
- Sulphur (S) – found in many amino acids as well as thiamine and biotin; necessary for developmental and neurological processes and for synthesis of collagen; detoxifies; increases blood circulation;

reduces muscle cramping and back pain; removes inflammation; assists in the healing of muscles; helps the liver produce choline; an important element in nerves and the myelin sheath; stimulates flow of bile; regulates heart and brain function; promotes healthy skin, nails, and hair; helps lubricate joints.

- **Zinc (Zn)** – is found in all body fluids, including urine as well as the moisture found in the eyes, mouth, lungs, and nose; a cofactor for enzyme function, especially carbonic anhydrase needed for carbon dioxide transport; part of peptidases needed for protein digestion; necessary for normal taste sensation; important in wound healing; a necessary part of DNA and for cell division and synthesis; necessary for hormone production and for the prostate gland; and a vital part of the immune system.

Fat-soluble vitamins:

- **A** – maintains epithelia; required for synthesis of visual pigments (rhodopsin); necessary for calcification of growing bones; promotes the growth and health of all body cells and tissues; deficiency causes problems with eyesight, especially night blindness as well as skin and reproductive problems.
- **D** (steroids including D3 or cholecalciferol) – required for normal bone growth, calcium and phosphorus absorption, and retention in kidneys; deficiency leads to rickets, osteoporosis, osteomalacia, muscle weakness, fibromyalgia, impaired balance, and depression.
- **E** (tocopherols) – antioxidant; prevents breakdown of Vitamin A, fatty acids, and cell membranes; contributes to wound healing; assists in detoxifying the liver; deficiency leads to nerve degeneration, especially in hands and feet; Crohn's disease; Cystic fibrosis; and low birth weight infants.
- **K** – essential for liver synthesis of prothrombin and other clotting factors; deficiency causes hypoprothrombinemia (abnormally low levels of prothrombin in the blood) leading to delayed blood clotting and excessive bleeding.

Water-soluble vitamins:

- **B1** (thiamine) – coenzyme; necessary in the formation of carbon dioxide in cell respiration; synthesis of pentose sugars and of acetylcholine; deficiency leads to tiredness, irritability, loss of appetite, sleep disturbances, heart failure, memory problems and in severe cases, beriberi.
- **B2** (riboflavin) – part of FAD, a hydrogen carrier in cell respiration; necessary for all cell energy; deficiency leads to chapped lips; sore tongue; poor vision; and photosensitivity.
- **Niacin** (nicotinic acid) – part of NAD, a hydrogen carrier in cell respiration; necessary for metabolism of fat for energy; deficiency interferes with nerve and digestive function, sex hormones, and healthy skin; severe deficiency causes pellagra with cracked skin, inflamed mouth and tongue and mental disturbances.
- **B5** (pantothenic acid) – part of acetyl-CoA; necessary for cell respiration; required to utilize energy from amino acid and fatty acid metabolism; deficiency leads to fatigue, headaches, nausea, abdominal pain, tingling, cramps, and greater risk of lung infections.
- **B6** (pyridoxine) – coenzyme in amino acid and lipid metabolism; for synthesis of nucleic acids and antibodies; deficiency leads to weakness, depression, inflamed mouth and tongue, cracked lips and seizures in infants.
- **Folacin** (folic acid) – coenzyme in amino acid and nucleic acid metabolism. deficiency of folic acid interferes with the genetic material in the cell, causes anemia and interferes with the functioning of the nervous system.
- **B12** (cobalamin) – coenzyme in nucleic acid metabolism; needed by amino acids for energy; catalyst for various enzymes; deficiency leads to pernicious anemia.
- **Biotin** – coenzyme for synthesis of nucleic acids; for fatty acid and amino acid metabolism; for excretion of protein wastes; deficiency leads to weakness, poor appetite, hair loss, depression, sore tongue, and eczema.
- **C** (ascorbic acid) – coenzyme; antioxidant; delivers hydrogen ions; collagen formation (especially in wound healing); metabolism of amino acids; absorption of iron; deficiency leads to frequent colds or illnesses; poor wound healing; and in severe cases, scurvy.