Micronutrients

- Vitamins
- Mineral & trace elements
- Other Nutrients



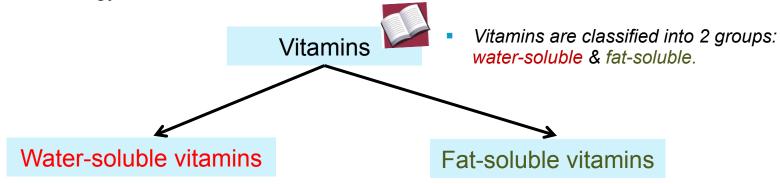






Vitamins are classified as water-soluble or fat-soluble

- Vitamins are needed in small amounts by the body, yet they are essential for good health.
- They serve as cofactors for metabolic reactions & energy utilization. However, vitamins do not provide energy.



- Water-soluble vitamins include the B vitamins complex family and vitamin C
 - B complex family includes mainly:
 Thiamine (vitamin B₁), riboflavin (vitamin B₂), niacin, vitamin B₆, vitamin B₁₂, folic acid, biotin & pantothenic acid.
- Fat-soluble vitamins include vitamins A, D, E & K₁

Metabolism:

 The excess of water-soluble vitamins is excreted in the urine, while an excess intake of fat-soluble vitamins is potentially more toxic since they are stored in the body.



Vitamins – General functions

Water-soluble vitamins:

- Thiamine is part of a coenzyme needed to oxidize carbohydrates.
- Riboflavin is a part of enzymes and coenzymes needed to oxidize glucose & fatty acids. Riboflavin is also utilized for cellular growth.
- Niacin is necessary to oxidize glucose & to synthesize protein, fat, and nucleic acids.
- Vitamin B₆ is a coenzyme needed to create protein, nucleic acids, and various amino acids.
- Vitamin B₁₂ is part of a coenzyme needed to synthesize nucleic acids and to metabolize carbohydrates.
- Folic acid promotes the production of red blood cells and is a coenzyme needed to produce DNA.
- Pantothenic acid is used in the synthesis of coenzyme A (CoA). CoA plays a key role in metabolism and the synthesis of fatty acids and other key compounds.
- Biotin is necessary for cell growth, production of fatty acids, and metabolism of fats & amino acids.
- Vitamin C promotes iron absorption, metabolizes certain amino acids, and synthesizes hormones from cholesterol. It also acts as an antioxidant to restore and extend vitamin E activity.

Fat-soluble vitamins:

- Vitamin A is necessary to synthesize visual pigments, promote the normal development of bones & teeth, and maintain epithelial cells.
- Vitamin D is produced in skin exposed to ultraviolet light. It promotes the development of teeth and bone, and the absorption of calcium and phosphorus.
- Vitamin E prevents the oxidation of vitamin A and polyunsaturated fatty acids (PUFA).
- Vitamin K is necessary to synthesize prothrombin, a blood clotting factor.





Minerals & Trace elements and other nutritional substances

- Minerals (mg quantities) and trace elements (in µg quantities) are essential and fulfill various functions in the body as electrolytes, enzyme constituent, building material. They do not provide any energy
- "Other" nutritional compounds such as Taurine & Carnitine have other functions



- Minerals and Trace Elements are naturally found in the body as ions but not as pure elements
 - Electrolytes are salts that dissolve and dissociate in water into positive and negative ions. Salt dissolves in water: NaCl → Na⁺ + Cl⁻
 - Electrolytes attract water & control its movement in and out of cells
 - Cations (positively charged ions) include sodium (Na⁺), potassium (K⁺), calcium (Ca²⁺), and magnesium (Mg²⁺).
 - Anions (negatively charged ions) include chloride (Cl⁻), bicarbonate (HCO₃⁻), phosphate (PO₄²⁻), and sulfate $(SO_4^{2-}).$

Other nutrients	Trace elements	Minerals
Taurine	Copper (Cu)	Calcium (Ca)
Carnitine	Chromium (Cr)	Chlorine (CI)
Inositol	lodine (I)	Magnesium (Mg)
Choline	Selenium (Se)	Phosphorous (P)
Nucleotides	Zinc (Zn)	Potassium (K)
		Sodium (Na)
		Fluoride (F)
		Iron (Fe)
		Manganese (Mn)
NostlāHoalthScionco		Molybdenum (Mo)





