VITAMINS

Vitamins may be regarded as organic compounds required in the diet in small amounts to perform specific biological functions for normal maintenance of optimum growth and health of the organism.

A vitamin is defined as an organic compound and a vital nutrient that an organism requires in limited amounts. An organic chemical compound (or related set of compounds) is called a vitamin when the organism cannot synthesize the compound in sufficient quantities, and must be obtained through the diet.

Thus, the term is conditional both upon the circumstances and the particular organism. For example, ascorbic acid (vitamin C) is a vitamin for humans, but not for most other animal organisms. Supplementation is important for the treatment of certain health problems, but there is little evidence of nutritional benefit when used by otherwise healthy people.

All natural vitamins are organic food substances found only in living things, that is, plants and animals. With few exceptions, the body cannot manufacture or synthesize vitamins. They must be supplied by the diet or in dietary supplements.

Vitamins are essential to the normal functioning of our bodies. They are necessary for growth, vitality, health, general well-being, and for the prevention and cure of many health problems and diseases.
Thus, each "vitamin" may refer to several vitamer compounds that all show the biological activity associated with a particular vitamin. Such a set of chemicals are grouped under an alphabetized vitamin "generic descriptor" title, such as "vitamin A," which includes the compounds retinal, retinol, and many carotenoids. Vitamers are often inter-converted in the body. The term vitamin does not include other essential nutrients such as dietary minerals, essential fatty acids, or essential amino acids, nor does it encompass the large number of other nutrients that promote health but are otherwise required less often.

Vitamins are classified by their biological and chemical activity, not their structure.

**There are 13 vitamins human body needs.** They are vitamins A, C, D, E, K and the B vitamins (thiamine, riboflavin, niacin, pantothenic acid, biotin, vitamin B-6, vitamin B-12 and folate).

![Vitamins](image)

Usually all vitamins are obtained from the foods we eat. Human body can also make vitamins D and K. People who eat a vegetarian diet may need to take a vitamin B12 supplement.

**Vitamins are classified as either water-soluble or fat soluble.**

There are 13 vitamins essential for humans: 4 fat-soluble (A, D, E and K) and 9 water-soluble (8 B vitamins and vitamin C).
**Water-soluble**

Water-soluble vitamins dissolve easily in water, and in general, most of these vitamins are readily excreted in urine thus, urinary output is a strong predictor of vitamin consumption. They are not toxic to the body. Many types of water-soluble vitamins are synthesized by bacteria.

The water soluble vitamins are a heterogenous group of compounds since they differ chemically from each other. Water soluble vitamins are not stored in the body in large quantities (except B\textsubscript{12}). For this reason, they must be continuously supplied in the diet.

The water soluble vitamins form *coenzymes* that participate in a variety of biochemical reactions, related to either *energy generation* or *hematopoiesis*.

**Fat-soluble**

Fat-soluble vitamins are absorbed through the intestinal tract with the help of lipids (fats). Because they are more likely to accumulate in the body, they are more likely to lead to *hypervitaminosis* than are water-soluble vitamins. Fat-soluble vitamin regulation is of particular significance in cystic fibrosis.

Their availability in the diet absorption and transport are associated with fat. They are soluble in fats and oils and also the fat solvents (alcohol, acetone etc.). Fat soluble vitamins can be stored in liver and adipose tissue. They are not readily excreted in urine. Excess consumption of these vitamins (particularly A and D) leads to their accumulation and toxic effects. All the fat soluble vitamins are isoprenoid compounds, since they are made up of one or more of five carbon units namely isoprene units (-CH=C.CH\textsubscript{3}-CH=CH-).

Fat-Soluble Vitamins participate in diverse processes such as *Blood Clotting and Vision*.

There are eight types of vitamin B:

1. Thiamin (B1)
2. Riboflavin
3. Niacin
4. Pantothenic acid
5. Biotin
6. Vitamin B6 (pyridoxine)
7. Folate (called folic acid when included in supplements)
8. Vitamin B12 (cyanocobalamin).

**Vitamers**

The term vitamers represents the chemically similar substances that possess qualitatively similar activity as that of vitamin. Some good examples of vitamers are...
1. Retinol, Retinal and Retinoic acid are **vitamers of vitamin A**.
2. Pyridoxine, Pyridoxal and Pyridoxamine are **vitamers of vitamin B**.