

Vitamins – an essential nutrient

A vitamin is an organic compound and an essential 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 it must be obtained through the diet.

Vitamins are classified as either water-soluble or fat-soluble. In humans there are 13 vitamins: 4 fat-soluble (A, D, E, and K) and 9 water-soluble (8 B vitamins and vitamin C). Water-soluble vitamins dissolve easily in water and, in general, are readily excreted from the body to the degree that urinary output is a strong predictor of vitamin consumption. Because they are not as readily stored, more consistent intake is important. 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 water-soluble vitamins.

Requirement

Vitamin requirements are different for everyone due to factors such as: age, exercise, pregnancy and breastfeeding, alcohol and tobacco, dietary habits, digestion, climate, medication.

Provitamin

A provitamin is a substance that may be converted within the body to a vitamin. The term "provitamin" is used when it is desirable to label a substance with little or no vitamin activity, but which can be converted into an active form by normal metabolic processes. For example, "provitamin A" is a name for β -carotene, which has only about 1/6 the biological activity of retinol (vitamin A). More examples: Provitamin D₂ is ergosterol, and provitamin D₃ is a form of cholesterol, microorganisms in the intestine — commonly known as "gut flora" — produce vitamin K and biotin, while one form of vitamin D is synthesized in the skin with the help of the natural ultraviolet wavelength of sunlight. Humans can produce some vitamins from precursors they consume. Examples include vitamin A, produced from beta carotene, and niacin, from the amino acid tryptophan.

Deficiencies

A vitamin deficiency can cause a disease or syndrome known as an avitaminosis (complete deprivation) or hypovitaminosis (deficient quantity).

Humans must consume vitamins periodically but with differing schedules, to avoid deficiency. The body's stores for different vitamins vary widely; vitamins A, D, and B₁₂ are stored in significant amounts, mainly in the liver, and an adult's diet may be deficient in vitamins A and D for many months and B₁₂ in some cases for years, before developing a deficiency condition. However, vitamin niacin and niacinamide are not stored in significant

amounts, so stores may last only a couple of weeks. For vitamin C, the first symptoms of scurvy in experimental studies of complete vitamin C deprivation in humans have varied widely, from a month to more than six months, depending on previous dietary history that determined body stores.

Deficiencies of vitamins are classified as either a primary or a secondary deficiency. A primary deficiency occurs when an organism does not get enough of the vitamin in its food. A secondary deficiency may be due to an underlying disorder that prevents or limits the absorption or use of the vitamin, due to a "lifestyle factor", such as smoking, excessive alcohol consumption, or the use of medications that interfere with the absorption or use of the vitamin. An underlying disorder may be metabolic as in a defect converting tryptophan to niacin.

Well-known human avitaminosis involve thiamine (beriberi), niacin (pellagra), vitamin C (scurvy), and vitamin D (rickets).

Hypervitaminosis

Hypervitaminosis is a condition of abnormally high storage levels of vitamins, which can lead to toxic symptoms. Hypervitaminoses are primarily caused by fat-soluble vitamins (D, E, K and A), as these are stored by the body for longer periods than water-soluble vitamins. Generally, toxic levels of vitamins stem from high supplement intake and not from natural food. Toxicities of fat-soluble vitamins can also be caused by a large intake of highly fortified foods. In the European Union, the European Food Safety Authority has set ULs (Tolerable upper intake levels).

Anti-vitamins

Anti-vitamins are chemical compounds that inhibit the absorption or actions of vitamins. For example, avidin is a protein in raw egg whites that inhibits the absorption of biotin; it is deactivated by cooking. Medication can be an anti-vitamin. For example, birth control pills destroy vitamin B6.

True-False statements

Read the statements and find out whether the statements are true (T) or false (F). Therefore, use the above-mentioned text. Tick the correct answer and provide the correct answer for the false statements.

statement	T	F	justification
A vitamin is an inorganic compound.		x	A vitamin is an organic compound.
A primary deficiency occurs when an organism does not get enough of the vitamin in its food.	x		
Hypervitaminosis is a condition of abnormally high storage levels of		x	Hypervitaminosis is a condition of abnormally high storage levels of

vitamins, but doesn't lead to toxic symptoms.		vitamins, which can lead to toxic symptoms.
Fat-soluble vitamins are not as readily stored, more consistent intake is important.	x	Water-soluble are not as readily stored, more consistent intake is important.
Medication can be an anti-vitamin.	x	
Provitamin D2 is cholesterol and provitamin D3 is a form of ergosterol.	x	Provitamin D2 is ergosterol and provitamin D3 is a form of cholesterol.
An underlying disorder may be metabolic as in a defect converting tryptophan into vitamin B1.	x	An underlying disorder may be metabolic as in a defect converting tryptophan into niacin.

Word guessing game

Get into 6 (9) groups. Choose one speaker who gets a specific term from the teacher. The other group members have to ask questions to find out the word, but the speaker can only say yes or no. The group can ask only 20 questions. Inform students: The main concern the topic vitamins. Make sure that the speaker knows the word.

avitaminosis	hypervitaminosis	requirement
fat-soluble	essential	deficiency
provitamin	β-carotene	overconsumption