

Fat soluble vitamins

Vitamins mostly act as catalysts that facilitate biochemical reactions in the body. Each of them has its own unique and irreplaceable function. We are not able to produce vitamins to ensure normal physiological needs, and therefore we have to obtain them from the outside, most often from food. ^[1]

Fat-soluble vitamins (A, D, E, K) are stored in body tissues, so it is possible to overdose on them, unlike water-soluble vitamins, whose possible excess is excreted in the urine without consequences. ^[1]

Breast milk contains enough vitamins for the needs of the infant, with the exception of vitamin K and D, therefore it is necessary to supplement both of these vitamins. Vitamin K is needed to prevent haemorrhagic disease of the newborn and is given to all newborns shortly after birth. Vitamin D is needed to prevent rickets and is given daily from the second week of life. ^[2]

The lack of fat -soluble vitamins is especially dangerous for patients with malabsorption syndrome and cholestasis (in both cases there is a risk of a deficiency of vitamins A, D, E, K, zinc and essential fatty acids). Vitamin D deficiency is common in people with reduced exposure to sunlight (UVB). The use of certain medicines can also lead to a lack of vitamins (antibiotics - vit. K; phenobarbital, phenytoin - vit. D, K and folate; mineral oils - vit. A, D, E, K). ^[3]

Fat-soluble vitamins ^[3] ^[1]

Vitamin	Importance	Lack	Surplus	Source
A (retinol and carotenoids)	Sight . Epithelial cell integrity - cell differentiation, cell membrane stability, epithelial maturation, activation of some genes; Placenta development, fetal lung maturation, mucus production, spermatogenesis, bone tissue metabolism.	Day blindness, drying of the conjunctiva and cornea, wrinkling and clouding of the cornea, Bitot's spots - grayish coatings on the conjunctiva, photophobia, blindness; Epithelial damage, basal cell proliferation, hyperkeratosis, squamous metaplasia; Dry and scaly skin, obstruction of bronchioles, metaplasia of the epithelium of the urinary tract and salivary glands - more frequent infections; broken tooth enamel; delayed overall growth and mental development.	<i>Acute</i> (very high single dose): nausea, vomiting, optic nerve papilledema, cranial nerve palsies, bulging fontanelle in infant. <i>Chronic</i> : loss of appetite, failure to thrive, itching of the skin, inflammation of the corners of the mouth, peeling skin of the palms and soles, bone pain, cortical hyperostosis , hepatosplenomegaly to liver cirrhosis, anemia and thrombocytopenia; scaly, dry skin, alopecia , tongue pain, increased intracranial pressure (pseudotumor cerebri), teratogenic effect .	Liver, milk, eggs, green and yellow vegetables, fruit.
D (calciferols)	Calcium and phosphorus homeostasis and a range of extraskeletal effects.	Rickets , osteomalacia , osteoporosis	<i>Acute</i> : hypercalcemia , muscle weakness, loss of appetite, nausea, headache, polyuria . <i>Chronic</i> : nephrocalcinosis, bone pain, vascular calcification, renal insufficiency , idiopathic infantile hypercalcemia	Skin (+ UVB). D3 (cholecalciferol): fish (salmon, mackerel, cod liver oil), fortified milk. D2 (ergocalciferol): plants and fungi.
E (tocopherols and tocotrienols)	Antioxidant ; stabilization of cell membranes.	<i>Hypovitaminosis E in chronic cholestasis</i> : progressive peripheral neuropathy, cerebellar ataxia, dysfunction of the posterior spinal cord, muscle weakness and focal necrosis in striated muscle. hemolysis in premature infants.	Muscle weakness, diarrhea, antagonism of vitamin K, enhanced effect of anticoagulant drugs .	Seeds, nuts and almonds, vegetable oils including olive and sunflower, vegetables (broccoli), green leafy vegetables, whole grains, avocado. Unstable in UV light.
K (phyloquinones, farnoquinones)	Post-translational carboxylation of coagulation factors II, VII , IX, X and proteins C , S. Oxidative phosphorylation. Bone tissue metabolism (calcium metabolism).	prolonged prothrombin time (Quick's time - the second phase of coagulation), bleeding (in newborns, the so-called hemorrhagic disease), increased PIVKA (<i>protein induced in vitamin K absence</i>).	A synthetic water-soluble analogue (menadione) causes neonatal jaundice in large doses .	K1 (phyloquinone): green leafy vegetables (spinach, cabbage), vegetable oils, soybeans, tomatoes. K2 (menaquinone): intestinal flora; beef liver, butter, yolk. Sensitive to oxidation, acids, alkalis and light.

Detailed articles

- Vitamin A ,
- Vitamin D ,
- Vitamin E ,
- Vitamin K.

Links

Related Articles

- Water soluble vitamins

References

1. BAYER, M. Fat-soluble vitamins. *Practical Pharmacy* [online] . 2008, year 4, vol. 5, pp. 235-237, also available from < <https://www.solen.cz/pdfs/lek/2008/05/10.pdf> >
2. LEBL, J, J JANDA and P POHUNEK, et al. *Clinical Pediatrics*. 1st edition. Galén, 2012. 698 pp. pp. 117. ISBN 978-80-7262-772-1
3. KLIEGMAN, Robert M., Karen J. MARCDANTE, and Hal B. JENSON. *Nelson Essentials of Pediatrics*. 1st edition. China: Elsevier Saunders, 2006. 5; pp. 146-151. ISBN 978-0-8089-2325-1