

VITAMINS

Vitamins are organic substances with no energy value, essential for the body's functions and generally obtained through diet. They are divided into two groups: fat-soluble (A, D, E, K), stored in the body, and water-soluble (B, C), eliminated in urine.

The two main families of vitamins:

- Fat-soluble Vitamins:

- o Vitamin A: Vision, immune system. Sources: fish oil, liver, egg yolk, carrots.

- o Vitamin D: Calcium absorption, bone strength. Sources: sun exposure, oily fish.

- o Vitamin E: Antioxidant, cell protection. Sources: vegetable oils, nuts.

- o Vitamin K: Blood clotting and bone strength. Sources: green vegetables, cabbage.

- Water-soluble Vitamins:

- o Vitamin C: Antioxidant, vitality. Sources: citrus fruits, kiwis, fresh vegetables.

- o B vitamins (B1, B2, B3, B5, B6, B8, B9, B12): Energy production, metabolism, nervous system. Sources: meat, fish, whole grains, dairy products.

Key points to remember:

- 13 vitamins are essential for health.

- The body produces very few of them (except D and K), so a balanced diet is necessary.

- Deficiencies occur with an unbalanced diet or increased needs (pregnancy, sports, old age).

- A course of vitamins may be necessary, but be careful not to overdose.

Vitamines hydrosolubles

Vitamine	Nom	Rôle	Conséquence de la carence
Vitamine B₁	Thiamine , ou aneurine	<ul style="list-style-type: none">• métabolisme énergétique (notamment dans le complexe Pyruvate déshydrogénase)	<ul style="list-style-type: none">• polynévrites• œdèmes• myocardites• béribéri
Vitamine B₂	Riboflavine	<ul style="list-style-type: none">• métabolisme énergétique (en particulier dans la chaîne respiratoire)• participe à la formation des flavines (FAD/FMN)	<ul style="list-style-type: none">• lésions des lèvres et des muqueuses buccales,• lésions de la langue• lésions des yeux
Vitamine	Nicotinamide ou	<ul style="list-style-type: none">• métabolisme énergétique	<ul style="list-style-type: none">• maladie

B₃ (ou PP)	niacine	<p>(participe à la formation du NAD⁺/NADH)</p> <ul style="list-style-type: none"> • anti-pellagreuse 	<ul style="list-style-type: none"> • du cuir chevelu • pellagre
Vitamine B₅	Acide pantothénique	<ul style="list-style-type: none"> • métabolisme énergétique (un des constituants du Coenzyme A) • synthèse de certaines hormones 	<ul style="list-style-type: none"> • lésions cutanées • arrêt de la croissance
Vitamine B₆	Pyridoxine	<ul style="list-style-type: none"> • métabolisme des acides aminés (décarboxylases, aminotransférases) • synthèse de la vitamine B₃ 	<ul style="list-style-type: none"> • Lésions cutanées • troubles neurologiques (convulsions) • polynévrites
Vitamine B₈ (ou H)	Biotine	<ul style="list-style-type: none"> • métabolisme des acides gras, glucides et acides aminés (coenzyme de carboxylation) • synthèse des vitamines B₉ et B₁₂ 	<ul style="list-style-type: none"> • troubles digestifs • ataxie • signes cutanés
Vitamine B₉ (ou M)	Acide folique	<ul style="list-style-type: none"> • synthèse des purines, pyrimidines et acides aminés (coenzyme participant au métabolisme des "unités monocarbonées") notamment la méthylation de l'ADN, de l'ARN et des protéines 	<ul style="list-style-type: none"> • troubles digestifs • troubles neurologiques • asthénie
Vitamine B₁₂	Cobalamine	<ul style="list-style-type: none"> • métabolisme des acides nucléiques (coenzyme de transfert des radicaux méthyls) notamment dans la synthèse de la méthionine • anti-anémique (rôle important dans l'hématopoïèse) 	<ul style="list-style-type: none"> • anémie de Biermer • glossite • douleurs neurologiques
Vitamine C	Acide ascorbique	<ul style="list-style-type: none"> • synthèse du collagène • génération des globules rouges (hématies) • anti-scorbutique • stimulation des défenses naturelles et immunitaires • Antioxydant (réducteur) 	<ul style="list-style-type: none"> • scorbut • poly-infections et septicémies • Maladies cardiovasculaires et hypertension
Vitamine U	S-Méthylméthionine	<ul style="list-style-type: none"> • cation, intermédiaire biochimique dans de nombreuses voies métaboliques 	<ul style="list-style-type: none"> • ulcères (1950 Cheney) • Reflux

			<ul style="list-style-type: none"> gastriques kystes aux seins
--	--	--	------------------------------------------------------------------------------------------------------------------------

Vitamines liposolubles

Vitamine	Nom	Rôle	Conséquence de la carence
Vitamine A	Rétinol	<ul style="list-style-type: none"> favorise la croissance améliore la vision (antixérophtalmique) - coenzyme substrat de la rhodopsine captant la lumière 	<ul style="list-style-type: none"> manque de croissance altération des épithéliums cécité crépusculaire
Vitamine D	Calcitriol (forme active)	<ul style="list-style-type: none"> antirachitisme favorise l'absorption du calcium et du phosphore (prohormone transformée dans le foie en hormone intervenant sur le métabolisme phosphocalcique) 	<ul style="list-style-type: none"> rachitisme ostéomalacie hypoparathyroïdie
Vitamine E	Tocophérols Tocotriénols	<ul style="list-style-type: none"> antioxydant antistérilité 	<ul style="list-style-type: none"> stérilité anémie hémolytique du nouveau-né
Vitamine K₁	Phylloquinone	<ul style="list-style-type: none"> antihémorragique (coagulation sanguine) fixation du calcium par les os 	<ul style="list-style-type: none"> hémorragie par avitaminose K
Vitamine K₂	Ménaquinone		

Former Vitamins

Omega-3 fatty acids were initially considered vitamins (F) but are no longer classified as such in medicine today because the necessary daily intake—between two and three grams per day on average for adults—makes them more suitable as ordinary dietary components. The term "vitamin F" was still used on the internet in 2015 for commercial purposes. Omega-3s that have passed their expiration date or are improperly stored degrade into substances suspected of being carcinogenic.

Human Vitamin Requirements

These are difficult to establish because they vary with age, height, sex, muscle activity, and production by the gut microbiota. They increase during growth, illness, and fever, and, in women, during pregnancy and breastfeeding.

Besoins en vitamines moyens pour un adulte de 70 kg
(1 µg = un millionième de gramme).

Vitamine	Nom ou rôle	AJR
Vitamine C	acide ascorbique	80 mg
Vitamine B₃ (PP)	nicotinamide	18 mg
Vitamine B₅	acide pantothénique	6 mg

Vitamine B ₆	pyridoxine	2 mg
Vitamine B ₂	riboflavine	1,6 mg
Vitamine B ₁	thiamine	1,4 mg
Vitamine B ₉	acide folique	200 µg
Vitamine B₈ (H)	biotine	150 µg
Vitamine B ₁₂	cobalamine	1 µg
Vitamine D	calciférol (antirachitique)	5 µg
Vitamine E	tocophérol (antioxydant)	10 mg
Vitamine A	rétinol (antixérophtalmique)	800 µg
Vitamine K	phylloquinone et ménaquinone (antihémorragique)	100 µg

There is no evidence of the effectiveness of this measure in preventing chronic diseases. A review of all research indexed on PubMed, Embase, and Cochrane indicates a wide variety of results depending on the vitamins and minerals chosen, the chronic conditions studied, the protocols, etc. [However, there is no demonstrated benefit in non-malnourished patients in terms of overall mortality or the occurrence of cardiovascular disease] or in preventing cognitive decline. There might be a slight reduction in the risk of developing cancer, but only in men. [] Taking vitamin supplements may be more effective than education on good nutrition for maintaining health, for example, in patients with Alzheimer's disease, to prevent weight loss and increase immune parameters. In general, older populations appear to benefit in various ways from vitamin and mineral supplements in clinical studies, although this practice is still relatively uncommon (around 10%) in reality.

Analyzing vitamin deficiencies through a blood test can be difficult. This is standard practice for vitamin D. Sunlight is the primary source of vitamin D and should be prioritized unless otherwise advised by a doctor.

By definition, vitamin deficiencies must be corrected. The recommended daily allowances (RDAs) are the values defined in the RDAs. Water-soluble vitamins C, B, and U must be supplied to the body daily through diet, while fat-soluble vitamins A, D, E, and K are stored by the body. Any daily excess of water-soluble vitamins is eliminated. Therefore, exceeding the RDAs is of little benefit.

Dozens of diseases, whether causes or symptoms, are correlated with vitamin deficiencies.

Vitamin Storage

Some vitamins can be destroyed by heat (cooking), air (the action of oxygen when cutting into small pieces), or light (ultraviolet rays). Drying, freezing, and reheating can also lead to vitamin loss. Furthermore, a large portion of water-soluble vitamins are lost in the cooking water. Therefore, soups or broths, where the cooking water is retained, or steaming, where the food is not submerged in water, help to retain a greater quantity of vitamins.

Production conditions, seed selection, and vitamins

Current production conditions might have a downward effect on micronutrient concentrations in food, but a Canadian meta-analysis published in 2017 explains that the comparison methods used are unreliable and that natural variations (soil, weather) are much more significant than historical variations in certain elements. This study is corroborated by a publication from the French Academy of Agriculture.

