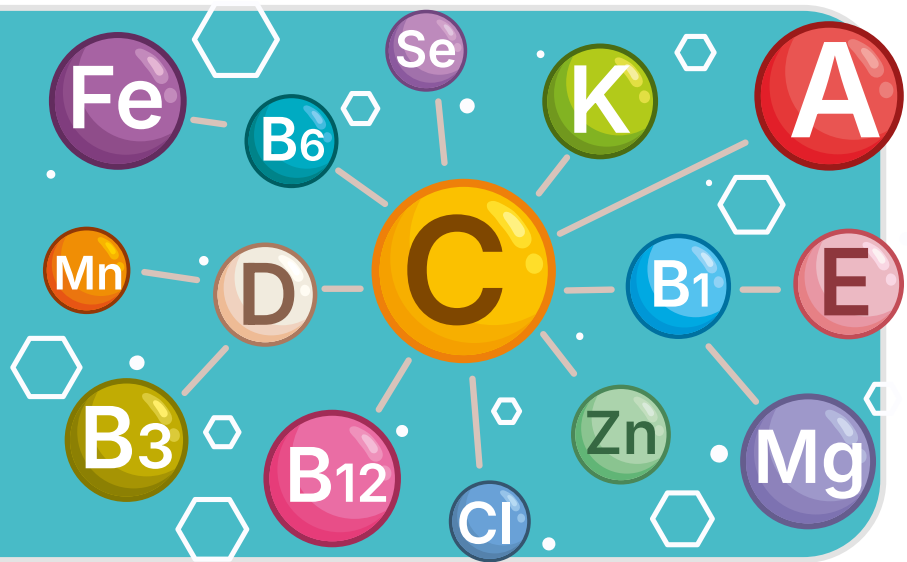


LIPID-SOLUBLE VITAMINS



VITAMIN A

MAIN SOURCES

Retinol: whole and semi-skimmed milk; Cheddar cheese; butter; eggs (yolk); liver; kidney; fatty fish (sardines, mackerel); vegetable creams.

Beta-carotene: dark leafy greens (kale, spinach, lettuce), peas; orange/yellow/red vegetables and fruits (carrots, apricots, mangoes, papayas, peppers, tomatoes, sweet potatoes, pumpkin).

FUNCTION IN THE BODY

- Keeps skin healthy
- Allows you to see in low light
- Helps with child growth
- Produces mucus to protect mucous membranes (mouth, nose, lungs)
- Antioxidant

DEFICIENCY / EXCESS EFFECTS

Deficiency

Dryness and infections of the skin and mucous membranes; night blindness; it can lead to total blindness; Children may not grow properly.

Excess (rare)

- can be toxic
- can harm a developing baby
- accumulates in the liver

WHY DOES IT HAPPEN?

- Children need nutrients to grow
- deficiency weakens the immune system
- the retina produces little rhodopsin when there is a lack of vitamin A.



VITAMIN D

MAIN SOURCES

Sunlight (main source); fatty fish (salmon, sardines, herring, mackerel); Fortified dairy products; fortified cereals.

FUNCTION IN THE BODY

- Allows intestinal absorption of calcium
- Helps deposit calcium in bones and teeth
- Necessary for the immune system.

DEFICIENCY / EXCESS EFFECTS

Deficiency

In children it causes rickets (weak bones and bowed legs); in adults it causes osteomalacia (weak bones, higher risk of fractures).

Excess (rare)

- Excess absorbed calcium can damage kidneys and other organs.

WHY DOES IT HAPPEN?

- Without enough calcium in the bones, they cannot bear the weight
- If calcium is taken from the bones and not replaced, they weaken.





VITAMIN

E

MAIN SOURCES

Foods of plant origin, especially soybeans, corn, olive oil, nuts, seeds, vegetable creams.

FUNCTION IN THE BODY

- Antioxidant

DEFICIENCY / EXCESS EFFECTS

Deficiency and excess are rare in the diet, and may occur in the context of supplementation.



VITAMIN

K

MAIN SOURCES

Foods of plant origin, especially green vegetables; liver; cheese; green tea; also produced by intestinal bacteria.

FUNCTION IN THE BODY

- It helps blood clot when injury occurs.

DEFICIENCY / EXCESS EFFECTS

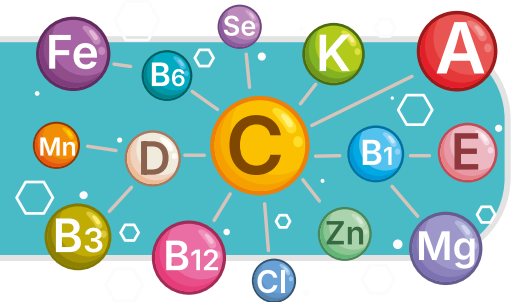
Deficiency (rare)

It can occur in babies, so vitamin K is given at birth.

WHY DOES IT HAPPEN?

- Babies can lose blood during childbirth and have reduced reserves.

WATER-SOLUBLE VITAMINS



VITAMIN (thiamine)

B1

MAIN SOURCES

Meat (especially pork), milk, cheese, eggs, vegetables, fresh and dried fruit, wholemeal bread, fortified cereals.

FUNCTION IN THE BODY

- Release of energy from carbohydrates during cellular respiration.

DEFICIENCY / EXCESS EFFECTS

Deficiency

It causes beriberi (affected nerves and muscles, problems with memory, concentration and heart rhythm).

WHY DOES IT HAPPEN?

- Energy is needed for nerve cells to control muscles and brain
- Lack of thiamine prevents the proper release of energy.



VITAMIN (riboflavin)

B2

MAIN SOURCES

Meat, milk, dairy products, eggs, fortified cereals, mushrooms.

FUNCTION IN THE BODY

- Release of energy from carbohydrates, fat and protein during cellular respiration.

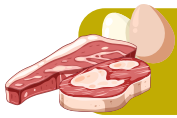
DEFICIENCY / EXCESS EFFECTS

Rare disability

It can cause cracks in the corners of the mouth.



MAIN SOURCES



VITAMIN B₃

Beef and pork, wheat flour, corn, eggs, milk; can be produced from tryptophan.

FUNCTION IN THE BODY

- Release of energy from food.

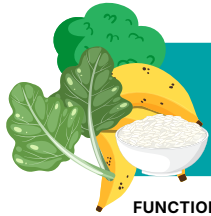
DEFICIENCY/EXCESS EFFECTS

Disability

It causes pellagra (diarrhea, dermatitis, dementia).

WHY DOES IT HAPPEN?

A lack of vitamin B3 prevents the nervous system and brain from functioning.



VITAMIN B₉ (folate)

MAIN SOURCES

Folate: dark green plant foods (Brussels sprouts, broccoli, kale, spinach); yeast extract; peas; chickpeas; asparagus; brown rice; fruits such as oranges and bananas; added to some breads and cereals.

FUNCTION IN THE BODY

- Works with vitamin B12 to form red blood cells; Reduces risk of neural tube defects in babies.

DEFICIENCY / EXCESS EFFECTS

Deficiency

Causes megaloblastic anaemia; can cause neural tube defects (e.g., spina bifida).

WHY DOES IT HAPPEN?

Red blood cells become too large and do not pass through capillaries; the causes of neural tube defects are still being studied.



VITAMIN B₁₂

MAIN SOURCES

It does not occur naturally in plants. It is found in meat, fish, cheese, dairy products, fortified cereals, fortified yeast.

FUNCTION IN THE BODY

- Works with folate in the production of red blood cells; keeps nerve cells healthy.

DEFICIENCY / EXCESS EFFECTS

Deficiency

It can cause pernicious anaemia. Vegans should take supplements.

WHY DOES IT HAPPEN?

Absorption depends on a protein produced in the stomach; without it, B12 is not absorbed.



VITAMIN C (ascorbic acid)

FONTES PRINCIPAIS

Fruits and vegetables, especially citrus fruits (orange, lemon, lime, grapefruit), currants, kiwi, guava, cabbage, broccoli, potatoes; small amount in the liver.

FUNCTION IN THE BODY

- Helps absorb iron; necessary to produce and maintain connective tissue; antioxidant.

DEFICIENCY / EXCESS EFFECTS

Deficiency

anaemia due to lack of iron; bleeding from the skin and gums; wounds that do not heal; scurvy (severe).

WHY DOES IT HAPPEN?

Iron is not absorbed without vitamin C; The connective tissue breaks down, leading to bleeding and poor healing.

