

Vitamin and mineral absorption

Vitamins are organic low molecular weight substances necessary in small amounts for the proper functioning of the body. The body cannot make them on its own (with some exceptions), so they must be taken in the diet. Their main function is metabolism and regulation of metabolism.

Fat-soluble vitamins

Fat-soluble vitamins (A, D, E, K) enter the enterocytes by diffusion in the form of micelles, where they become part of chylomicrons.

Water-soluble vitamins

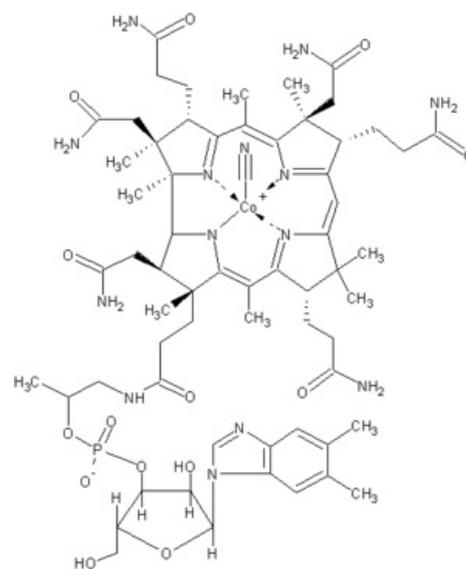
Water-soluble vitamins are absorbed in the proximal part of the small intestine. They are actively resorbed by symport with Na^+ . Only vitamin **B₆** penetrates the intestinal wall by diffusion. **Vitamin B₁₂** (cobalamin) must be taken in through the diet. The most important animal cobalamin products are liver, kidney, meat, fish and eggs. It binds in the stomach and duodenum to a glycoprotein formed by the parietal cells of the gastric mucosa (intrinsic factor). Bound to intrinsic factor, it is absorbed by endocytosis. In the cytoplasm, it is separated from intrinsic factor and vitamin B₁₂ is actively transported across the basolateral membrane into the blood. And from there, it's taken protein-bound to the liver.

Calcium

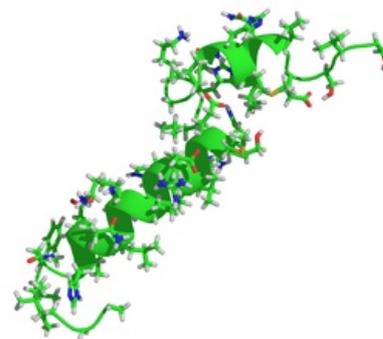
Calcium is absorbed in all compartments of the intestine, but mainly in the jejunum and ileum. Ca^{2+} jions are transported into the cytoplasm bound to specific proteins on the luminal side of enterocytes. In the cytoplasm, they bind to cytoplasmic calcium-binding protein or enter the mitochondria. Calcium absorption is controlled by **vitamin D and parathyroid hormone**.

Iron

Iron taken in through food is absorbed in only small amounts. About 15-20 mg is taken in daily through food. Adult men and women absorb 1-1.5 mg per day, pregnant women and children more. **Iron heme** is best absorbed. **Fe^{2+}** is also better absorbed than Fe^{3+} , because it does not form insoluble compounds. In the intestine, iron is bound to transferrin, which binds to a specific receptor on the luminal side of enterocytes and is transferred to the cytoplasm by endocytosis. In the cytoplasm, iron is released and binds to cytoplasmic ferritin. Part of the iron supply is separated from the ferritin (the amount needed by the organism) and transported into the blood where it binds to plasma transferrin. The rest of the iron enters the intestinal contents and is excreted in the faeces.



Vitamin B12 molecule (cobalamin)



3D structure of parathyroid hormone

Links

Related articles

- Chylomicron test
- Calcium
- Dietary calcium
- Iron
- Vitamins
- Vitamins (1st Faculty of Medicine, NT)

External links

- Vitaminy (czech wikipedia) (<https://cs.wikipedia.org/wiki/Vitam%C3%ADn%7C>)
- Vitamin (english wikipedia) (<https://en.wikipedia.org/wiki/Vitamin%7C>)

Used literature

- KITTNAR, Otomar. *Lékařská fyziologie*. 1. edition. Praha : Grada, 2011. ISBN 978-80-247-3068-4.
- SILBERNAGL, Stefan – DESPOPOULOS, Agamemnon. *Atlas fyziologie člověka*. 6. edition. Praha : Grada, 2011. ISBN 978-80-247-0630-6.