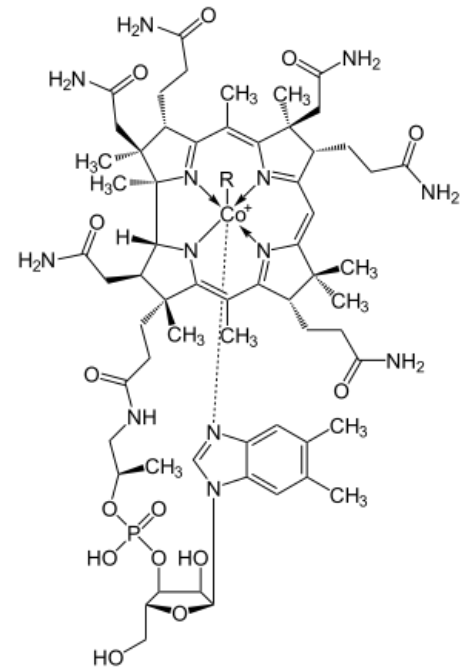


# Vitamin B12

Vitamin B<sub>12</sub> (cobalamin) is the collective name for several compounds that are in the center of porphyrin skeletal cobalt. Vitamin B<sub>12</sub> has a number of biological functions - plays an important role in hematopoiesis, is essential for the development of the central nervous system in children, contributes to the formation of nucleic acids, transmethylation reactions and has anabolic effect. Deficiency of vitamin B<sub>12</sub> in adults causes macrocytic anemia, impaired rear and lateral spinal cords, peripheral nerves and dementia or depression. Lack of vitamin B<sub>12</sub> also affects secondary folate cycle resulting in impaired synthesis of purines and pyrimidines necessary for the formation of DNA and RNA.

## Source

In nutritionally significant quantities occurs only in animal foods. Rich sources are liver, kidney, meat warm-blooded animals (1-2 µg/100 g), fish, egg yolk and dairy products (milk µg/100, 0.3 ml cheese µg/100 0.2 to 0.6g). Plant foods contain trace amounts of vitamin B<sub>12</sub> only if it has been processed by bacterial fermentation (e.g. beer). Absorbed in the small intestine only if the stomach creates a complex with an internal factor. Therefore it is necessary to properly functioning stomach and large amounts of vitamin B<sub>12</sub> are formed by the intestinal flora in humans unusable. Cobalamin with an internal factor in the distal ileum bind to specific receptor cubilin and this complex then enters by endocytosis into enterocytes. Inside the enterocyte cobalamin binds to other carriers and excreted into the plasma. 75-80% is bound to haptocorrin and goes to hepatocytes. The cells of other organs enter only vitamin B<sub>12</sub> bound to transcobalamin II (the holotranscobalamin) after binding to specific receptors through endocytosis. The cell cobalamin is converted to active metabolites and adenosylcobalamin methylcobalamin, which serve as cofactors of enzymes. The daily recommended dose for adults : 3 mg. Minimal in infants: approximately 0.1 to 0.3 mg.



Vitamin B12 structure

## Function

Haemopoiesis; development of the central nervous system in childhood; cofactor of two metabolic reactions: conversion of homocysteine to methionine by methionine synthase (failure of this reaction leads to the accumulation of homocysteine); conversion methylmalonyl-CoA to succinyl-CoA action methylmalonyl-CoA mutase (failure of this reaction leads to an accumulation of methylmalonic acid and its increased urinary excretion).

## Deficit

Its deficiency is clinically manifested failure to thrive, macrocytic anemia and neurological symptoms. An adult is a stock (2-5 mg) of vitamin B<sub>12</sub> in the liver, which cover the need for a period of 5-10 years. Stocks, which creates the infant in utero (approximately 25 micrograms), will be exhausted as early as 3-5 months. Among laboratory manifestations include mostly macrocytic anemia, elevated aminotransferases, hyperhomocysteinemia and increased acid secretion methylmalonic acid plasma concentrations of homocysteine and methylmalonic acid excretion increased in the urine. Metabolic changes precede clinical manifestations. Pernicious anemia is an autoimmune disease that leads to atrophy of the gastric mucosa and by the lack of intrinsic factor.

## Surplus

Signs of excess were reported even after a high intake (5 mg) of the supplement.

## Links

### Related articles

- Fat Soluble Vitamins
- Water Soluble Vitamins

### Bibliography

- BENCKO, Vladimir, et al. *Hygiene and epidemiology : selected chapters*. 2. edition. Prague. 2008. ISBN 80-246-0793-X.

