# COBAMIDE COENZYMES. COBALAMINS (VITAMIN B12)

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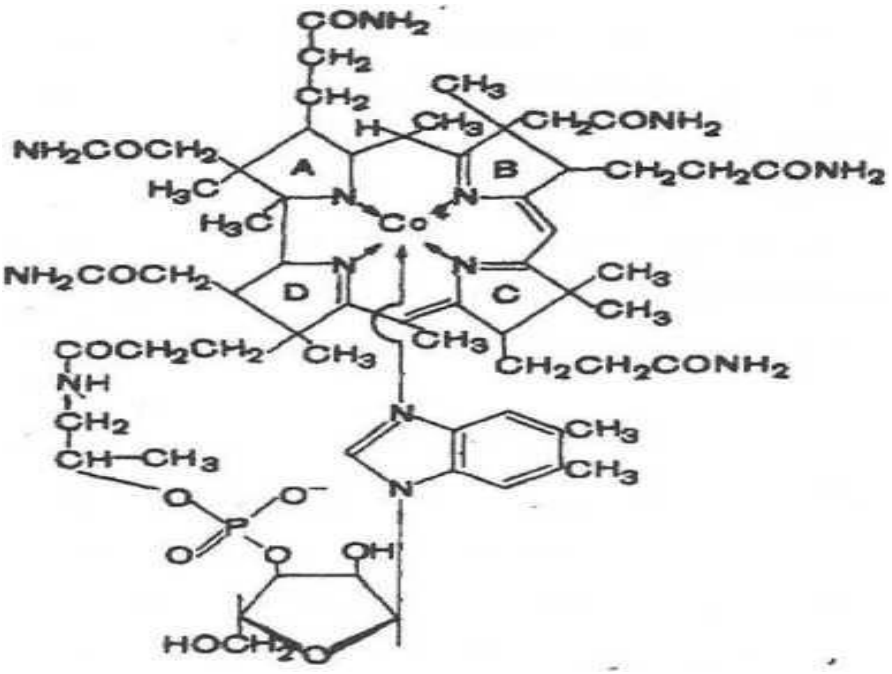
**Annotatsiya.** Reactions in which cobamide coenzymes take part are conventionally divided into two groups.

Cobalamins enter the human body with food. Liver, kidneys, eggs, and milk are rich in them. Plant foods are poor in cobalamins. Part of the vitamin B12 is produced by intestinal bacteria. An adult's daily requirement for the vitamin is about 2 mcg.

Vitamin B12 was discovered in 1958 by Barker. In the vitamin molecule, the central cobalt atom is bonded to the nitrogen atoms of the four reduced pyrrole rings, forming a porphyrin-like corrin nucleus, and to the nitrogen atom of 5,6-dimethylbenzimidazole (Figure 17). The cobalt-containing part of the vitamin molecule is a planar (planar) figure; Perpendicular to it is a nucleotide ligand, which, in addition to 5,6-dimethylbenzimidazole, contains ribose and phosphate residue in 3rd carbon atom. Vitamin B12 derivatives containing OH group (oxycobalamin), chlorine (chlorocobalamin),$_{H2O}$ (aquacobalamin) and nitrous acid (nitrithocobalamin) were obtained.

Cobalamin refers to corrines in which the planar ligand has the corrin ring structure of vitamin$_{B12}$.




**Rice. Vitamin B12**

**Metabolism**. Absorption of cobalamins from food is carried out in the stomach with the participation of intrinsic factor, or Castle factor, which is produced by lining cells. Intrinsic factor is a high-molecular-weight compound, a complex protein called a glycoprotein. 15 different amino acids are found in its composition, and its non-protein part, the prosthetic group, contains a heteropolysaccharide, which, when hydrolyzed, is broken down into hexosamine, mannose, galactose, fructose and fucose.

Absorption of cobalamins is carried out by the entire surface of the racing intestine and includes the following steps:

1) Complex formation: vitamin B12 + intrinsic factor;

2) binding of the complex by the epithelium of the mucosa of the small intestine with the participation of Ca2+ ions (obviously, there are membrane receptors for this complex of the ileal mucosa);

3) transport of the complex; vitamin B12 + intrinsic factor through intestinal mucosa by endocytosis;

4) release of vitamin B12 into the blood of the portal vein (in this case, the fate of the internal factor is not clear: it either hydrolyzes or returns to the intestinal lumen)

In large quantities, vitamin B12 can be absorbed by passive diffusion in the small intestine without intrinsic factor. But this process is slow.

In medical practice, cyanocobalamin obtained by microbiological synthesis is used. It is converted to hydroxycobalamin (OH-B12), which is the transport form of cobalamin. Gilroxicobalamin is carried in the bloodstream by two specific plasma proteins: transcobalamin I (TC-1) and transcobalamin P (TC-I1). TC-I belongs to the α-globulin fraction, its molecular weight is about 120,000 kDa. TC-II refers to β globulins, its molecular weight is 35000 kYes, TK-II is the main transport protein that facilitates the delivery of cobalamins to tissues, and TK-I serves to maintain the concentration of cobalamins in the blood (a kind of circulating depot of vitamin$_{B12}$). Cyanocobalamin can be deposited in the liver and in leukocytes. From the liver, it is excreted with bile into the intestines and then reabsorbed.

In the liver and kidneys, OH-B12 converts the coenzyme forms of methylcobalamin (methyl-B12) and deoxyadenosylcobalamin (DA-B12). Their formation requires ATP, FAD and magnesium chloride, the process is localized in the mitochondria, cobalamin is excreted mainly in the urine

In its free form, vitamin B12 is metabolically inactive, it is not even absorbed by the intestinal wall

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