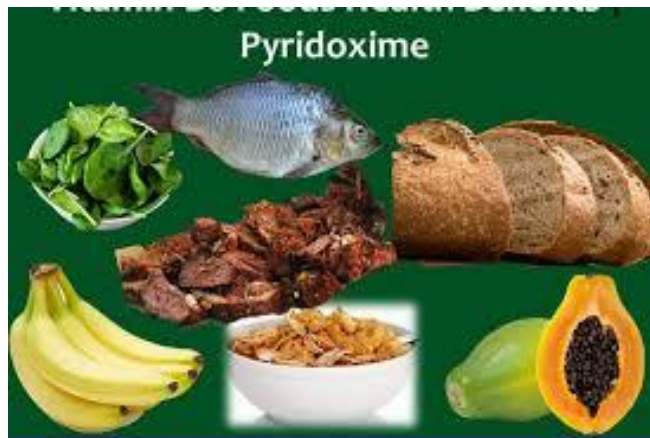


e- Vitamin B₆

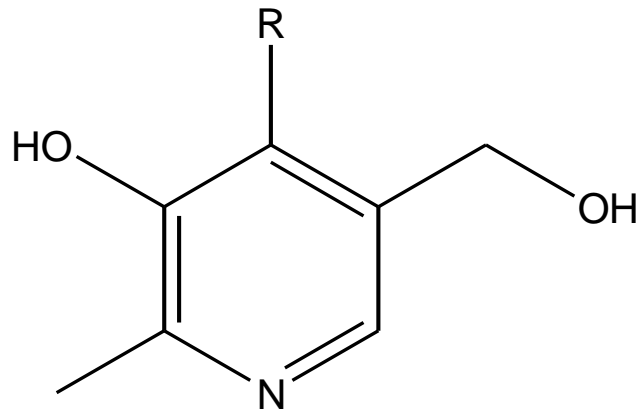
(Pyridoxine)



B₆

Vitamin B₆

- It is the generic descriptor for all 3-hydroxy-2-methylpyridine derivatives exhibiting the biological activity of pyridoxal and pyridoxamine.



R	Name
CH ₂ OH	Pyridoxine
CHO	Pyridoxal
COOH	Pyridoxic acid
CH ₂ NH ₂	Pyridoxamine

Significance of the vitamin

- It is important as a coenzyme in several aspects of metabolism.

Source of the vitamin

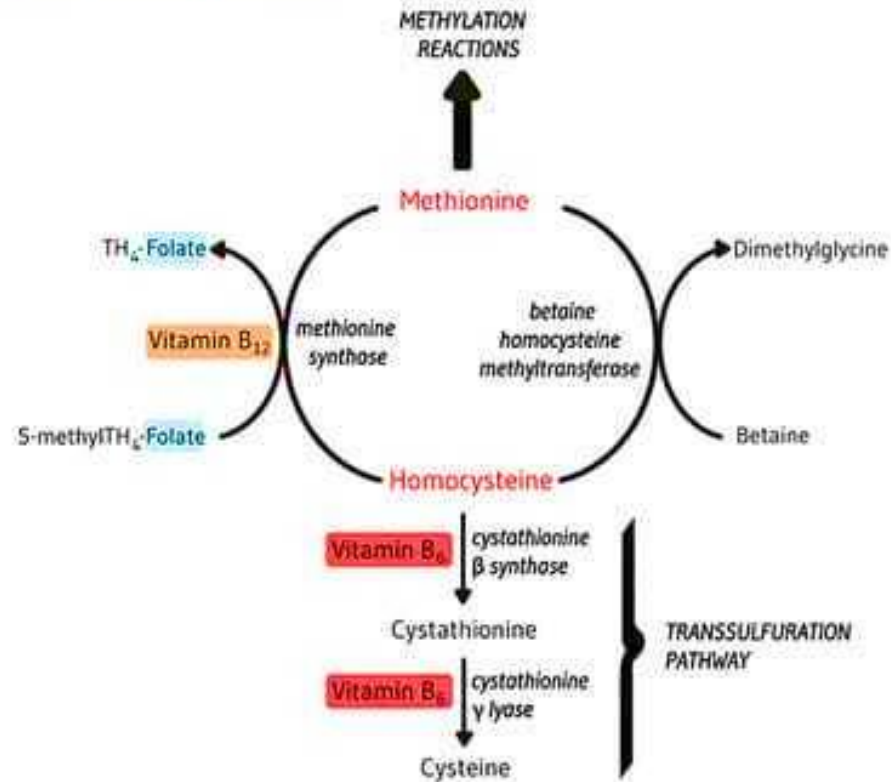
- It is widely distributed in foods.
- Meats, wheat, vegetables and nuts are good sources of the vitamin.
- In most of the foods, large portion of the vitamin is bound either to proteins or sugars.
- Plant tissues contain mostly pyridoxine, while the animal tissues contain mostly pyridoxal and pyridoxamine.

- The vitamin is affected by heat, light and storage.
- Pyridoxine is less affected by these conditions compared to pyridoxal and pyridoxamine.
- Pyridoxine hydrochloride is stable and used for food fortification and multivitamin supplements.
- Much of the vitamin in foods is not biologically available.

Metabolic functions of vitamin B₆

- Pyridoxal phosphate serves as a coenzyme of many enzymes involved in the metabolism of amino acids.
- Pyridoxal phosphate-dependent enzymes **cystathionine synthase** and **cystathionase** catalyze the **transsulfuration** of methionine to cysteine.
- Deficient patients show **homocysteinuria** and **cystathionuria**.
- It is important in the biosynthesis of serotonin, epinephrine and norepinephrine.
- It is also required for the biosynthesis of niacin.
- It is needed for the utilization of glycogen to release glucose.

Figure 3. Homocysteine Metabolism



Homocysteine is methylated to form the essential amino acid methionine in two pathways. The reaction of homocysteine remethylation catalyzed by the vitamin B₁₂-dependent methionine synthase captures a methyl group from the folate-dependent one-carbon pool (S-methyltetrahydrofolate). A second pathway requires betaine (N,N,N-trimethylglycine) as a methyl donor for the methylation of homocysteine catalyzed by betaine homocysteine methyltransferase. The catabolic pathway of homocysteine, known as the transsulfuration pathway, converts homocysteine to the amino acid cysteine via two vitamin B₆ (PLP)-dependent enzymes. Cystathionine β synthase catalyzes the condensation of homocysteine with serine to form cystathionine, and cystathionine is then converted to cysteine, α-ketobutyrate, and ammonia by cystathionine γ lyase. TH₄-Folate, Tetrahydrofolate.

Recommended Daily Allowance (RDA)

- 1.3 mg/day for men of age 14 years and above.
- 1.2 mg/day for women of age 14 years and above.
- 1.9 mg/day for pregnant and breastfeeding women.

Vitamin B₆ deficiency

- It is uncommon.
- It results in dermatologic and neurologic changes with less obvious metabolic lesion.
- The morphology of lesions are similar to the riboflavin and niacin deficiency.
- So, weakness, cheilosis, glossitis, anemia and susceptible to infections.



Vitamin B₆ uses

- Vitamin B₆ deficiency.
- Sideroblastic anemia.
- Given with drugs like anti-TB drugs.
- Pyridoxamine can be used to prevent the progression of diabetic nephropathy.

Vitamin B₆ toxicity

- It is relatively low.
- High doses of the vitamin induce peripheral nervous system symptoms such as ataxia.
- Since B₆ increases the conversion of L-dopa to dopamine, therefore, it will interfere with management of diseases treated with L-dopa.

f- Vitamin B₇

(Biotin)

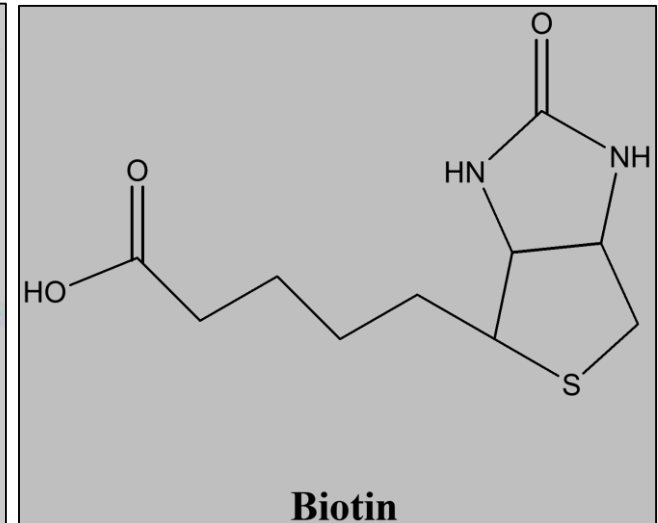
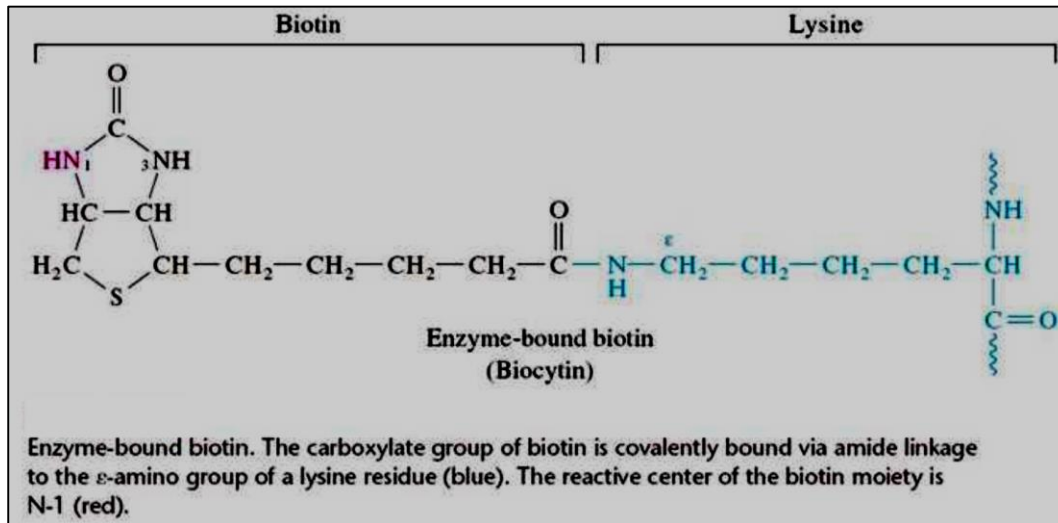


Vitamin H Provide Healthy Hair



Vitamin B₇

- It is called Biotin. Biotin, also called vitamin H (the H represents Haar und Haut, German words for "hair and skin").
- It is the trivial name of the compound *cis*-hexahydro-2-oxo-1*H*-thieno[3,4-*d*]-imidazole-4-pentanoic acid.

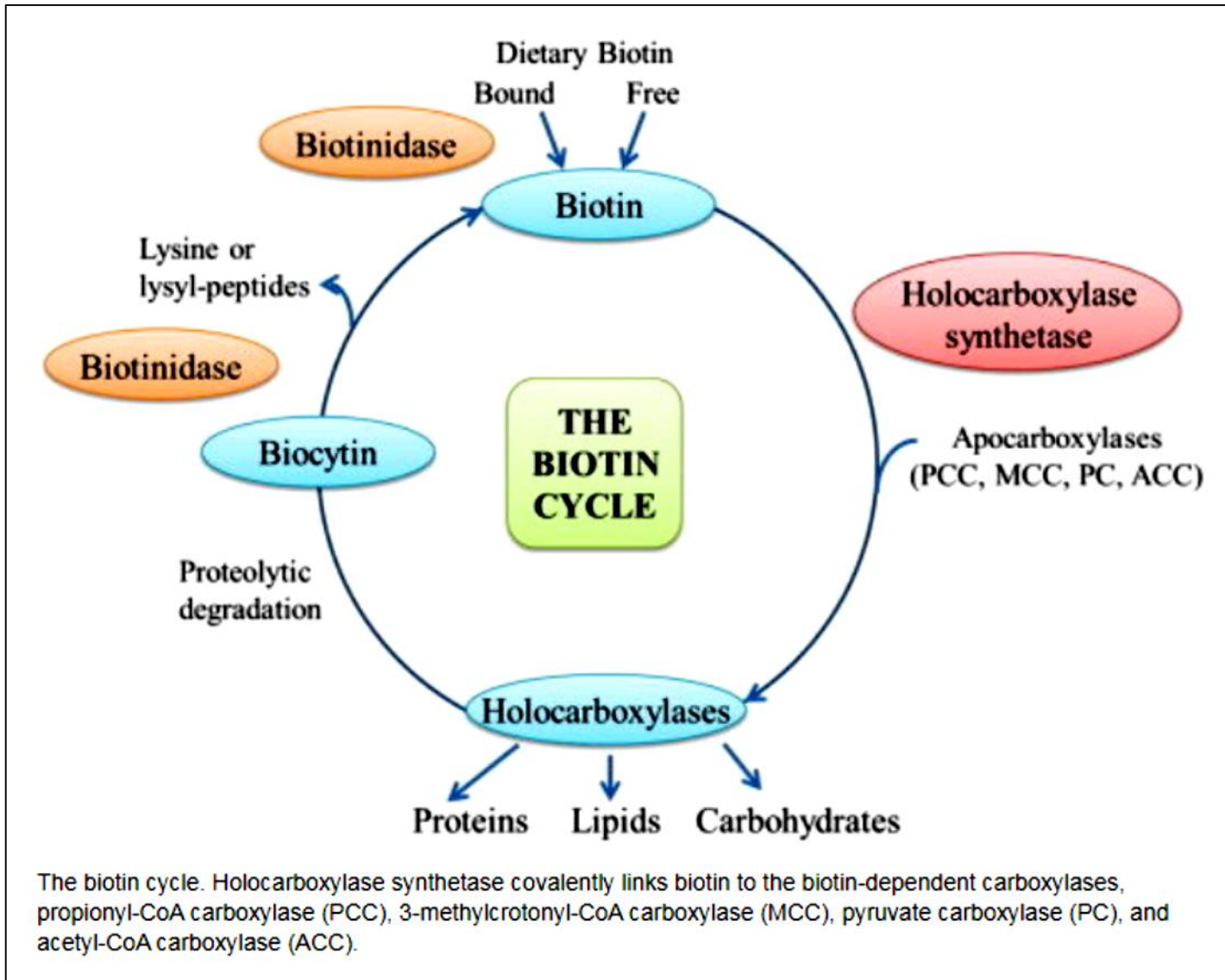


Significance of biotin

- The vitamin discovered after the research for nutritional factor that prevent egg whit injury in experiment animals.
- Avidin is a protein available in the egg white that produce biotin deficiency in animals.

Sources of biotin

- Royal jelly and brewer's yeast are the richest sources of biotin.
- Milk, liver, egg yolk and few vegetables are good sources of biotin.
- Biotin is destroyed by heat and oxidizing agents.
- Intestinal bacteria produce a small amount of biotin, which may be absorbed and contribute to daily needs.



Metabolic functions of biotin

Enzyme	Location	Function
Pyruvate carboxylase	Mitochondria	Formation of oxaloacetate from pyruvate; requires acetyl-CoA
Acetyl-CoA carboxylase	Cytosol	Formation of malonyl-CoA from acetyl-CoA for carboxylase fatty acid synthesis; requires citrate
Propionyl-CoA carboxylase	Mitochondria	Formation of methylmalonyl-CoA from propionyl-CoA produced by catabolism of some amino acids and odd-chain fatty acids
3-Methylcrotonoyl-CoA carboxylase	Mitochondria	Part of the leucine degradation pathway

Recommended Daily Allowance (RDA)

- 30 μg /day for men and women.

Biotin Deficiency

- It is rare because it is found in numerous foods and is synthesized by intestinal bacteria.
- Infant of certain mothers who have inadequate biotin in their milk.
- Biotin deficiency manifested itself as dermatitis, glossitis, anorexia, nausea and depression.

Toxicity of biotin

- No toxicity reported for biotin.