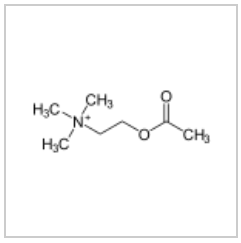
Basic biogenic amines

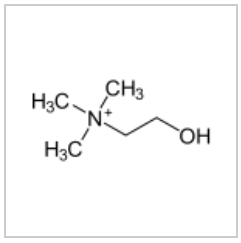
Biogenic amines are organic nitrogenous substances with high biological activity, which are formed by decarboxylation of amino acids with the simultaneous release of CO2, the cofactor is pyridoxal phosphate.

Ethanolamine

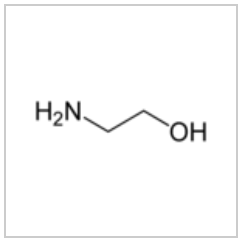
It is formed by decarboxylation of **serine.** It is triple methylated to form **choline**. Choline is a precursor to acetylcholine. The enzyme choline acetyltransferase catalyzes the formation of acetylcholine from acetyl-CoA and choline. Ethanolamine and choline are part of phospholipids - phosphatidylcholine and phosphatidylethanolamine.



Acetylcholine



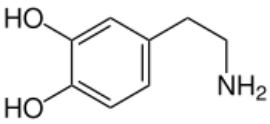
Choline



Ethanolamine

Dopamine

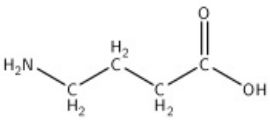
It is formed from **tyrosine**. The enzyme tyrosinhydroxylase hydroxylates tyrosin to 3,4-dihydroxyphenylalanine **(DOPA)**. Subsequently, DOPA-decarboxylase (PLP cofactor) cleaves CO_2 to form **dopamine**. **noradrenalin** can be formed from dopamine by hydroxylatio and then **adrenaline** by methilation.



Dopamine

γ-aminobutyric acid = GABA

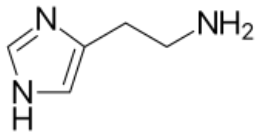
It is formed from **glutamate** by glutamate decarboxylase.



GABA

Histamine

It is formed from **histidine** by histidine decarboxylase.



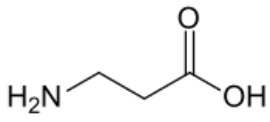
Histamine

β-alanine

It is formed by decarboxylation of **aspartate**, but they are also formed during the breakdown of pyrimidine bases. It is part of Coenzyme A.

Cysteamine

It is formed by decarboxylation of cystein. It is part of **coenzyme A**.

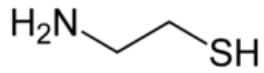


Beta-alanine

Tryptophan derivatives

Tryptamine

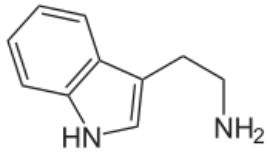
It is formed by decarboxylation of an aromatic amino acid **tryptophan**. It is a regulatory molecule whose function is still little known.



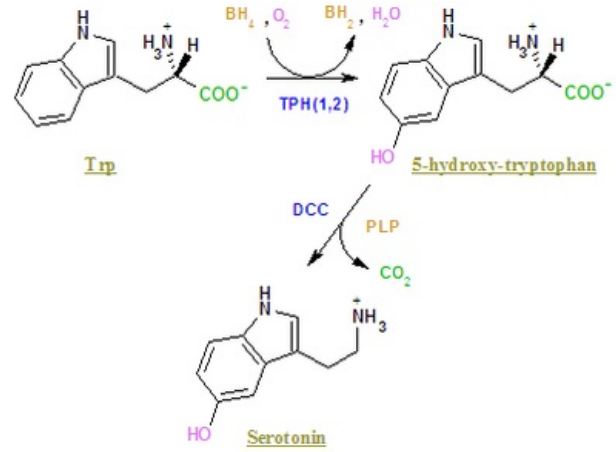
Cysteamine

Serotonin

Serotonin (5-hydroxytryptamine) is also a biogenic amine. It arises **from tryptophan** after hydroxylation (by tryptophan-5-monoxygenase with the participation of tetrahydrobiopterine) and the after decarboxylation.



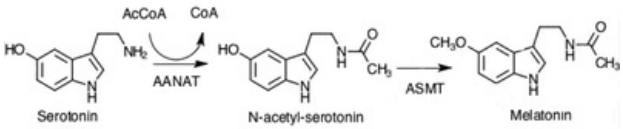
Tryptamine



Synthesis of serotonin

Melatonin

Melatonin (N-acetyl-5-methoxytryptamine) is synthesized **from serotonin** by N-acetylation followed by O-methylation.



Synthesis of melatonin

Links

Related articles

- Amino acids
- Coenzyme A
- Catecholamines
- GABA
- Decarboxylation - creation of biogenic amines

Used literature

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- MATOUŠ, Bohuslav, et al. *Základy lékařské chemie a biochemie.* 1. edition. Praha : Galén, 2010. pp. 540. ISBN 978-80-7262-702-8.
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