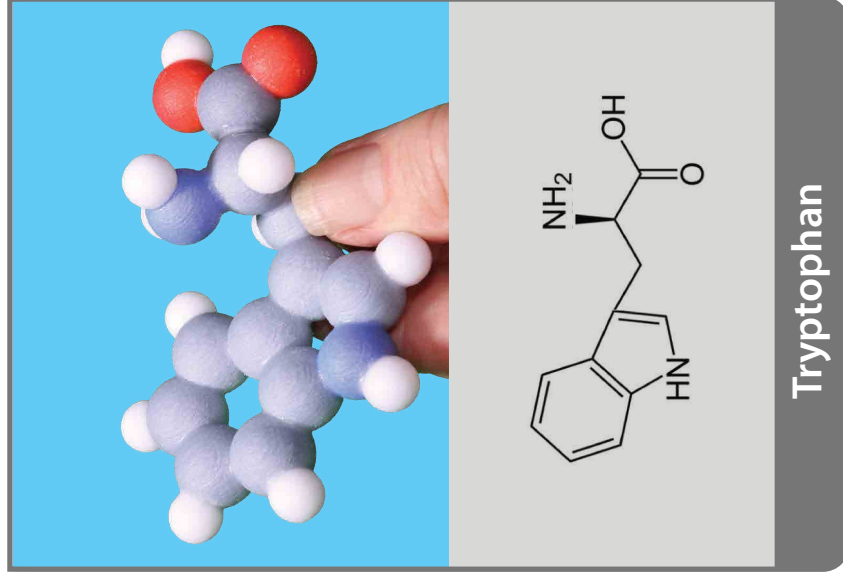
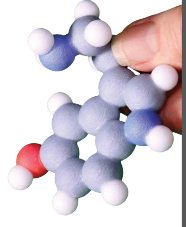
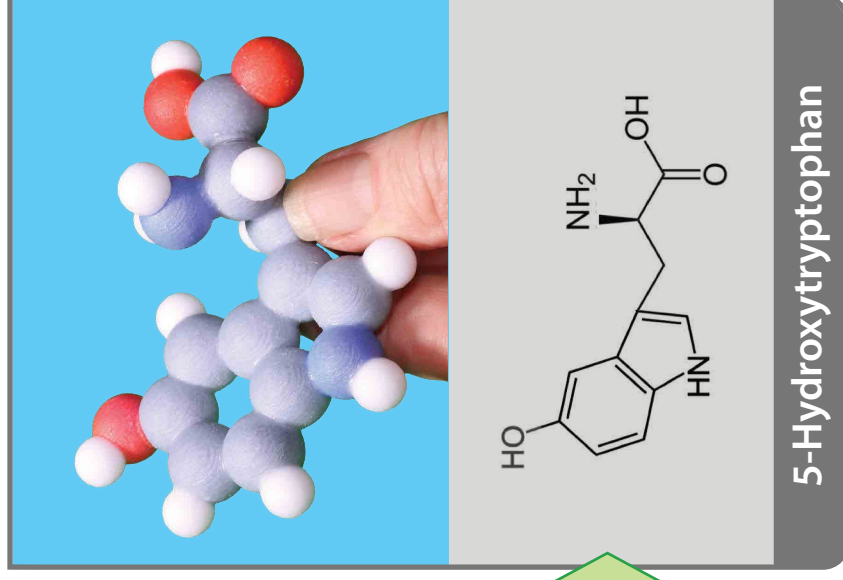


Serotonin Biosynthesis Model Guide

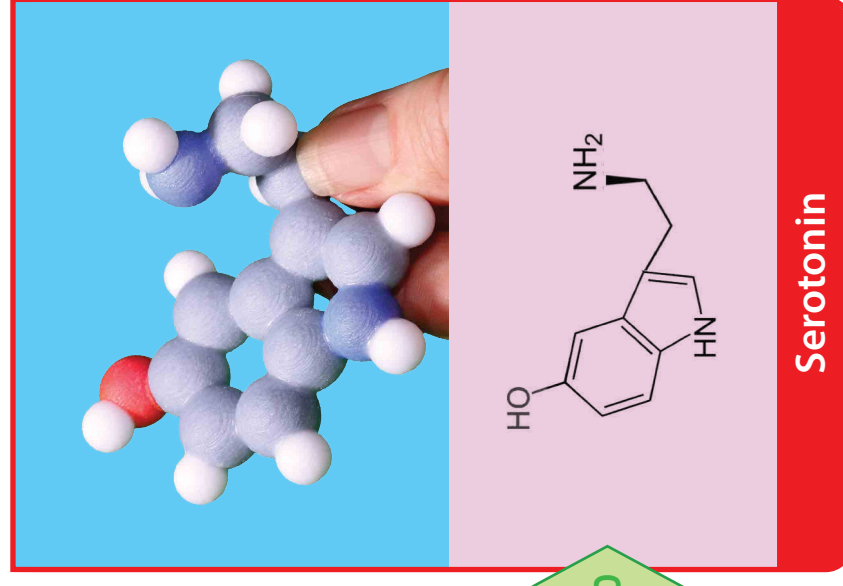
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Tryptophan (Trp or W) is one of the 20 standard amino acids and is an essential amino acid that cannot be synthesized by the human body. Tryptophan is composed of the standard amino acid backbone with an indole ring side chain.



5-Hydroxytryptophan, an intermediate molecule in the serotonin biosynthesis pathway, is formed by the addition of a hydroxyl (OH) group to the fifth carbon of the indole ring of tryptophan.



The final step in the serotonin biosynthesis pathway requires the removal of the carboxylic acid group (COOH) from the backbone of 5-hydroxytryptophan to form the neurotransmitter **serotonin**.

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Neurotransmitter (Serotonin)

TPH
Tryptophan Hydroxylase
(requires tetrahydrobiopterin as a cofactor)

AAAD
Aromatic L-Amino Acid Decarboxylase
(requires vitamin B6 as a cofactor)

Model Color Key

Oxygen

Hydrogen*

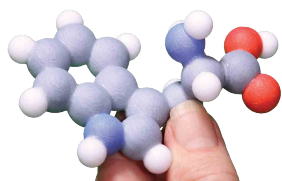
Carbon

Nitrogen

* Hydrogens not shown in chemical drawings

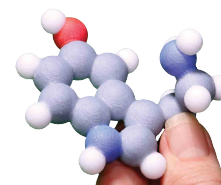
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Serotonin Biosynthesis

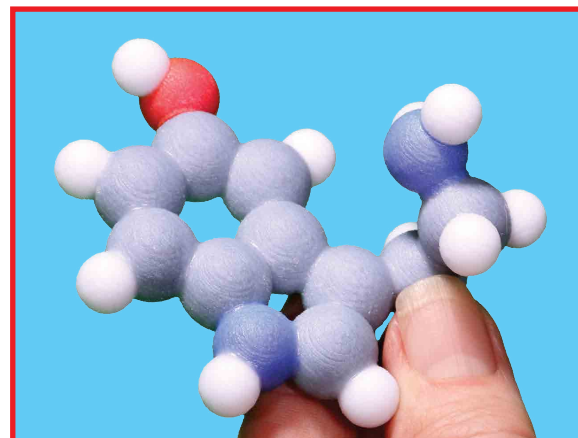
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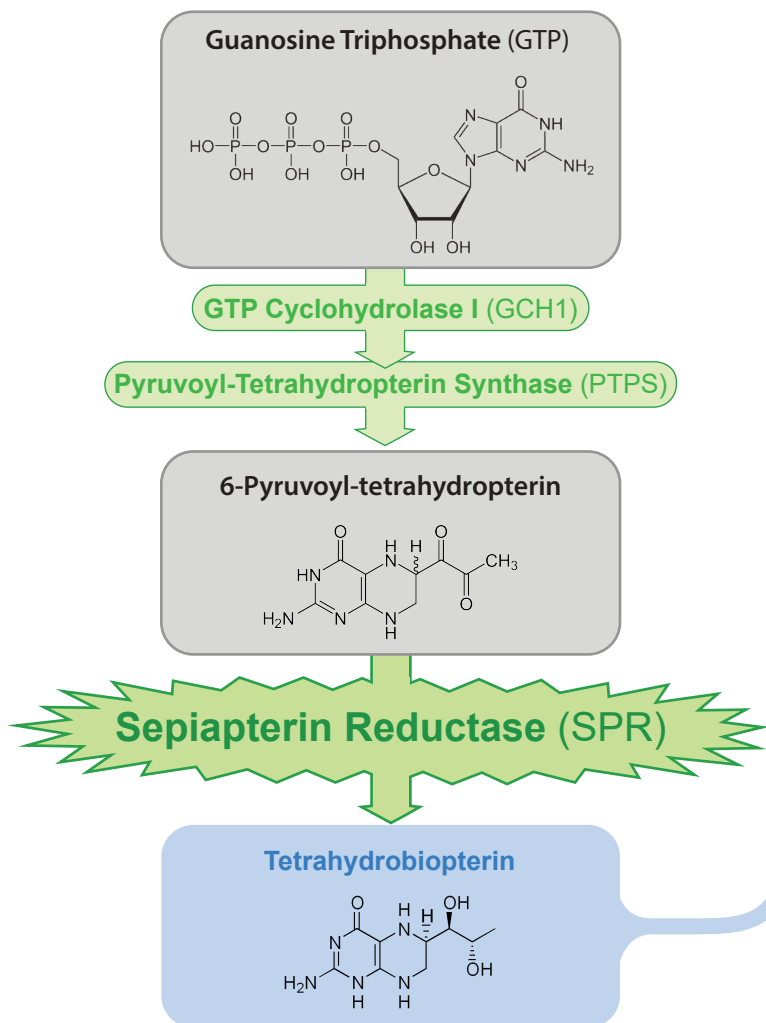
Sepiapterin reductase is the final enzyme in the biosynthetic pathway for **tetrahydrobiopterin** – a cofactor used by other enzymes in the synthesis of the neurotransmitters **dopamine** and **serotonin**.

In the case of **serotonin** biosynthesis, the enzyme **tryptophan hydroxylase** uses **tetrahydrobiopterin** to convert tryptophan to 5-hydroxytryptophan (5-HTP). In a second reaction, the enzyme **aromatic L-amino acid decarboxylase** converts 5-HTP into **serotonin**, the active neurotransmitter.

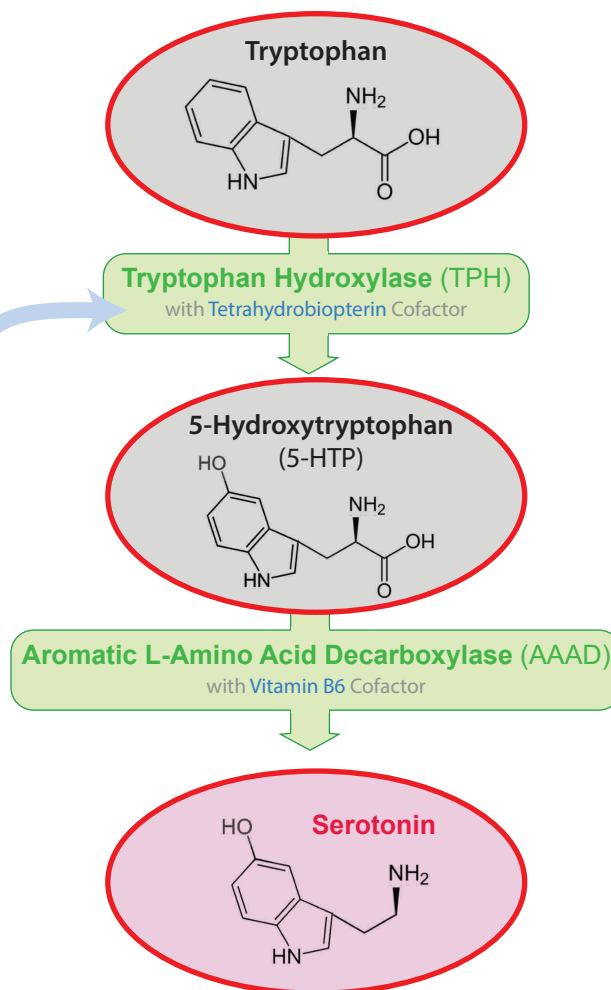
● Enzymes ● Neurotransmitters ● Cofactors



Tetrahydrobiopterin Pathway



Serotonin Pathway



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