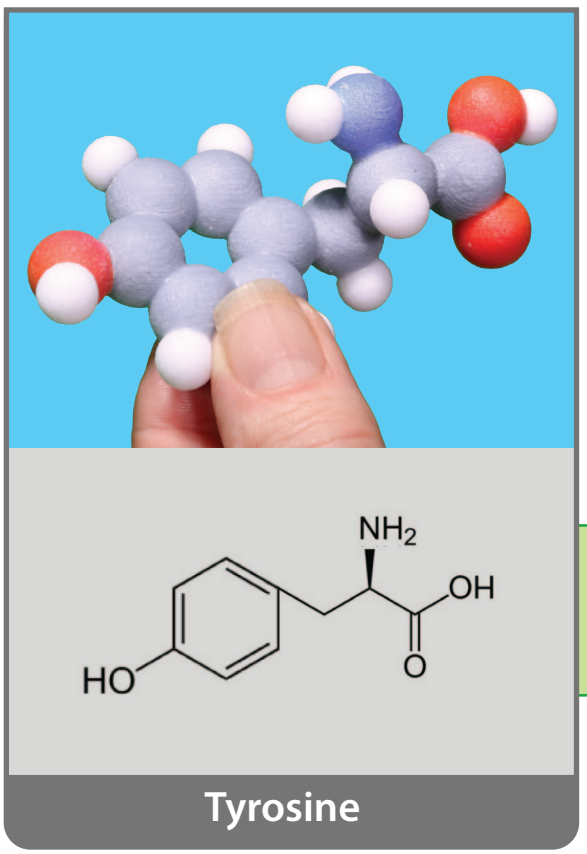
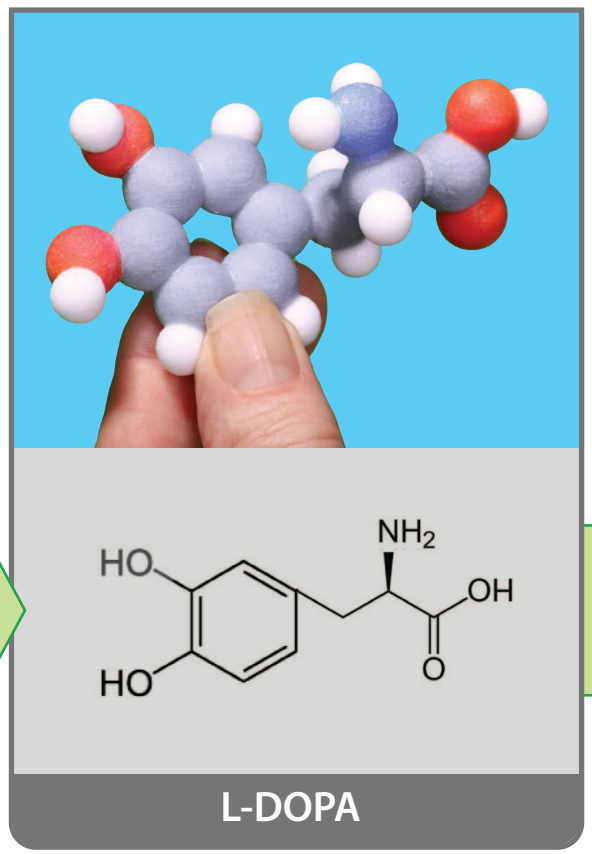
Dopamine Biosynthesis Model Guide

Neurotransmitters Module: The Beery Twins' Story©

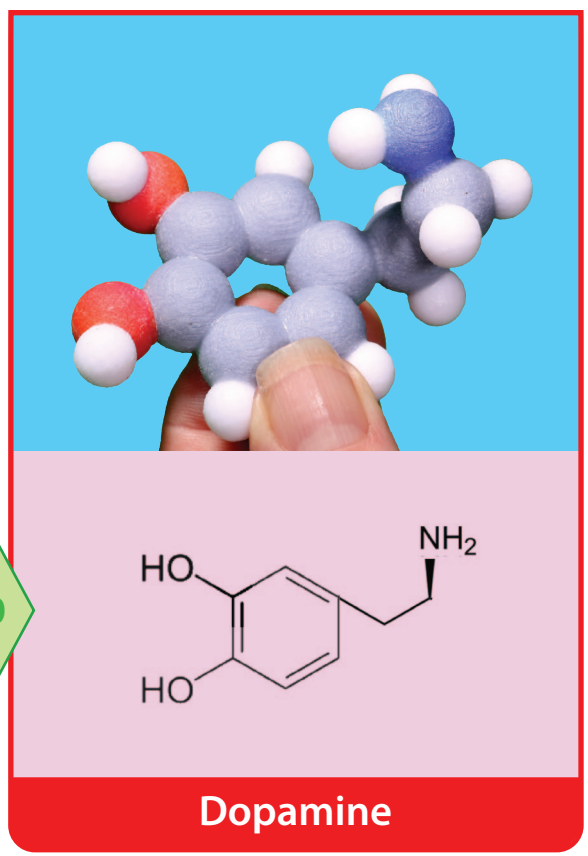
A Project-Based Learning Activity



TH



AAAD



Tyrosine (Tyr or Y) is a non-essential amino acid that can be synthesized in the human body from the amino acid phenylalanine. Tyrosine is composed of the standard amino acid backbone with an aromatic ring containing a hydroxyl (OH) group on the fourth carbon of the ring.

L-DOPA (L-3,4-dihydroxyphenylalanine), an intermediate molecule in the dopamine biosynthesis pathway, is formed by the addition of a hydroxyl group to the third carbon of the aromatic ring of tyrosine. L-DOPA can cross the blood-brain barrier. Dopamine cannot.

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

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Neurotransmitter (Dopamine)

TH — Tyrosine Hydroxylase
(requires tetrahydrobiopterin as a cofactor)

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

Model Color Key

- Oxygen
- Carbon
- Hydrogen*
- Nitrogen

* Hydrogens not shown in chemical drawings