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.
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 dopamine biosynthesis, the enzyme tyrosine hydroxylase uses tetrahydrobiopterin to convert tyrosine to L-DOPA. In a second reaction, the enzyme aromatic L-amino acid decarboxylase converts L-DOPA into dopamine, the active neurotransmitter.