Dopamine's metabolism and pathways
Dopamine is a monoamine neurotransmitter and a catecholamine, and it acts as a chemical messenger between nerve cells in the brain and the rest of the body. It also acts as a hormone.

- Synthesis: Dopamine is synthesized mainly in the brain in enteric neurons from tyrosine or phenylalanine catalyzed by tyrosine hydroxylase, aromatic amino acid decarboxylase, and other enzymes. However, the GI tract can produce from intestinal epithelial cells 50% of more of the bodies dopamine.
- Storage: Dopamine is stored in the cytoplasm and vesicles in axon terminals.
- Metabolism: Dopamine is broken down into inactive metabolites by enzymes such as monoamine oxidase (MAO), catechol-O-methyl transferase (COMT), and aldehyde dehydrogenase (ALDH).
- End-product: The main end-product of dopamine metabolism is homovanillic acid (HVA), which is filtered out of the bloodstream by the kidneys and excreted in urine.
- Therapeutic drugs: Parkinson's disease, ADHD, substance use disorders, and restless legs syndrome can be attributed to dysfunction in specific dopaminergic pathways. Some drugs for Parkinson's disease and other illnesses inhibit the enzymes that metabolize dopamine.

- Oxygen concentration: Increased oxygen levels can trigger dopamine oxidation, which can generate reactive oxygen species (ROS).
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Dopaminergic pathways the human brain are involved in both physiological and behavioral processes including movement, cognition, executive functions, reward, motivation, and neuroendocrine control.