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Assignment

## Acetylcholine

Acetylcholine is synthesized in certain neurons by the enzyme choline acetyltransferase from the compounds choline and acetyl-CoA. Cholinergic neurons are capable of producing ACh. An example of a central cholinergic area is the nucleus basalis of Meynert in the basal forebrain. The enzyme acetylcholinesterase converts acetylcholine into the inactive metabolites choline and acetate. This enzyme is abundant in the synaptic cleft, and its role in rapidly clearing free acetylcholine from the synapse is essential for proper muscle function. Certain neurotoxins work by inhibiting acetylcholinesterase, thus leading to excess acetylcholine at the neuromuscular junction, causing paralysis of the muscles needed for breathing and stopping the beating of the heart..

Acetylcholine is the neurotransmitter used at the neuromuscular junction in other words, it is the chemical that motor neurons of the nervous system release in order to activate muscles. This property means that drugs that affect cholinergic systems can have very dangerous effects ranging from paralysis to convulsions. Acetylcholine is also a neurotransmitter in the autonomic nervous system, both as an internal transmitter for the sympathetic nervous system and as the final product released by the parasympathetic nervous system. Acetylcholine is the primary neurotransmitter of the parasympathetic nervous systems.
In the brain, acetylcholine functions as a neurotransmitter and as a neuromodulator. The brain contains a number of cholinergic areas, each with distinct functions; such as playing an important role in arousal, attention, memory and motivation.

## Dopamine

The synthesis of dopamine (dihydroxyphenylethylamine) begins with the conversion of tyrosine to l-DOPA (dihydroxyphenylalanine) by the enzyme tyrosine hydroxylase. l-DOPA is then converted to dopamine by DOPA decarboxylase, as shown in Figure 4.2.10. Norepinephrine and epinephrine are synthesized from dopamine. Terminals that synthesize norepinephrine must first synthesize dopamine, which is placed in vesicles just like it is in dopamine-secreting terminals. The vesicles contain dopamine β hydroxylase, whereas tyrosine hyroxylase and l-DOPA decarboxylase and PNMT (phenylethanolamine *N*-methyltransferase) are all in the cytoplasm

Dopamine is produced in several areas of the brain, including the substantia nigra and the ventral tegmental area. It is a neurohormone that is released by the hypothalamus. Its action is as a hormone that is an inhibitor or prolactin release from the anterior lobe of the pituitary.