

Acetylcholine is an organic chemical that functions in the brain and body of many types of animals as a neurotransmitter—a chemical released by nerve cells to send signals to other cells. Its name derives from its chemical structure: it is an ester of acetic acid and choline. Parts in the body that use or are affected by acetylcholine are referred to as cholinergic.

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 used as 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.

Inside the brain acetylcholine functions as a neuromodulator—a chemical that alters the way other brain structures process information rather than a chemical used to transmit information from point to point. The brain contains a number of cholinergic areas, each with distinct functions. They play an important role in arousal, attention, and motivation.

Partly because of its muscle-activating function, but also because of its functions in the autonomic nervous system and brain, a large number of important drugs exert their effects by altering cholinergic transmission. Numerous venoms and toxins produced by plants, animals, and bacteria, as well as chemical nerve agents such as Sarin, cause harm by inactivating or hyperactivating muscles via their influences on the neuromuscular junction. Drugs that act on muscarinic acetylcholine receptors, such as atropine, can be poisonous in large quantities, but in smaller doses they are commonly used to treat certain heart conditions and eye problems. Scopolamine, which acts mainly on muscarinic receptors in the brain, can cause delirium and amnesia. The addictive qualities of nicotine derive from its effects on nicotinic acetylcholine receptors in the brain.

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