

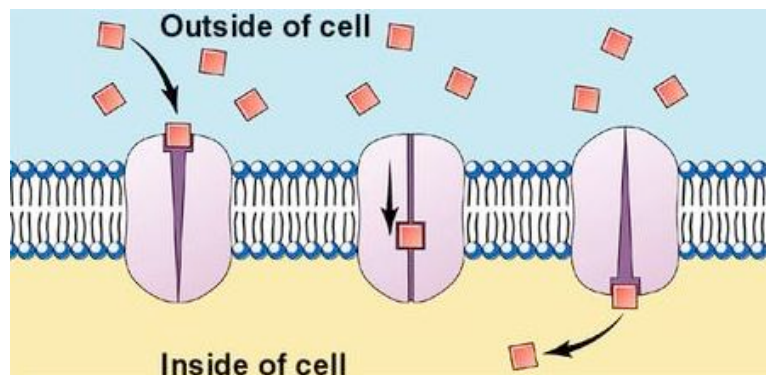
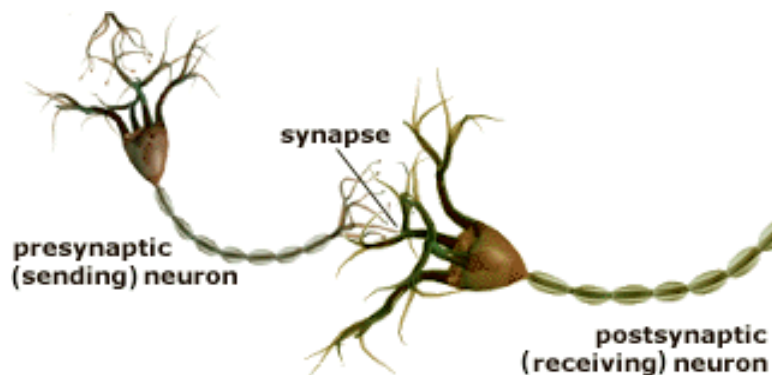
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## Neurotransmitters

Neurons communicate via neurotransmitters. These neurotransmitters act at receptors on dendrites (usually) and result in a change. Activating the receptors will open ion channels, resulting in charged atoms flowing into or out of the cell. The flow of charged atoms (ions) causes the cell to be either depolarized or hyperpolarized.

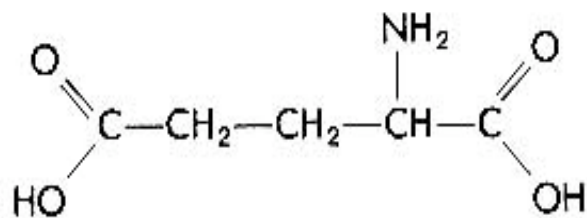
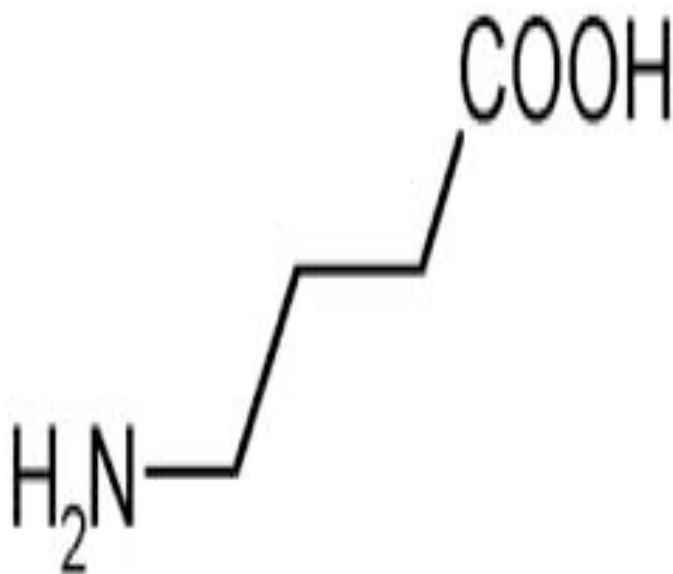
Because the inside of a cell has a negative charge overall, a positive charge applied causes a depolarization. Conversely, hyperpolarization occurs when a cell becomes more polarized than normal. The depolarization or hyperpolarization that follows will make the signal more or less likely to be transmitted down the axon and to another cell. Activation of receptors repetitively can result in a change in the ease of activation (sensitization or desensitization) or the number of receptors present at the dendrite.

Changes in the amount of neurotransmitter released by the presynaptic terminal as well as the number and sensitivity of receptors at the postsynaptic terminal lead to varying activity levels of the neurons. This modulation in activity on a cellular level can lead to outward changes, or behavior differences. The nervous system contains many different kinds of neurotransmitters, each with a general role. The most studied neurotransmitters include GABA, glutamate, acetylcholine, epinephrine, norepinephrine, serotonin and dopamine.



## GABA and Glutamate

GABA is the most common inhibitory neurotransmitter in the nervous system and is found throughout the body. An inhibitory neurotransmitter works by telling a neuron not to fire (relay the message).

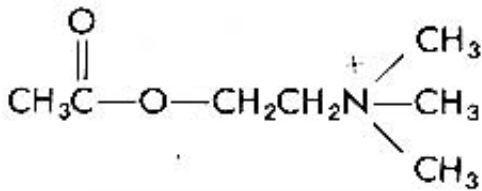


**Glutamate**  
(glutamic acid)

Inhibitory neurotransmitters are important and vital to the nervous system because without any inhibition, the brain would continually fire through excitatory synapses making the brain unstable. This unimpeded firing is referred to as a seizure. Glutamate is the principle

excitatory neurotransmitter. These two neurotransmitters are global.

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**Acetylcholine**

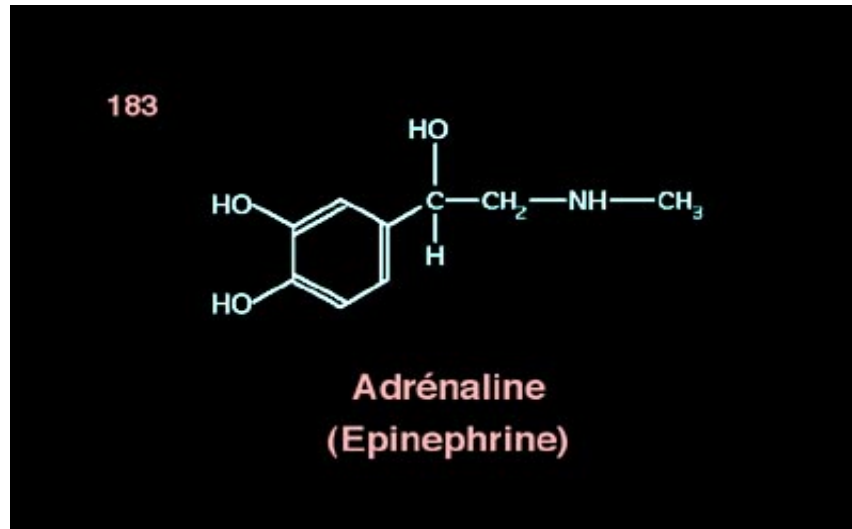
### Acetylcholine

Acetylcholine is responsible for muscular movement and has been shown to have a role in memory formation. It was the first neurotransmitter to be discovered, and thus is the best known.

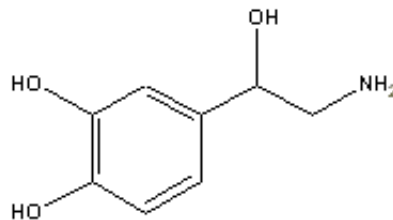
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### Epinephrine and Norepinephrine

Epinephrine and norepinephrine act very similarly. They are associated with vigilance and the fight-or-flight response. Their activity revs up the sympathetic nervous system, preparing a body to face danger or run away from it.



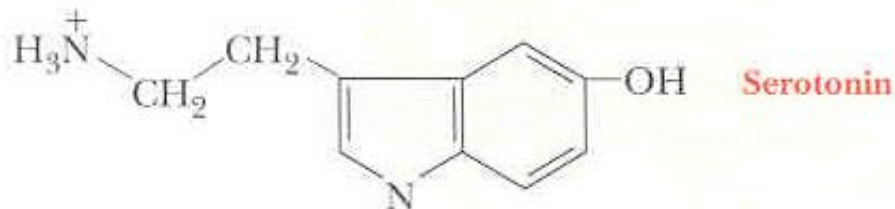
### norepinephrine




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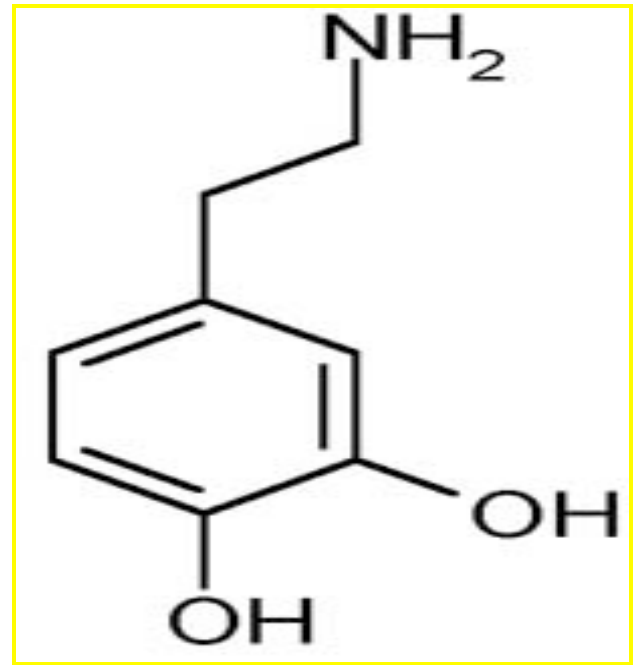
### Serotonin

Serotonin plays a role in mood, sleep rhythms and arousal. Decreases in serotonin have been shown to correlate with clinical depression.



## Dopamine

Dopamine has been implicated in numerous functions within the body, including movement, attention, learning, and the reward and reinforcement aspects of addictive drugs. It is the primary neurotransmitter affected by the illegal drugs cocaine, amphetamines and opiates. Dopamine and its actions in schizophrenia and amphetamine-induced psychosis will be the focus of much of this website.



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