

## The Synapse:

**Synapse** - the tiny gap between the axon end of one neuron and the dendrite of another neuron.

**Presynaptic neuron** - the neuron that carries the wave of depolarization

**Postsynaptic neuron** - the neuron that receives the stimulus

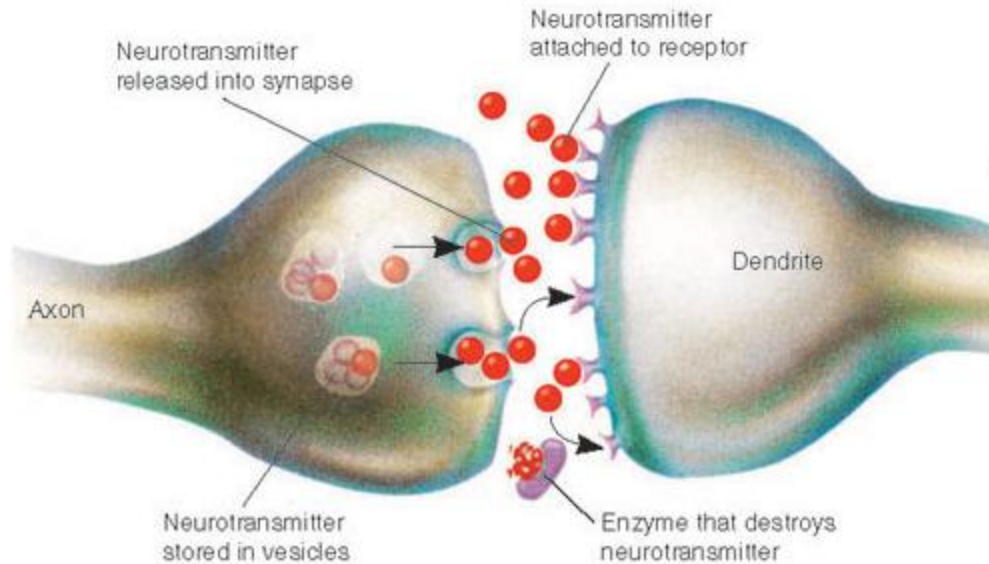
**Synaptic vesicles** - specialized vacuoles that release neurotransmitters

**Excitatory response** - opens sodium gates , triggering a wave of depolarization

**Inhibitory response** - makes post-synaptic neuron more negative inside by opening chloride channels. This raises the threshold of stimulus.

How a message is relayed across the synapse:

- A wave of depolarization reaches the end of the axon - this opens special calcium ion gates
- calcium release triggers release of neurotransmitters by exocytosis from the synaptic vesicles
- neurotransmitter diffuses into the gap
- neurotransmitter attaches to the special receptor sites of dendrite
- this causes either an excitatory response, that stimulates the next cell or an inhibitory response, which will stop the message
- once the neurotransmitter attaches to the postsynaptic receptors it is broken down almost immediately by an enzyme released from the presynaptic neuron.
- Neurotransmitters can stimulate or inhibit cells that are not neurons. They may work with muscles or glands.



### Types of Neurotransmitters:

#### (1) **acetylcholine**

- ▶ primary neurotransmitter of somatic and parasympathetic nervous systems
- ▶ can have excitatory or inhibitory effects
- ▶ stimulates skeletal muscles but inhibits cardiac muscles

#### (2) **noradrenaline** (also called norepinephrine)

- ▶ primary neurotransmitter of the sympathetic nervous system

#### (3) **glutamate**

- ▶ brain neurotransmitter
- ▶ 75% of all excitatory transmission in the cerebral cortex

#### (4) **GABA** (Gamma aminobutyric acid)

- ▶ brain's most common inhibitory neurotransmitter

#### (5) **Dopamine**

- ▶ brain neurotransmitter
- ▶ has two functions
- ▶ elevates mood
- ▶ controls skeletal muscles

#### (6) **Serotonin**

- ▶ multiple functions
- ▶ alertness
- ▶ sleepiness
- ▶ thermoregulation
- ▶ mood

