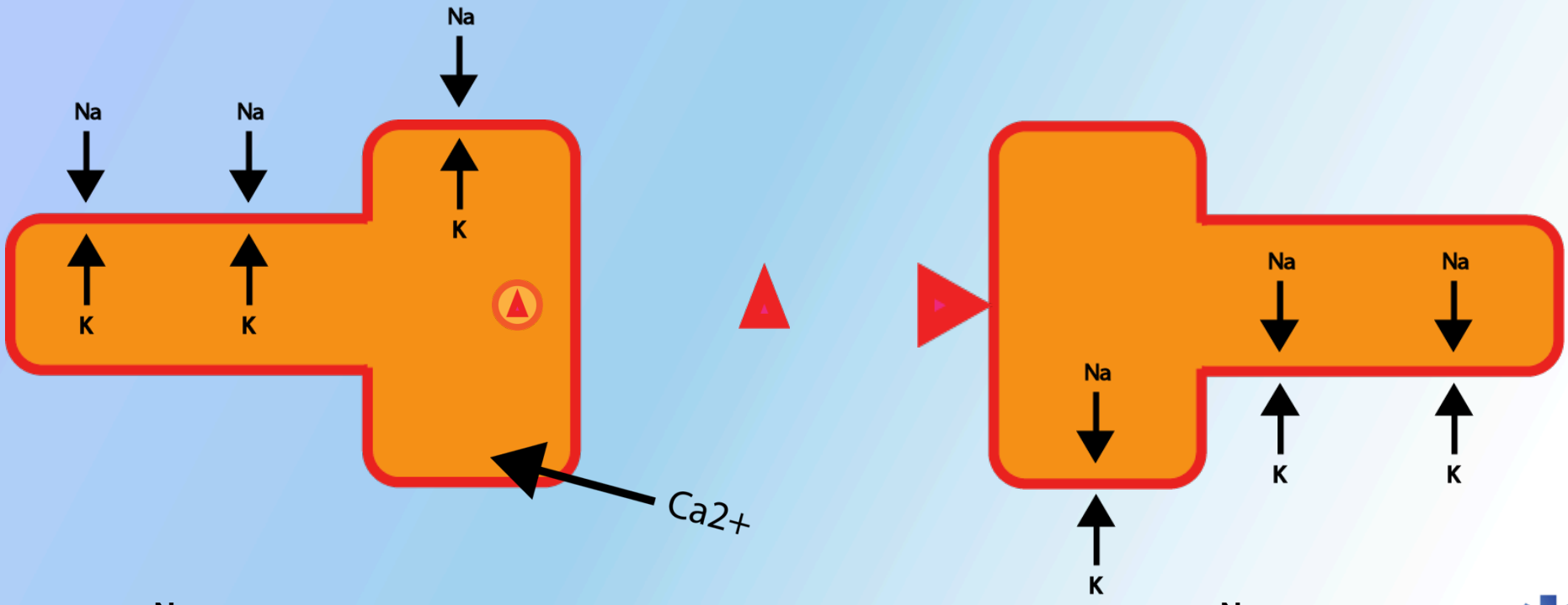
Neuromuscular Junctions

A few general things...



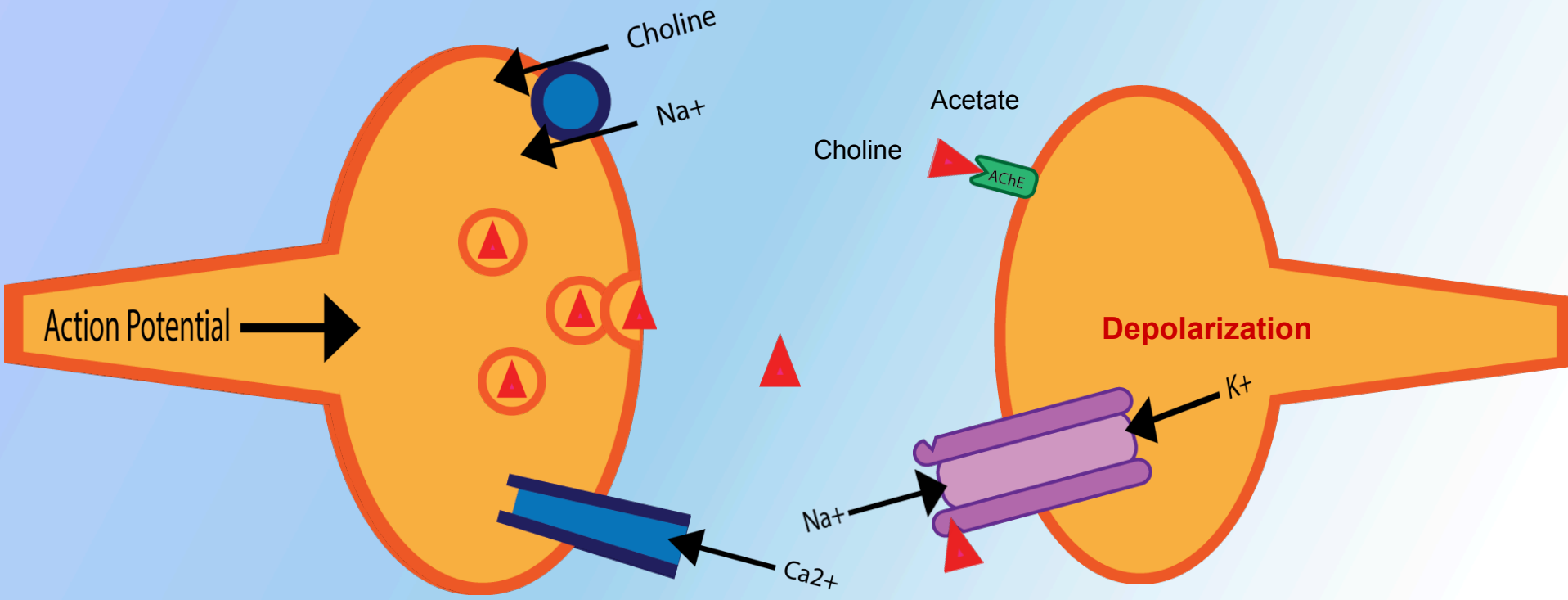
Acetylcholine (Cholinergic)

- Nicotinic - somatic (skeletal muscle)
- Muscarinic - typically relating to autonomic system

Norep/Epinephrine (Adrenergic)

- A,B adrenergic receptors - autonomic system
  - Smooth muscle, cardiac muscle

Skeletal Muscle is regulated by **Nicotinic Cholinergic** receptors



Presynaptic Nerve Terminal
Motor End Plate

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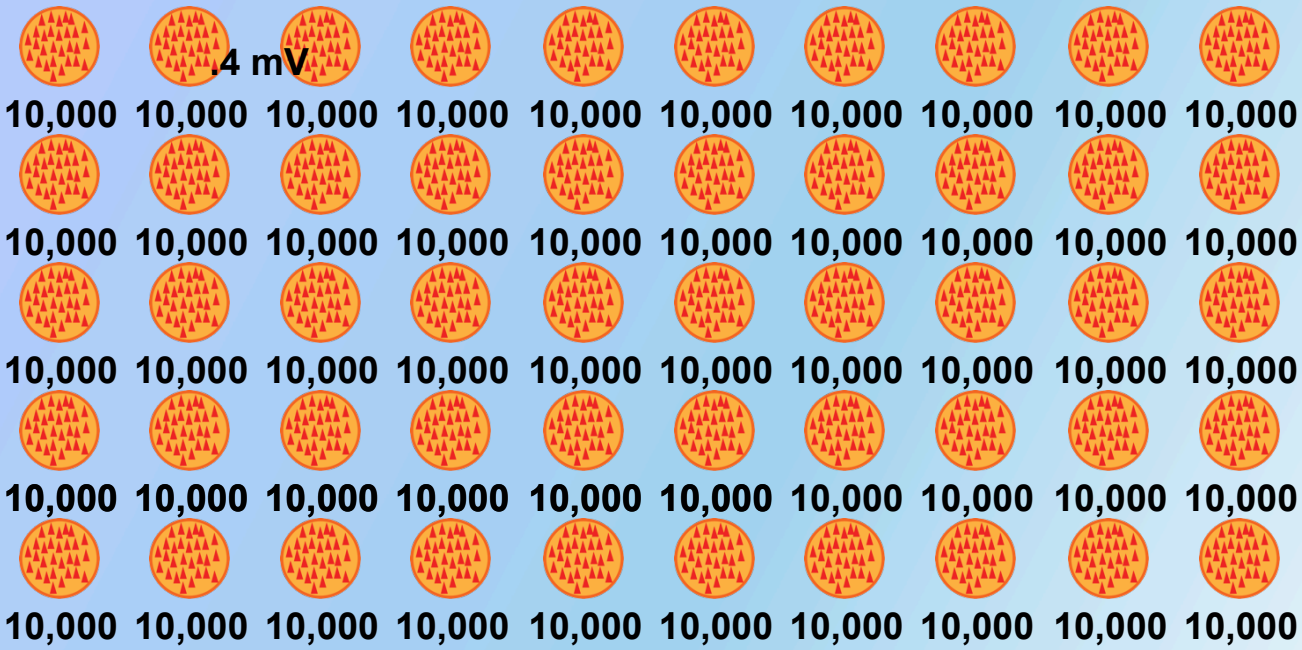
End Plate Potential

- The amount of ACh in a single vesicle is a quantum
  - The amount of change in membrane by a quantum is a **miniature end plate potential (MEPP)**
    - **Approximately 0.4 mV change**

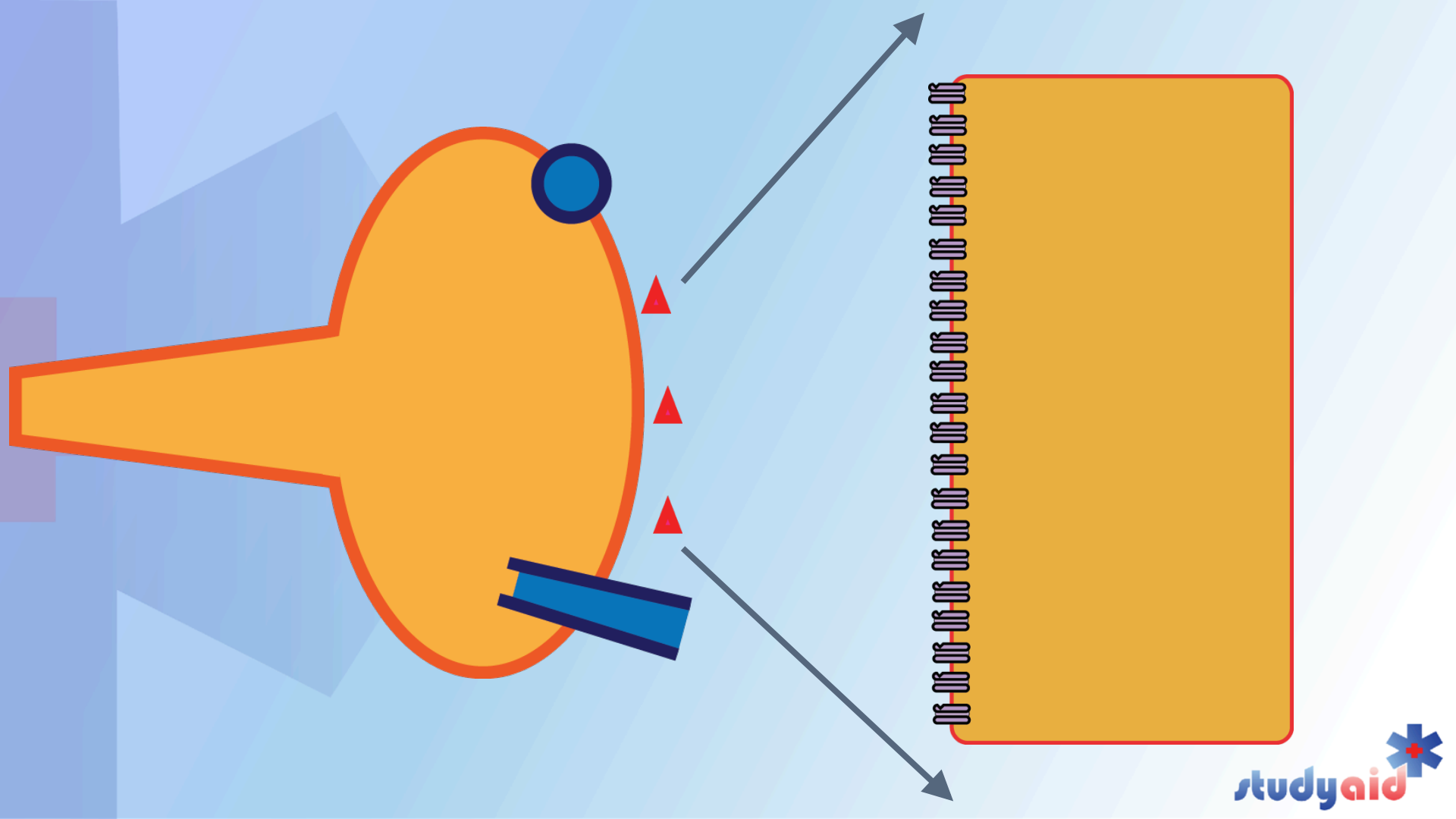
- MEPPs summate to cause **End Plate Potential (EPP)**
  - Requires a change from about -90 mV to -50 mV

Putting Things in Perspective



4 mV

20 mV



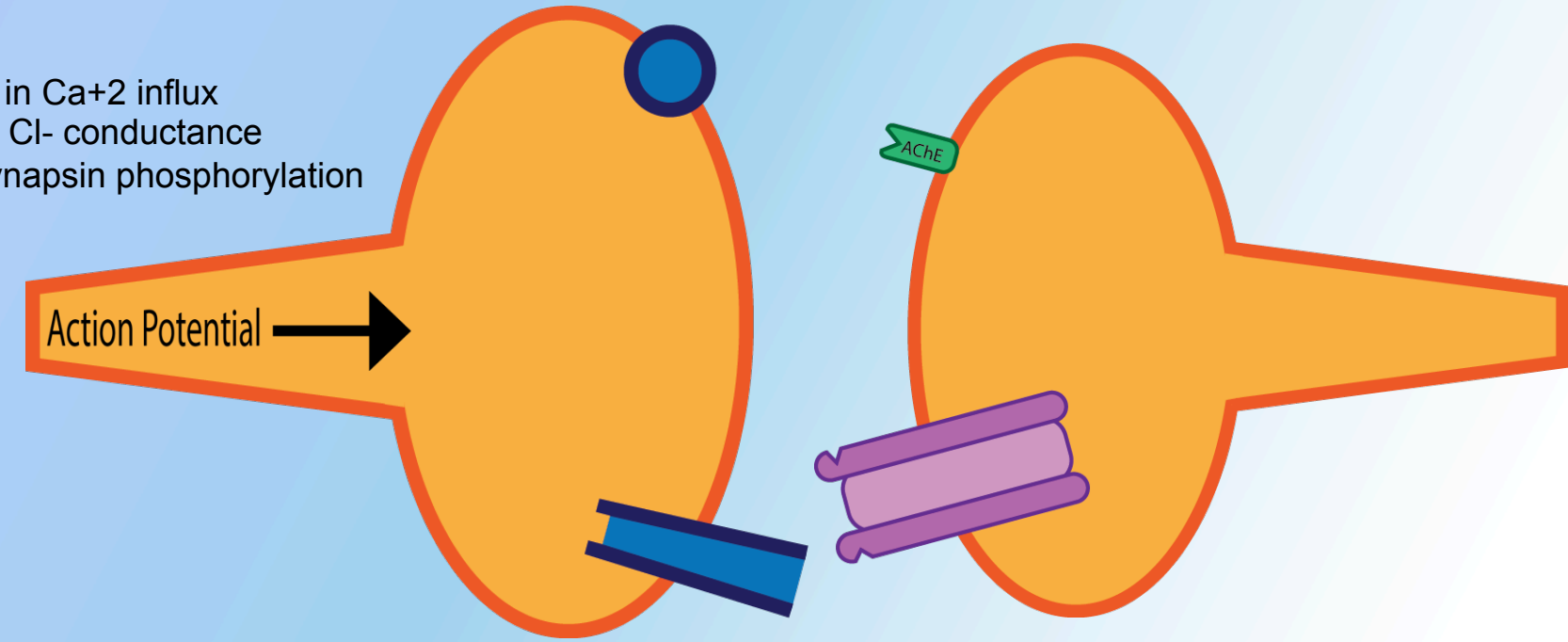
Excitation vs. Inhibition

- Excitatory postsynaptic potentials **depolarize** the next cell
  - Bring the membrane potential closer to an action potential
  - E.g. Na/K channel (for example, ACh)

- Inhibitory postsynaptic potentials **hyperpolarize** the next cell
  - Bring the membrane potential further from an actional potential
  - E.g. Cl- channel (via GABA, glycine)

Presynaptic Inhibition

- Decrease in Ca+2 influx
- Increased Cl- conductance
- Lack of synapsin phosphorylation



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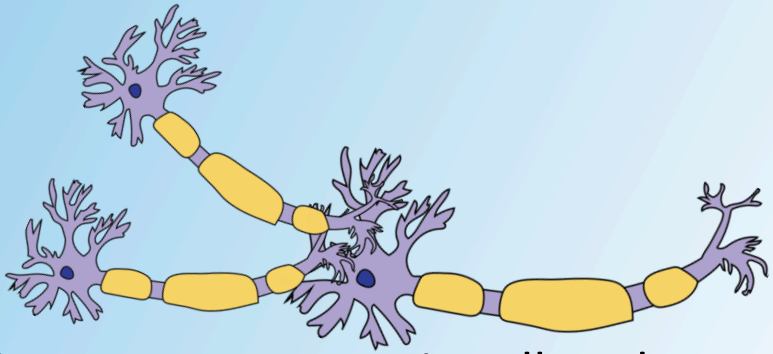
Summation

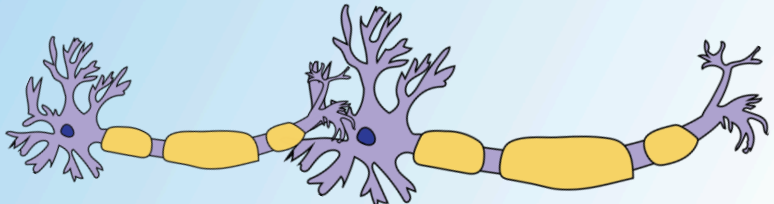


Spatial Summation

- Two or more presynaptic inputs arrive at a postsynaptic cell at the same time
  - If both are excitatory, their strength combines and produces larger depolarization
  - **Inhibition and excitation cancel themselves out**

Temporal Summation

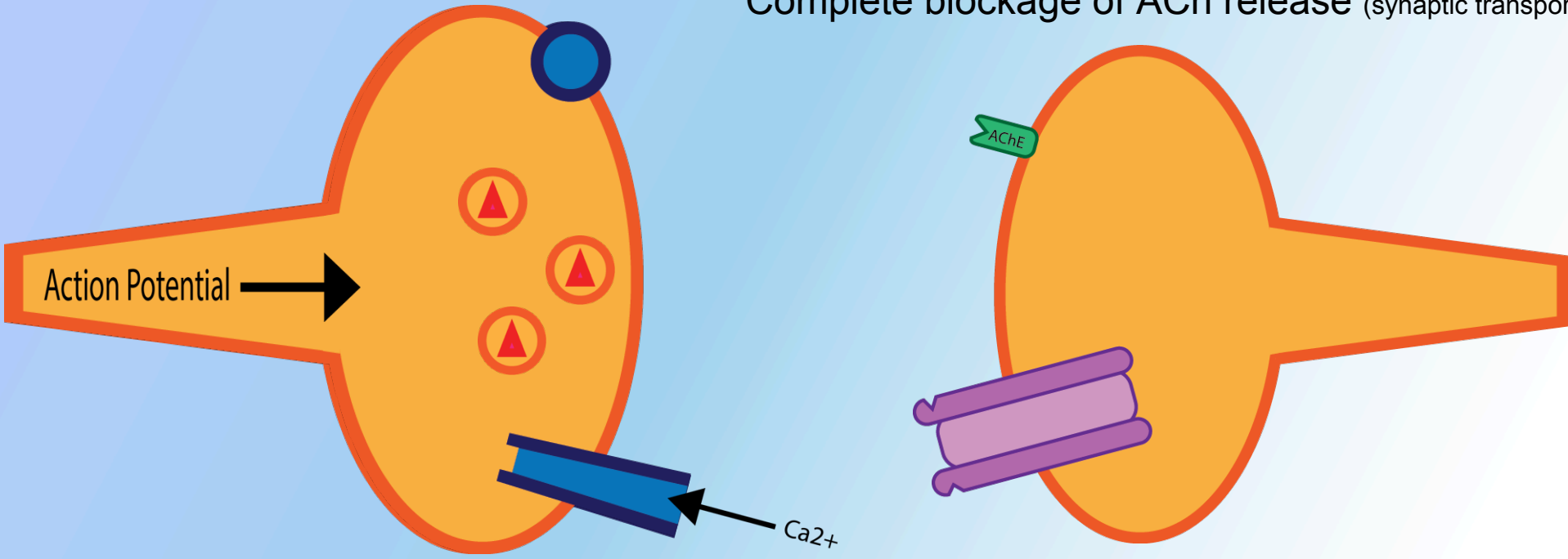
- One synaptic input fires at a rapid pace
  - Postsynaptic neuron to reaches its threshold via overlap



Toxins, Disruptions, Fluctuations

Botulinus Toxin

Complete blockage of ACh release (synaptic transpor



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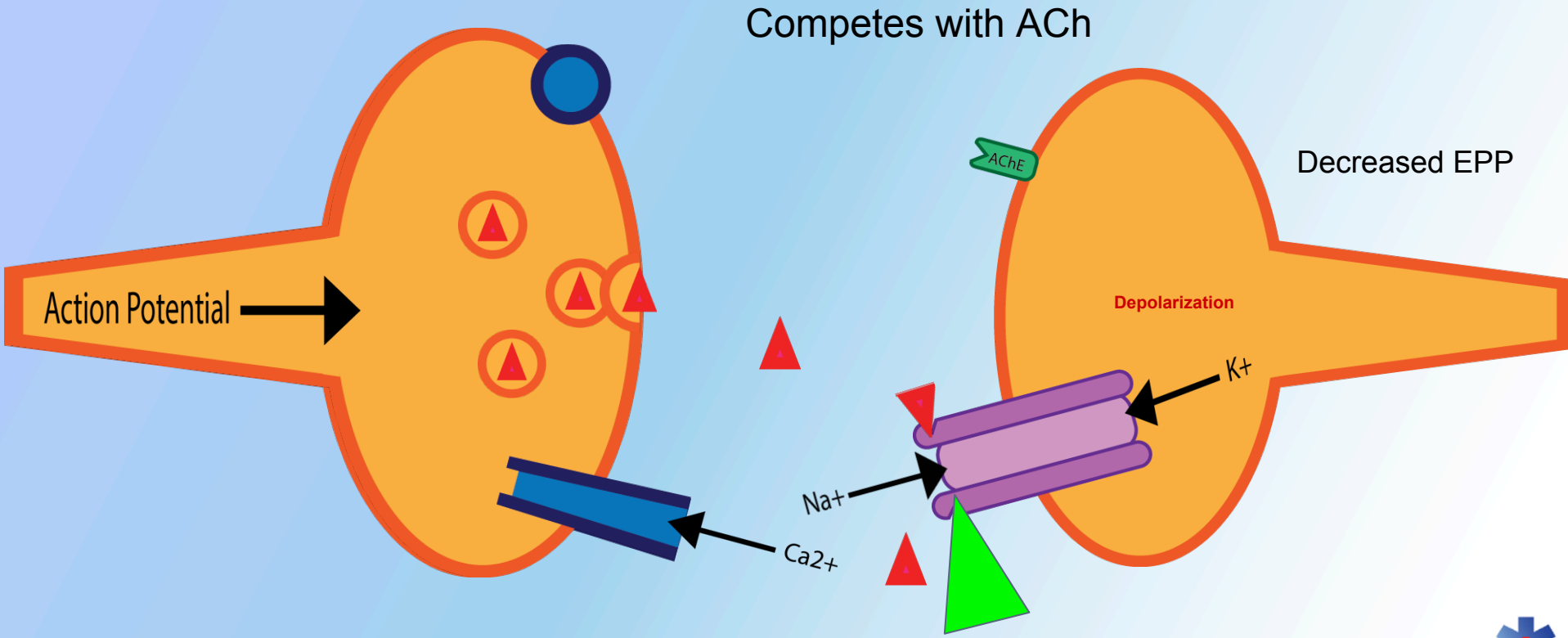
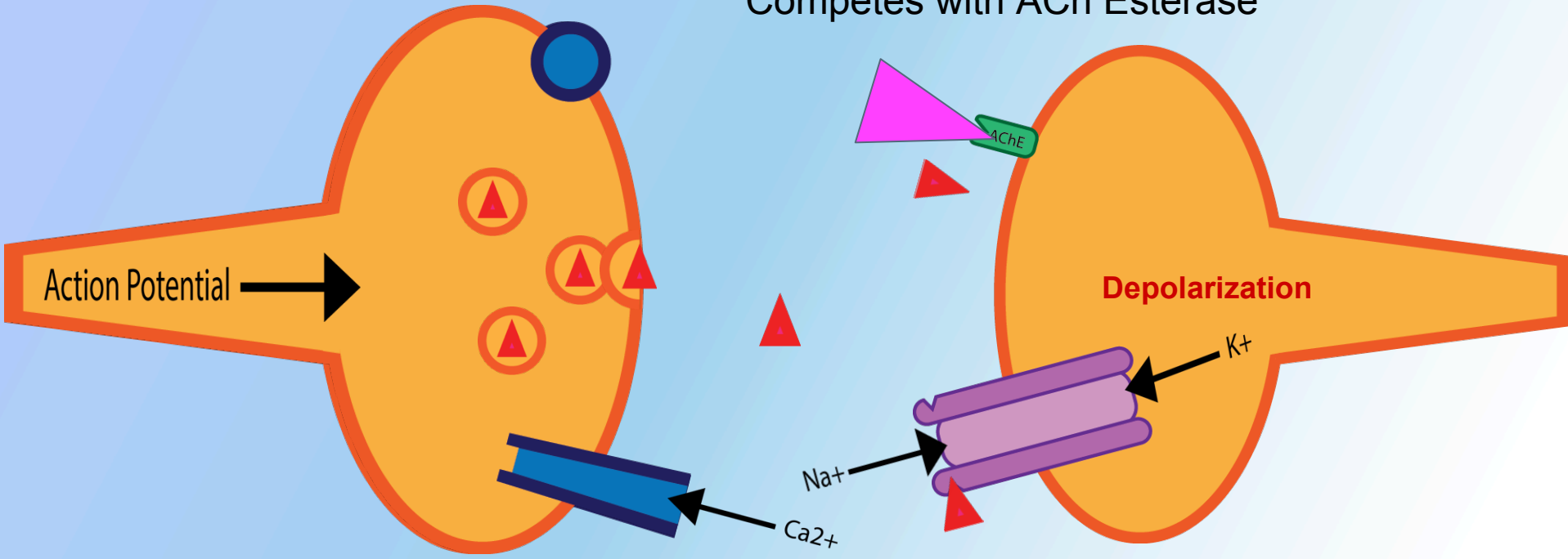


AChE inhibitors (e.g. neostigmine, physostigmine)

Competes with ACh Esterase



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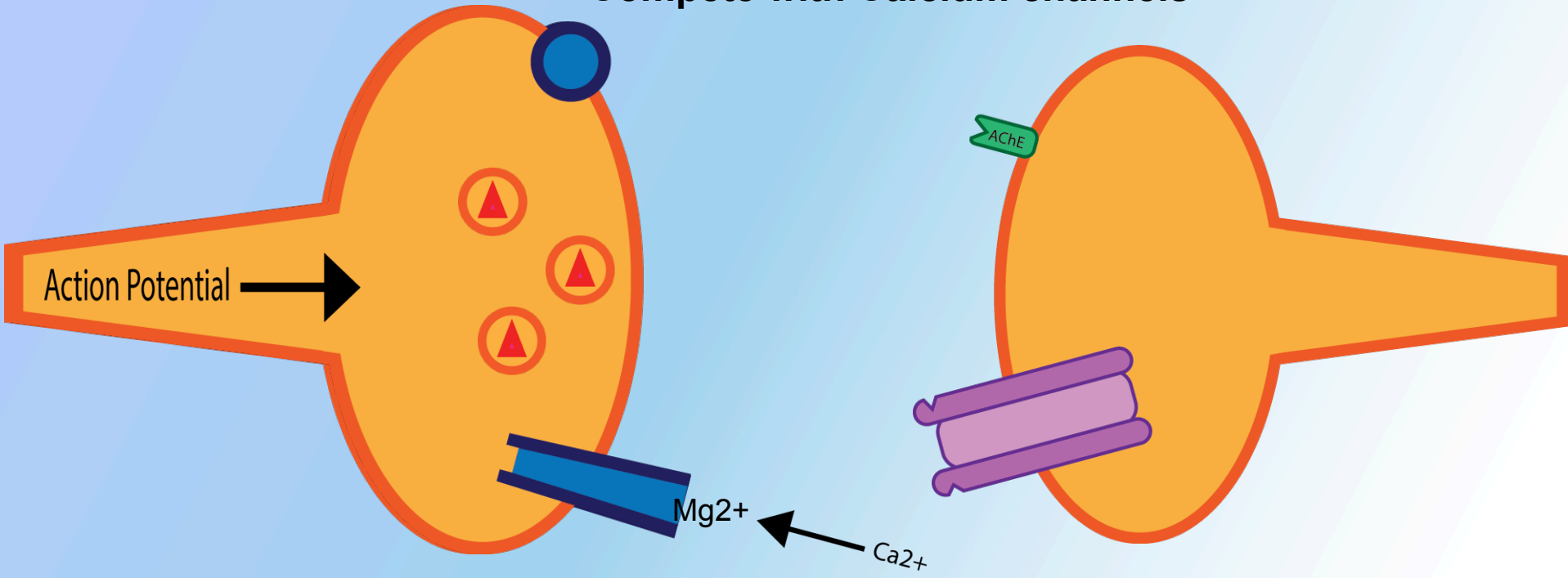
Magnesium Ions

Compete with Calcium channels



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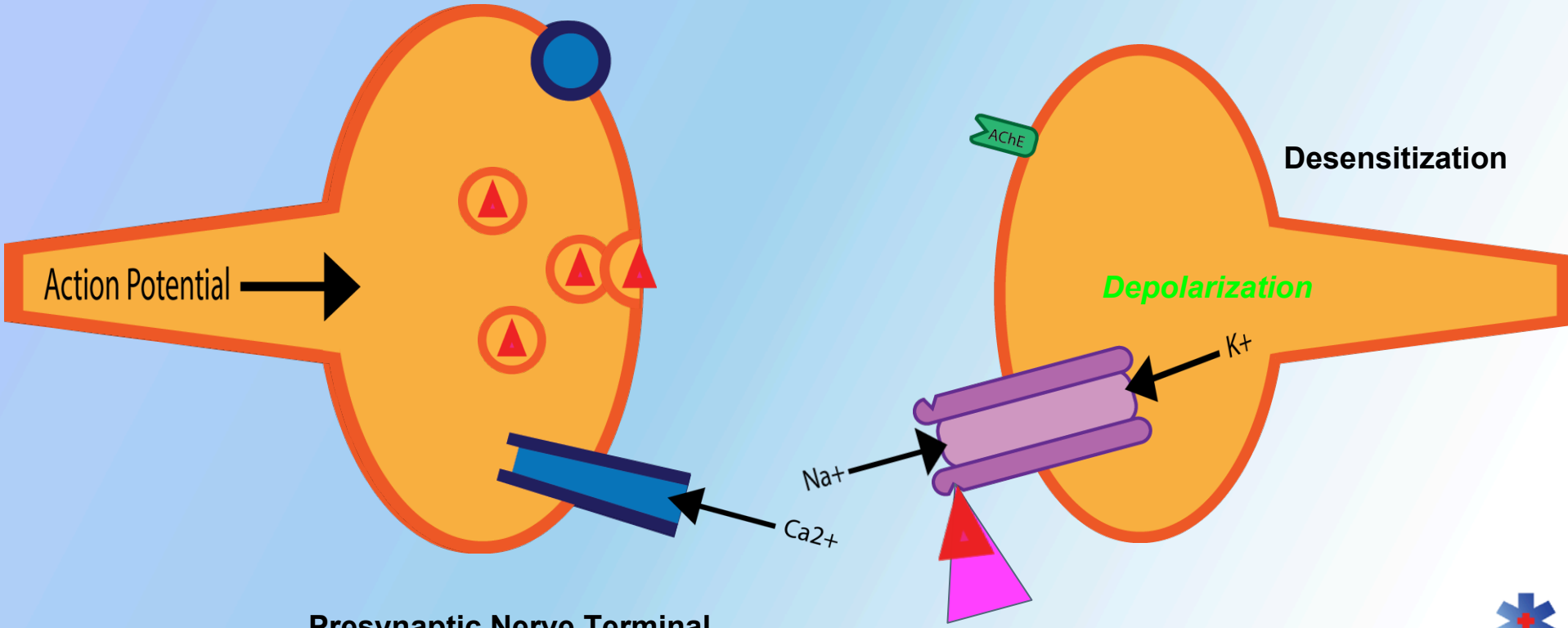
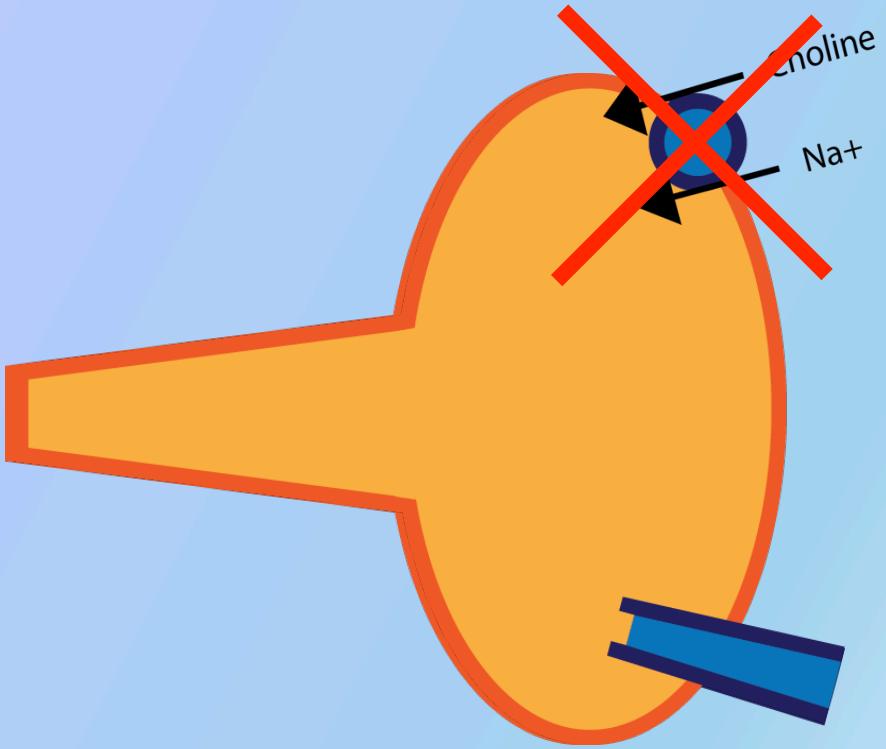
Suxamethonium chloride

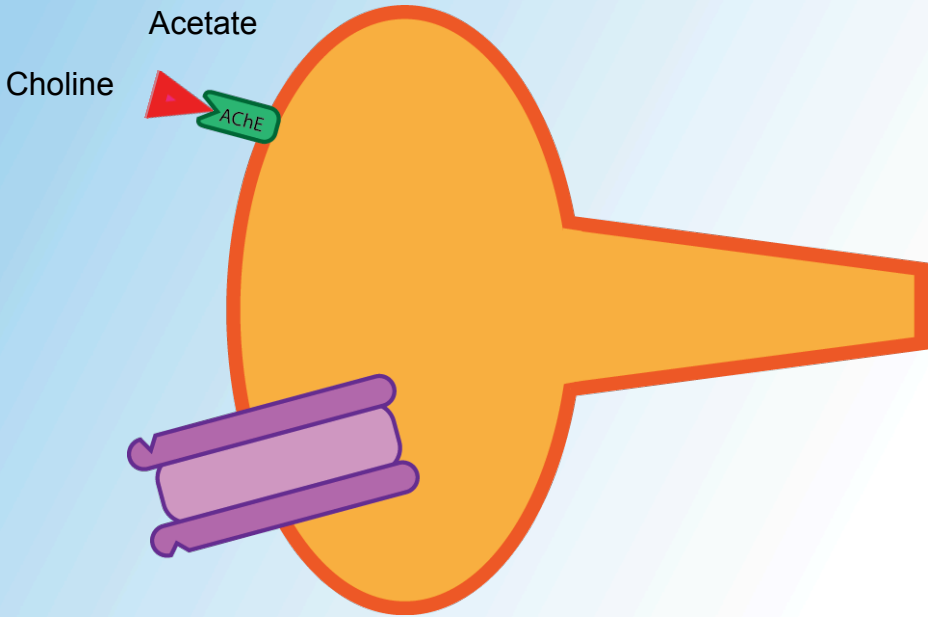
Inhibitor of Postsynaptic Depolarization



Hemicholinium

Blocks choline reuptake





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