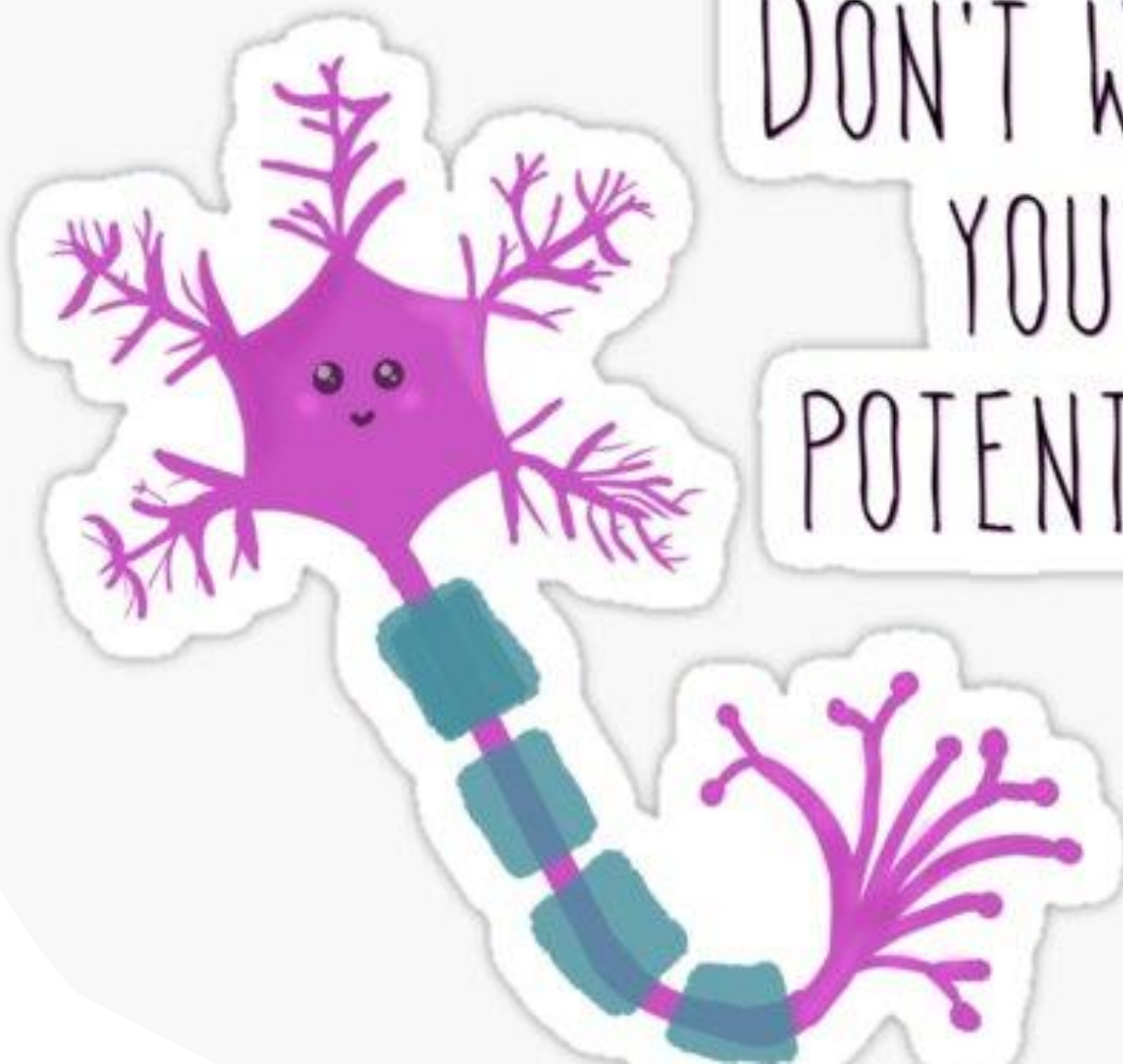


Nerve Physiology



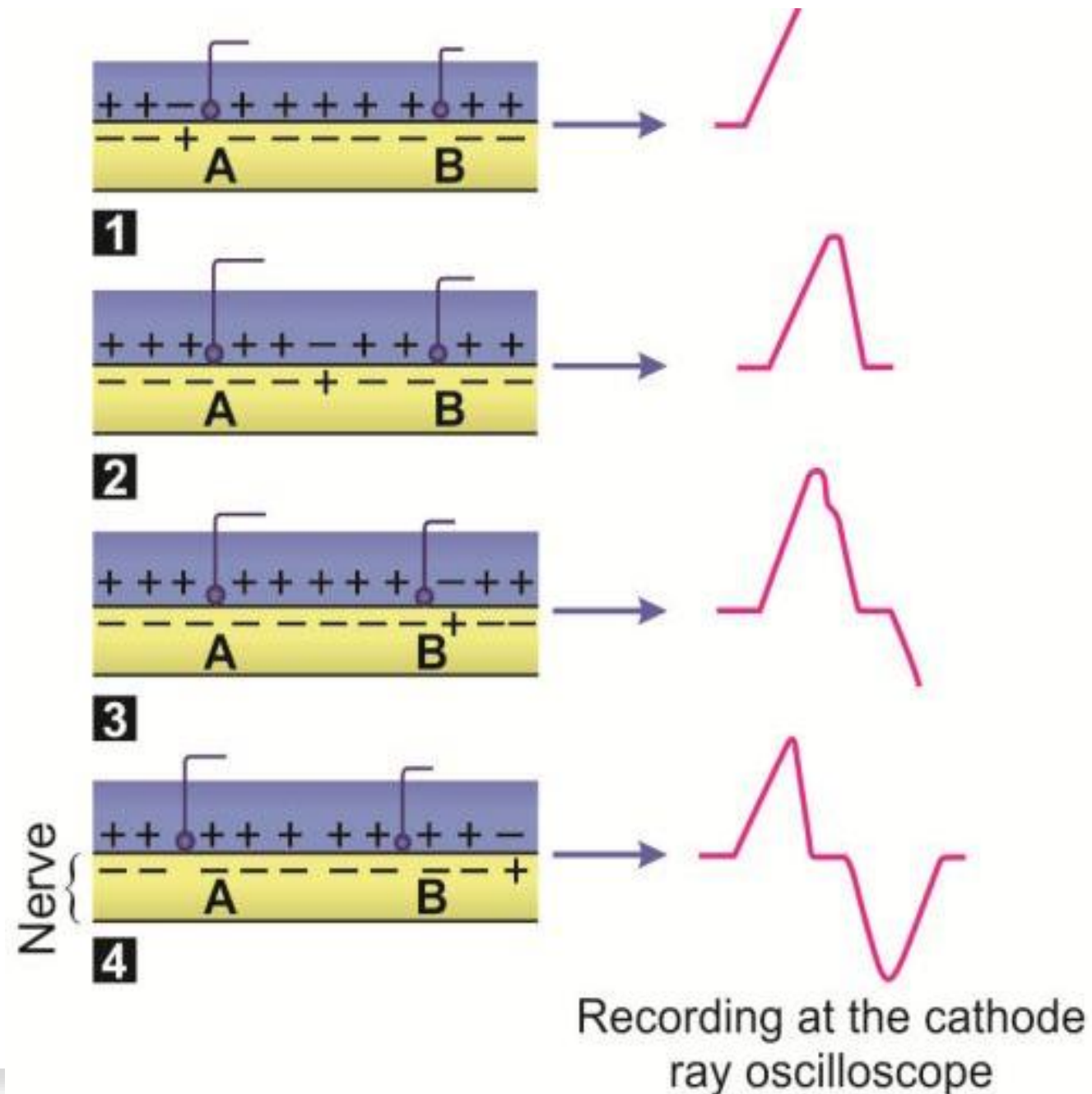
- *prof. safaa M.Kotb*
- *Professor and head of clinical physiology department
faculty of medicine ,menoufia university*

DON'T WASTE
YOUR
POTENTIAL.

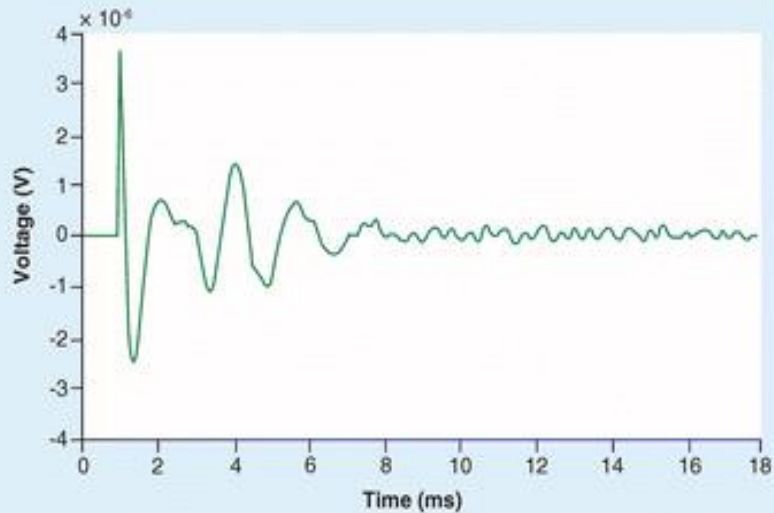
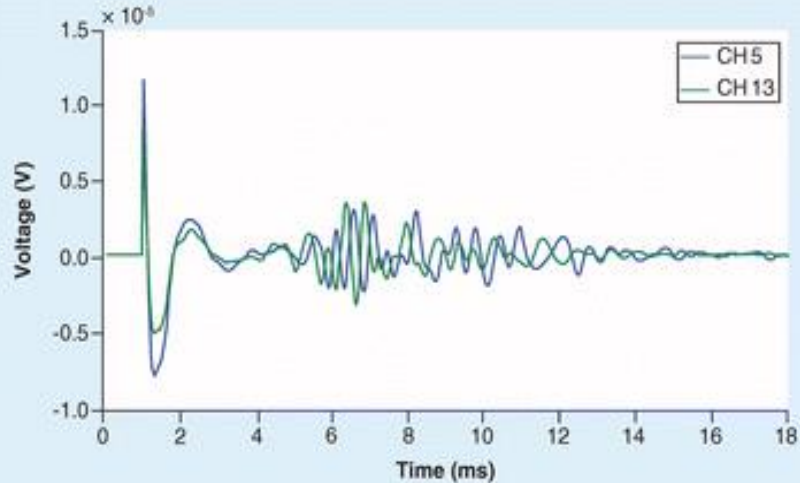


Biphasic action potential

The recording is considered biphasic since it contains both positive and negative voltage deflections.



Compound Action Potential (CAP)



A compound action potential is the result of summation of many action potentials from the different axons in the nerve trunk.

Stimulus

There are 2 characteristics of a stimulus that determine effectiveness of a stimulus to excite the tissue (*intensity and duration*).

Strength
Rate of change
duration

Factors affecting effectiveness of an electrical stimulation:

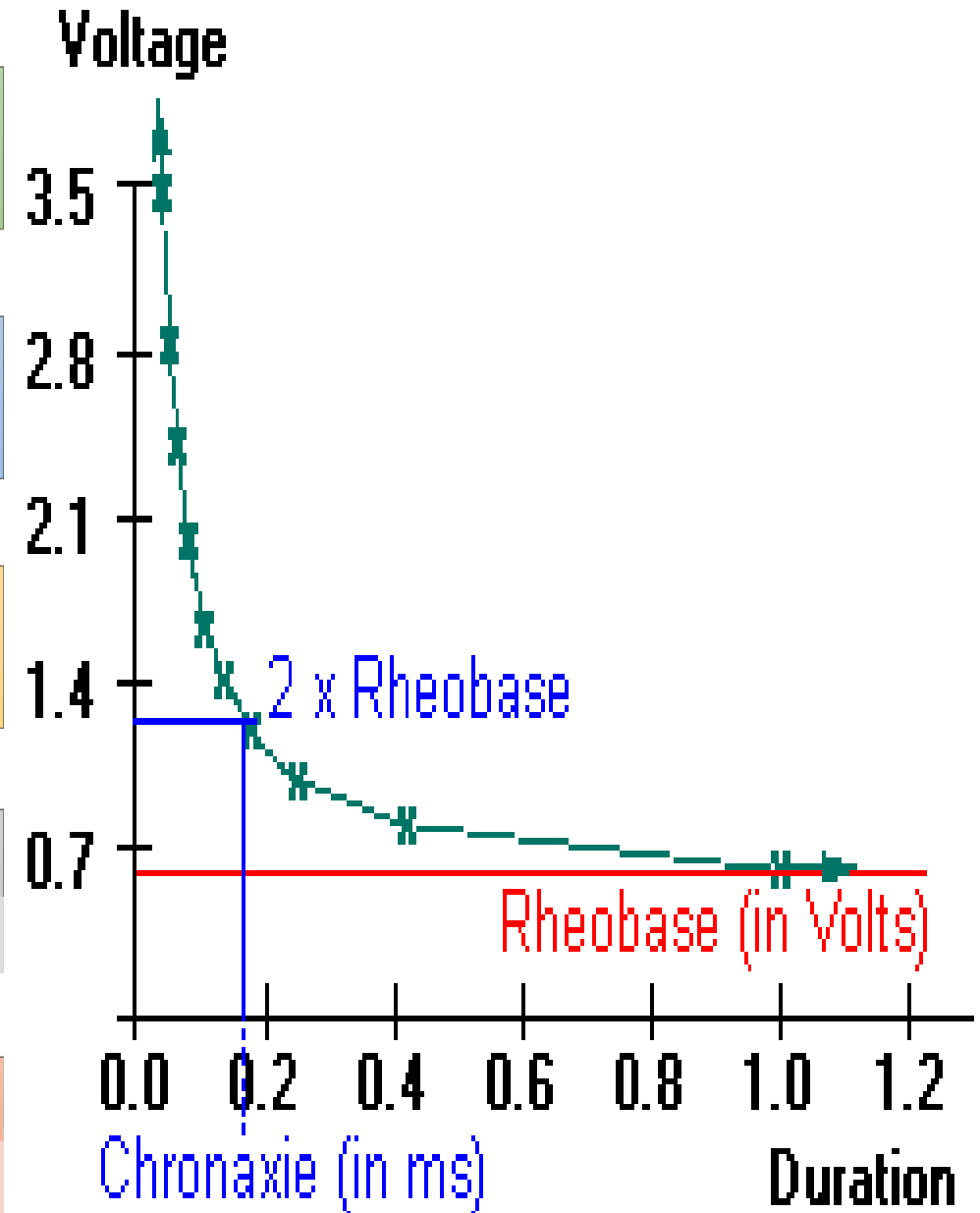
Rheobase

utilization time

2 x Rheobase: Twice the rheobase voltage.

Chronaxie.

accommodation



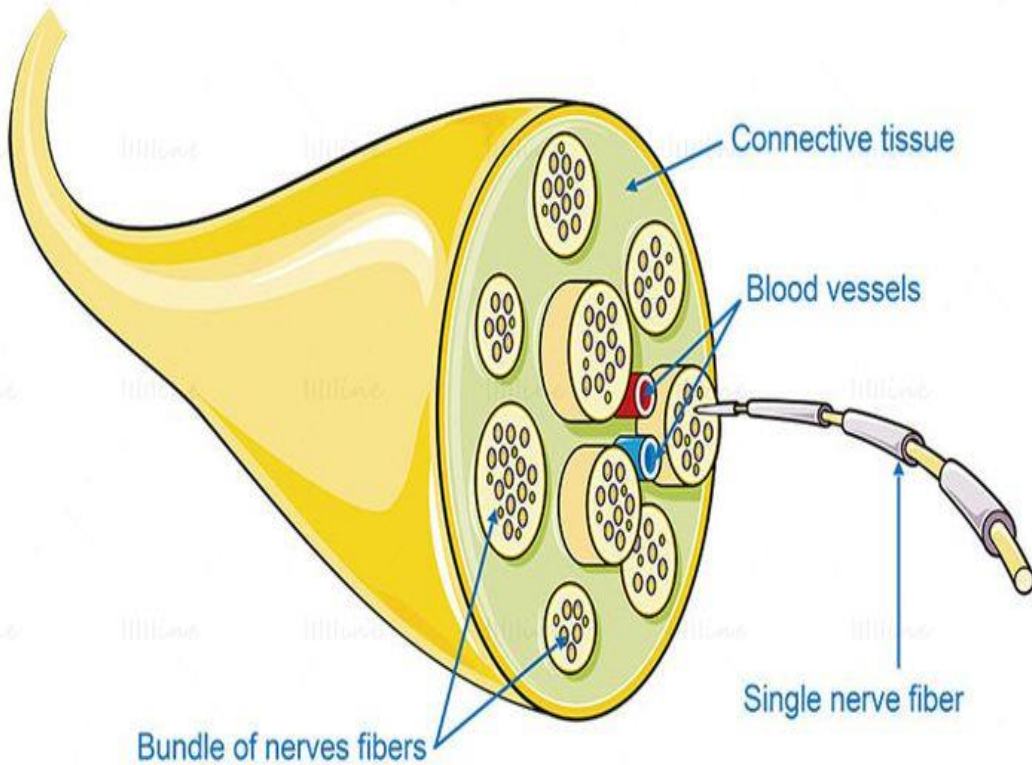
All or None Law

Tissues that obey all or none law:

- 1) Single nerve fiber.
- 2) Single muscle fiber.
- 3) Whole cardiac muscle

Tissues that do not obey all or none law:

- 1) Mixed nerve trunk.
- 2) Whole skeletal muscle.
- Cause: they have different fibers with different thresholds



Factors affecting conduction velocity

- 1-types of nerve
- 2- body temperature
- 3- pressure
- 4- hypoxia
- 5- local anaesthesia



NEUROMUSCULAR TRANSMISSION

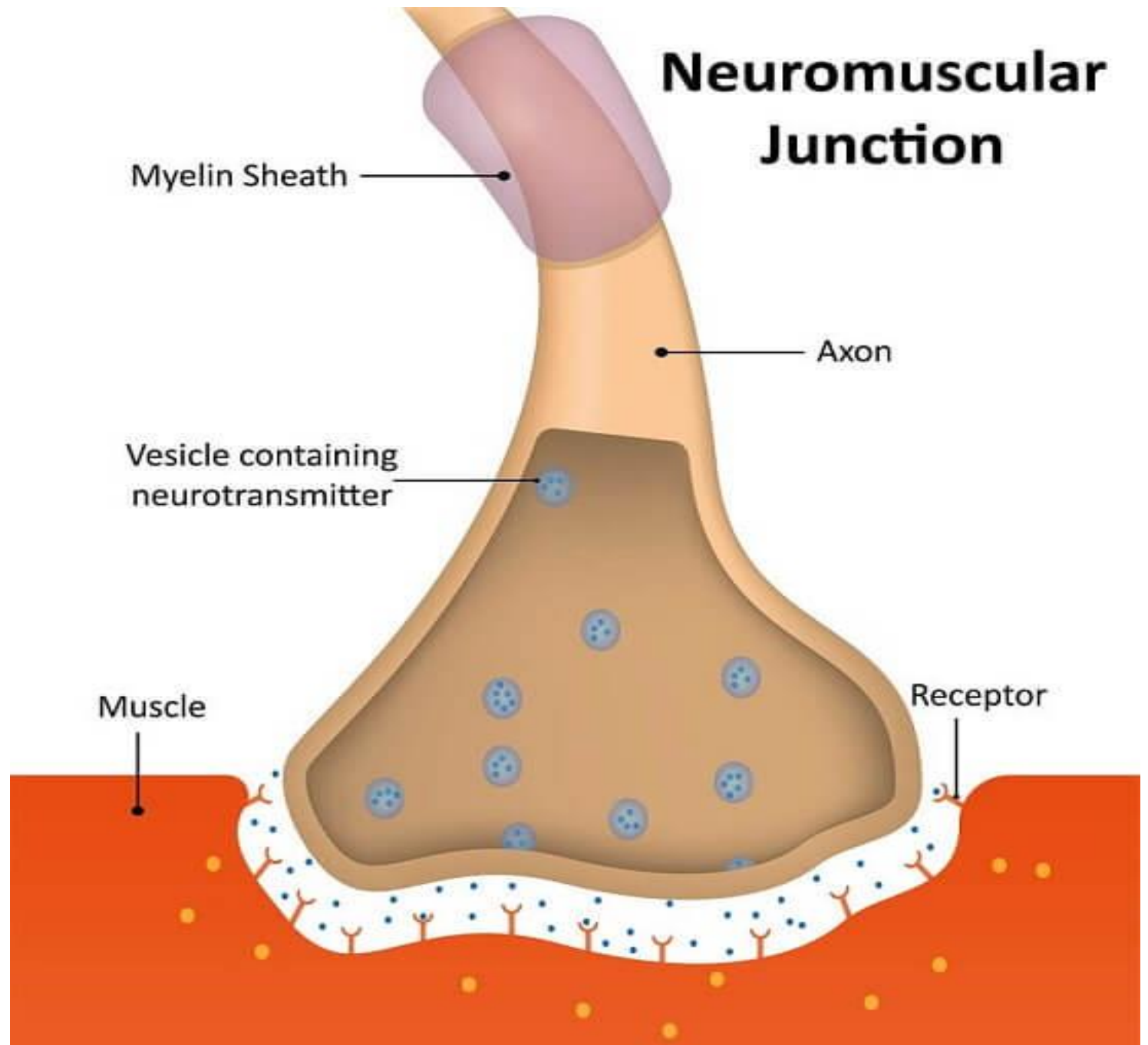
NEUROMUSCULAR TRANSMISSION

The neuromuscular junction is a synaptic connection between the terminal end of a motor nerve and a muscle.

It is the site for the transmission of action potential from nerve to the muscle.

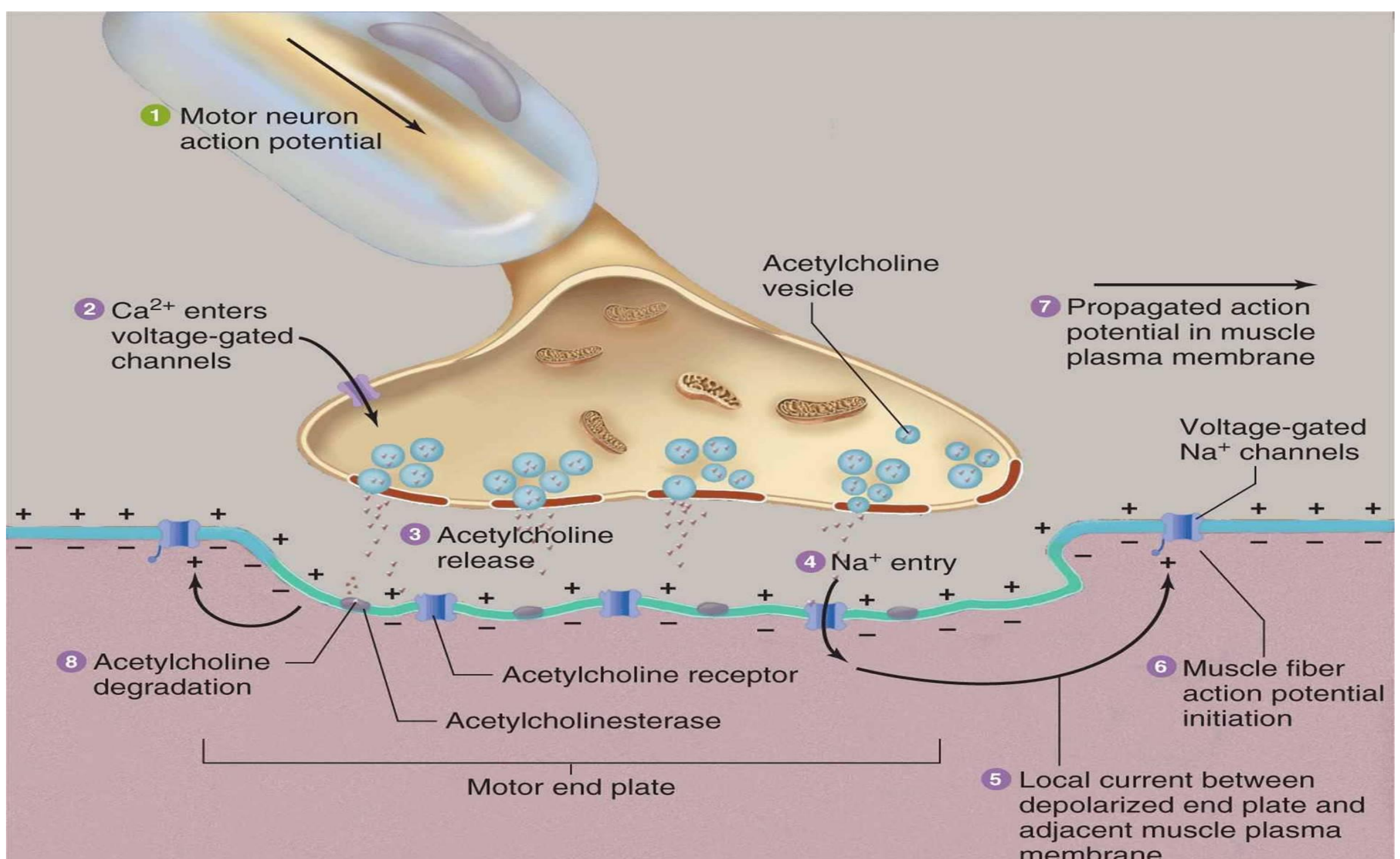


Structure



A detailed diagram of a neuromuscular junction. At the top, a motor neuron with a yellow branching axon terminal is shown. Below it, a sarcomere is depicted with red myofibrils and a blue Z-line. To the right, a myofibril is shown with a yellow sarcomere containing red myofibrils and purple mitochondria. The text 'Mechanism of neuromuscular transmission' is overlaid in the center.

Mechanism of neuromuscular transmission



Properties of neuromuscular transmission

- 1- unidirection
- 2- delay
- 3- fatigue
- 4- drugs

***acetylcholinesterase
enzyme***

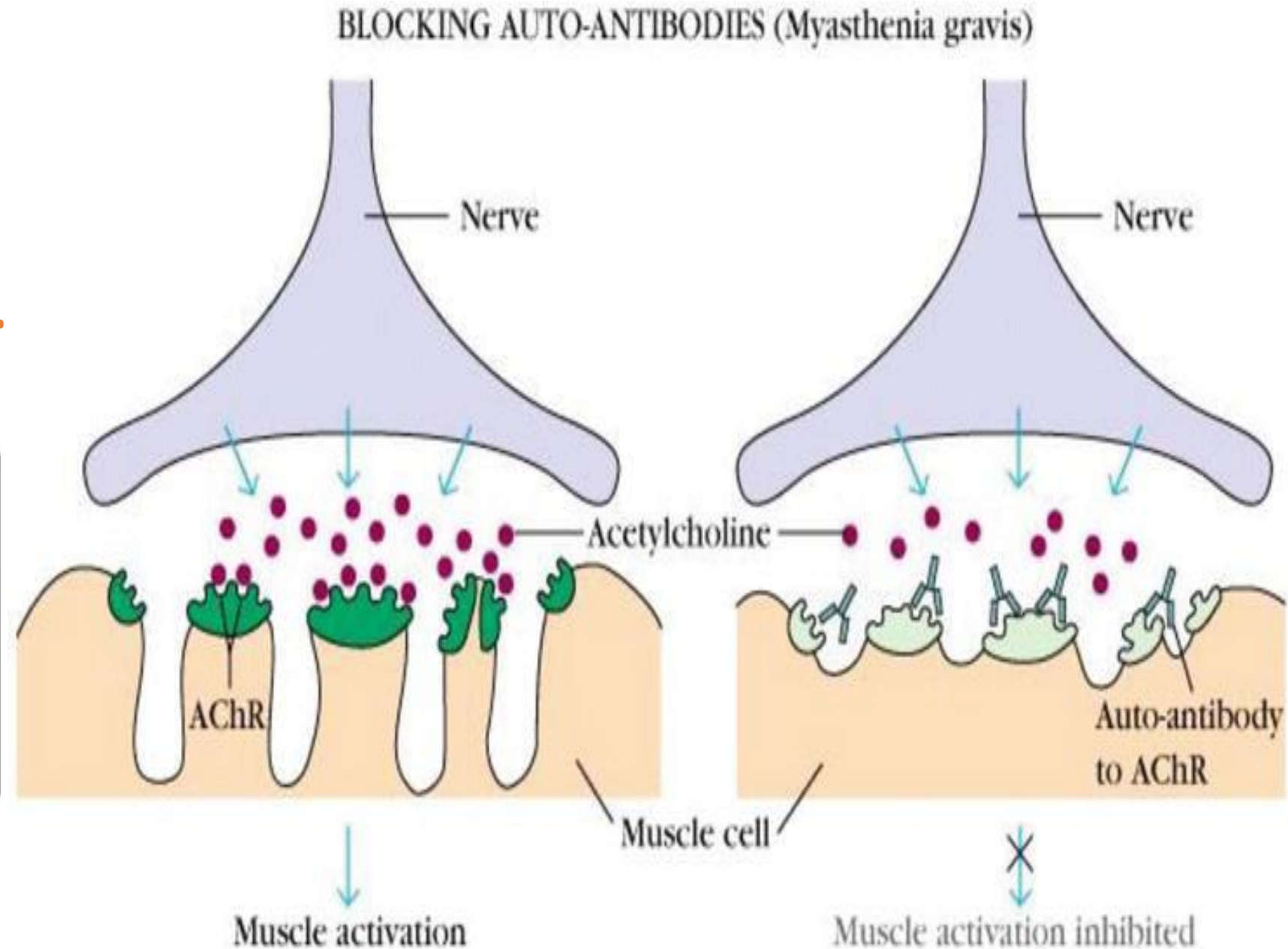
***Drug enhance
neuromuscular
transmission***

Choline is ***recycled back***
into

Drug block
neuromuscular
transmission

Myasthenia gravis

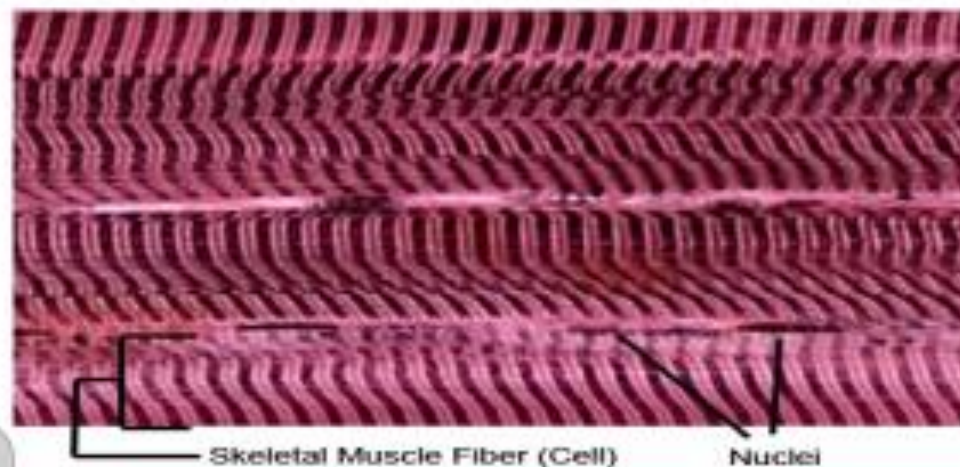
An autoimmune disease that results in loss of function at acetylcholine receptors and muscle weakness



Skeletal muscles

Skeletal muscles are organs that consist of muscle fibers bound by connective tissue. The connective tissue attaches skeletal muscle to the skeleton and other tissues and transmits the force of a contraction to the moving part.

Skeletal muscle is striated and voluntary muscle tissue that are consciously controlled through nervous system.



Function

- Skeletal muscle function is important for daily activities and your overall health.
- **Movement.** Skeletal muscles initiate and stop movement. When these muscles contract, they shorten and pull on your bone, making it move.
- **Stabilize the body.** You also use skeletal muscles to hold your body upright and maintain posture.
- **keep your joints stable.** Without these muscles, your bones would quickly become dislocated.

Movement



Function

- **Maintain body temperature.** Skeletal muscles help manage your body temperature. As they contract, your muscles use energy, known as ATP, which generates heat.
- **Protect organs.** Your skeletal muscles act as a shield and protect your organs, especially those in your abdomen. They also help support the weight of your organs.
- **Storage.** Your muscles store glycogen and amino acids, which are the building blocks of protein. Your body can use these amino acids to build proteins as needed and will release glycogen for energy during activity or starvation.



Morphology of skeletal muscle:

Each skeletal muscles are composed of numerous muscle fibers.

Each muscle fiber contains following structures:

