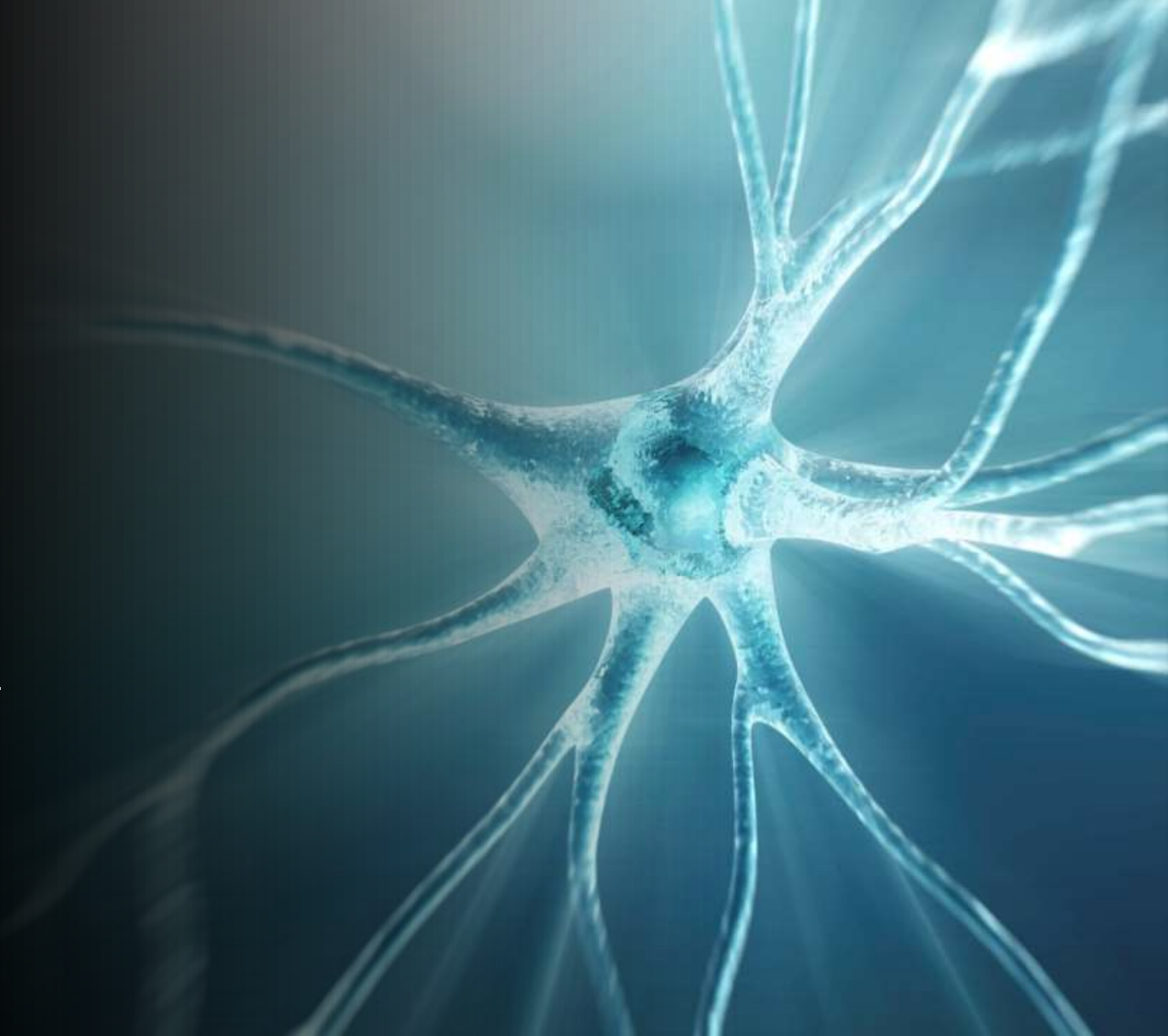




NERVE PHYSIOLOGY

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university*



The nervous system comprises of two groups of cells

Neurons

Glial cells



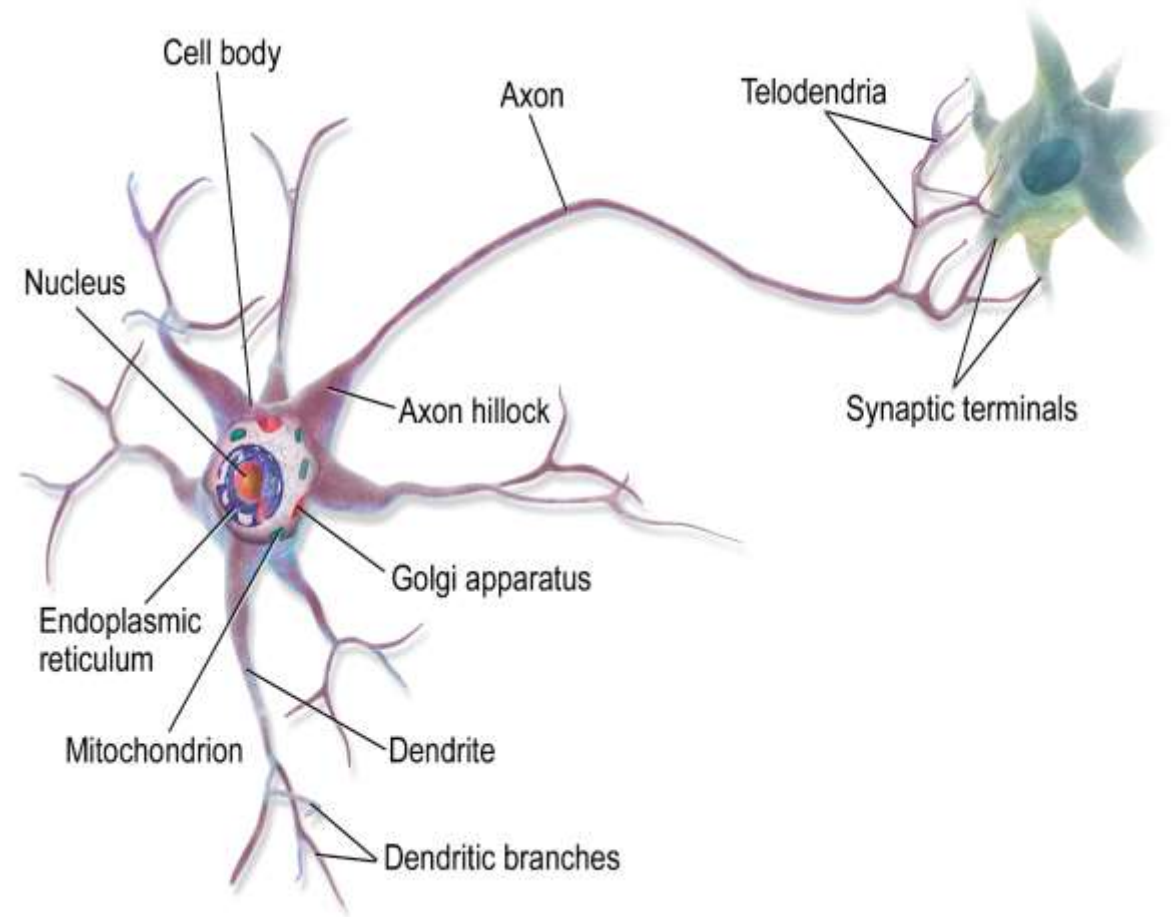
Structure of the neuron:

1) Receptor zone:

2) Impulse origin zone:

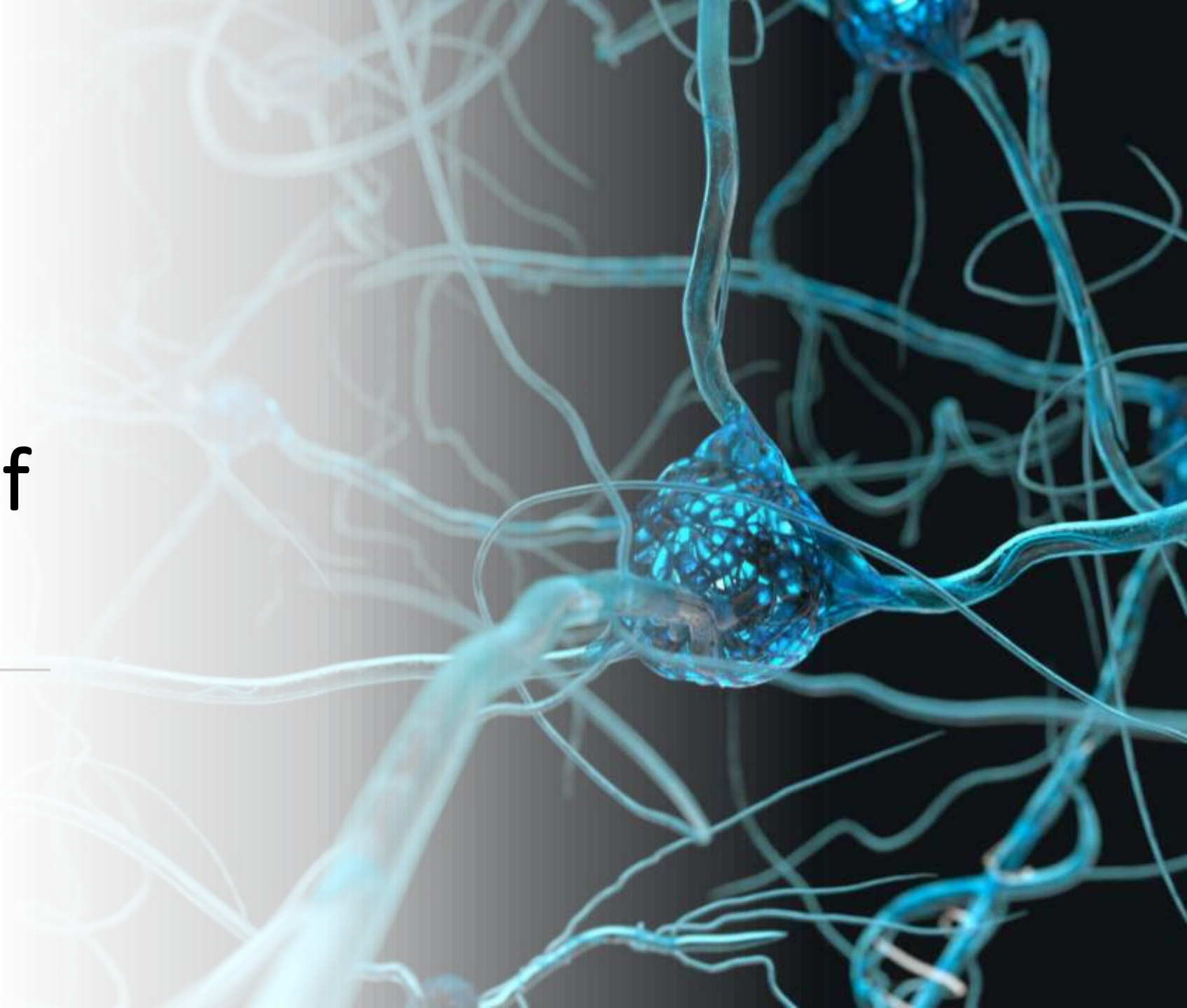
3) Impulse transmission zone:

4) Neurotransmitter secretion zone:





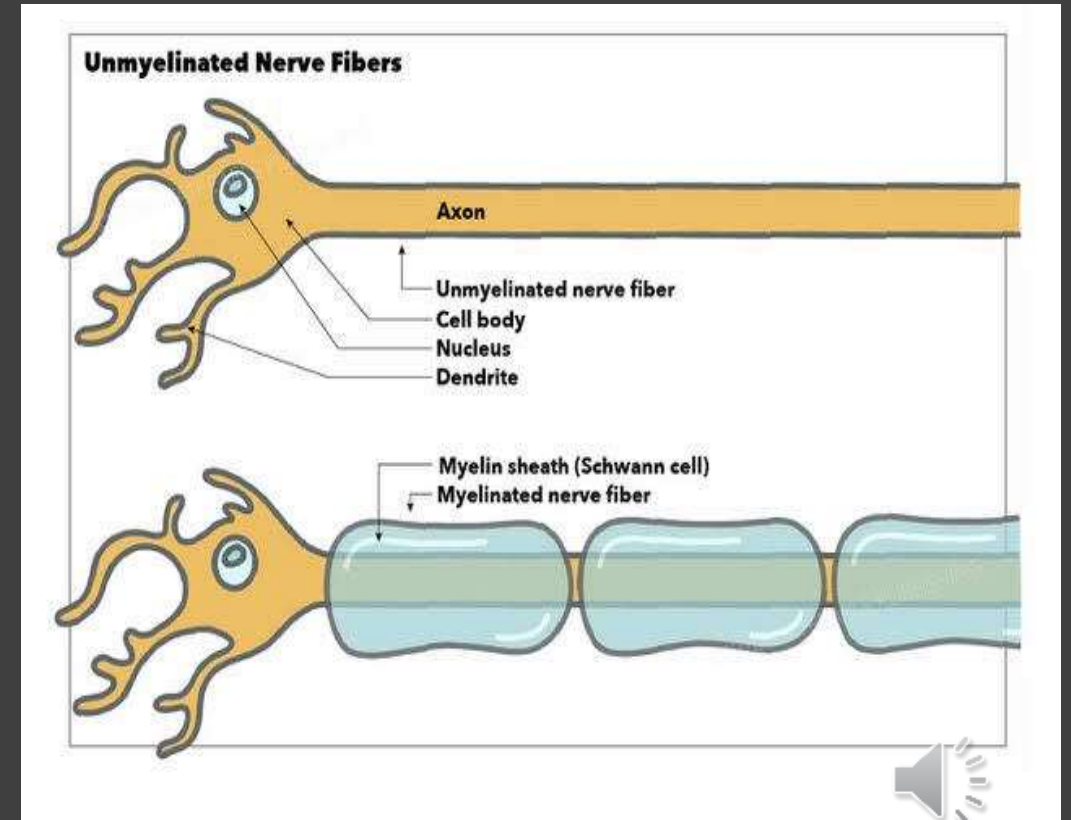
Classification of nerve fibers

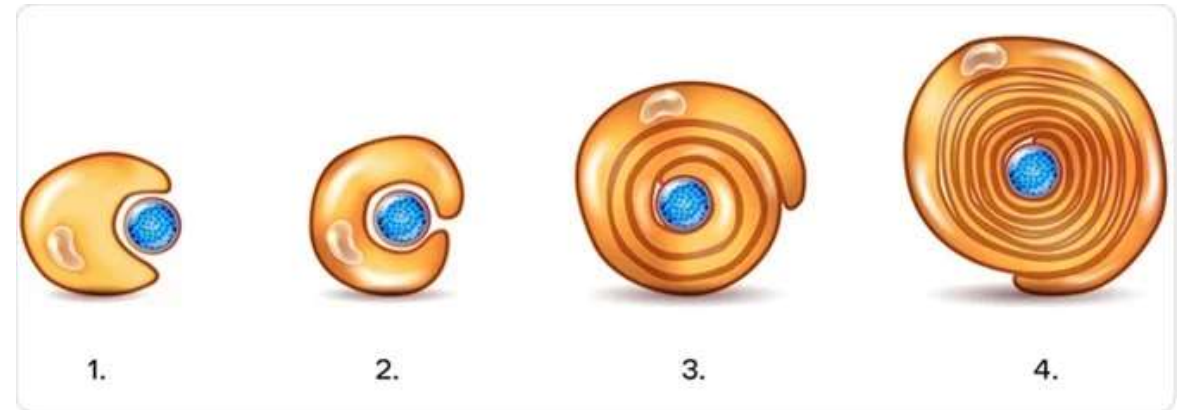
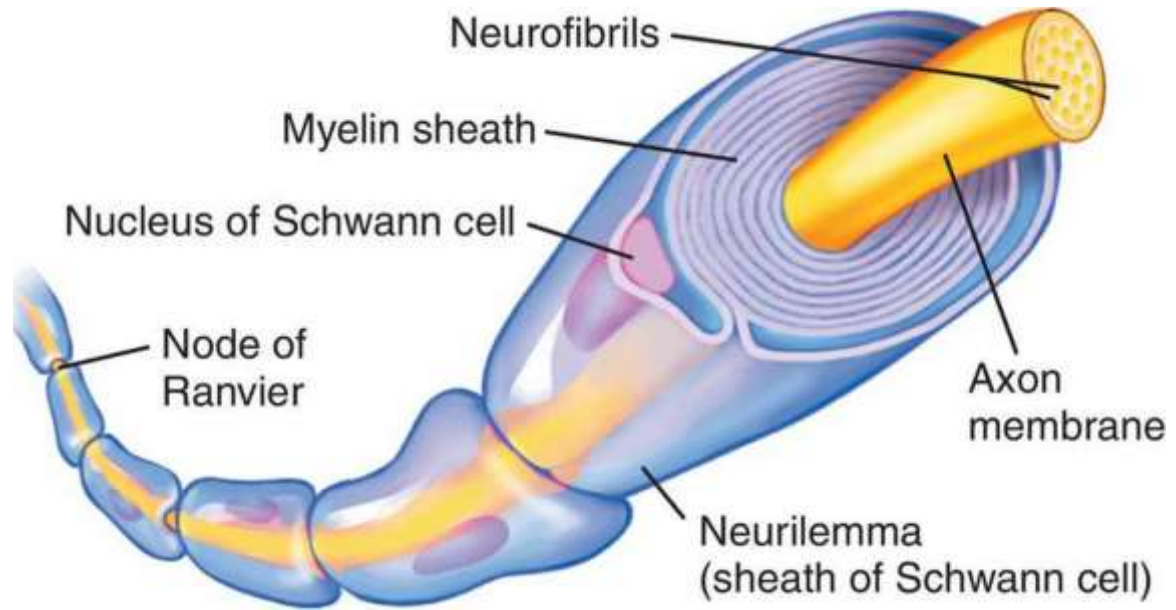


According to presence of myelin sheath

**Um myelinated
fibers:**

Myelinated fibers:.





Myelin sheath

- Protective, insulates the axon and speeds up the transmission.

According to diameter of nerve fiber:

Fiber type	Diameter(μm)	Conduction speed (m/s)	Function
A α	12-20	70-120	Proprioception, somatic nerves, Primary muscle spindle afferents, motor to skeletal muscle
A β	5-12	30-70	Touch, pressure
A γ	3-6	15-30	Motor to muscle spindle
A δ	2-5	12-30	Fast Pain, temperature, touch
B	<3	3-15	Preganglionic autonomic
C	0.3-1.3	0.5-2.3	Slow Pain, postganglionic sympathetic

Properties of nerves

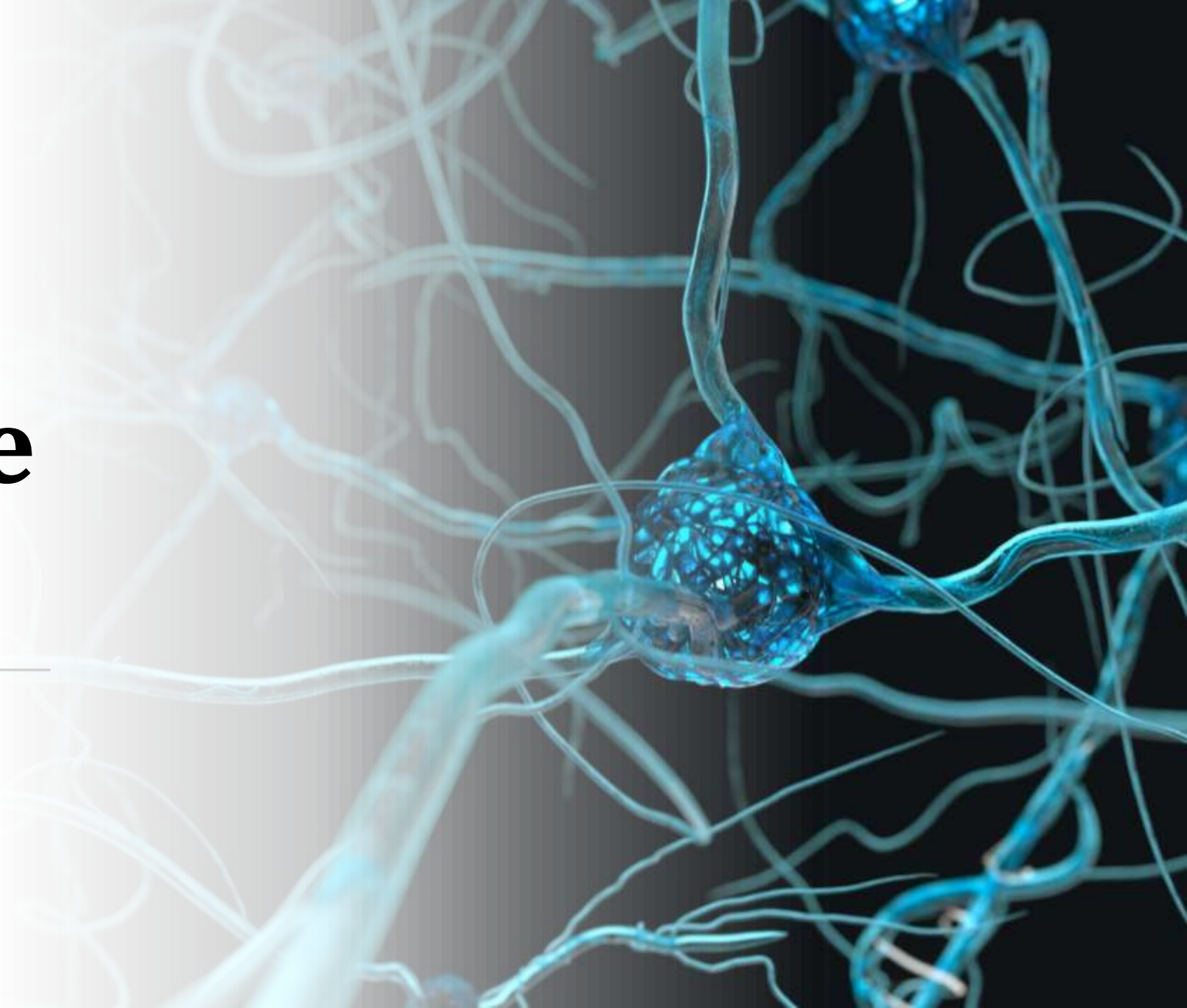
Excitability

Threshold stimulus

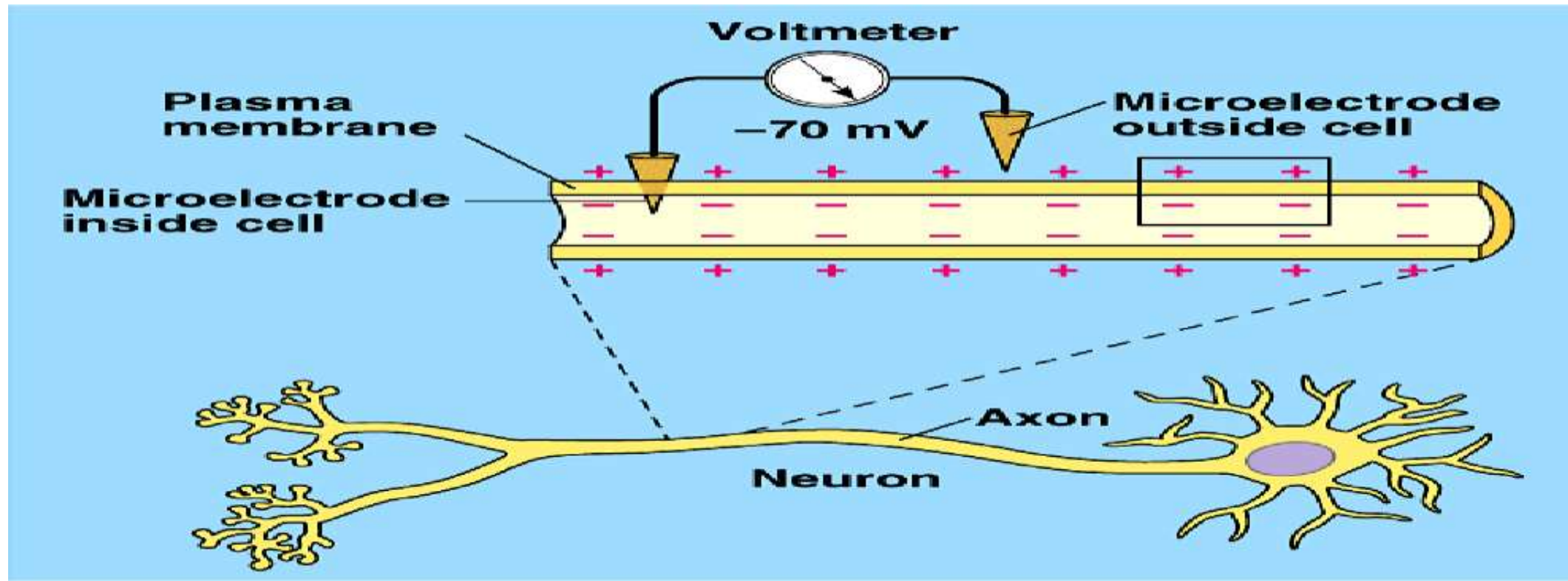
Conductivity.



Membrane Potential



Membrane Potential



Resting Membrane Potential:

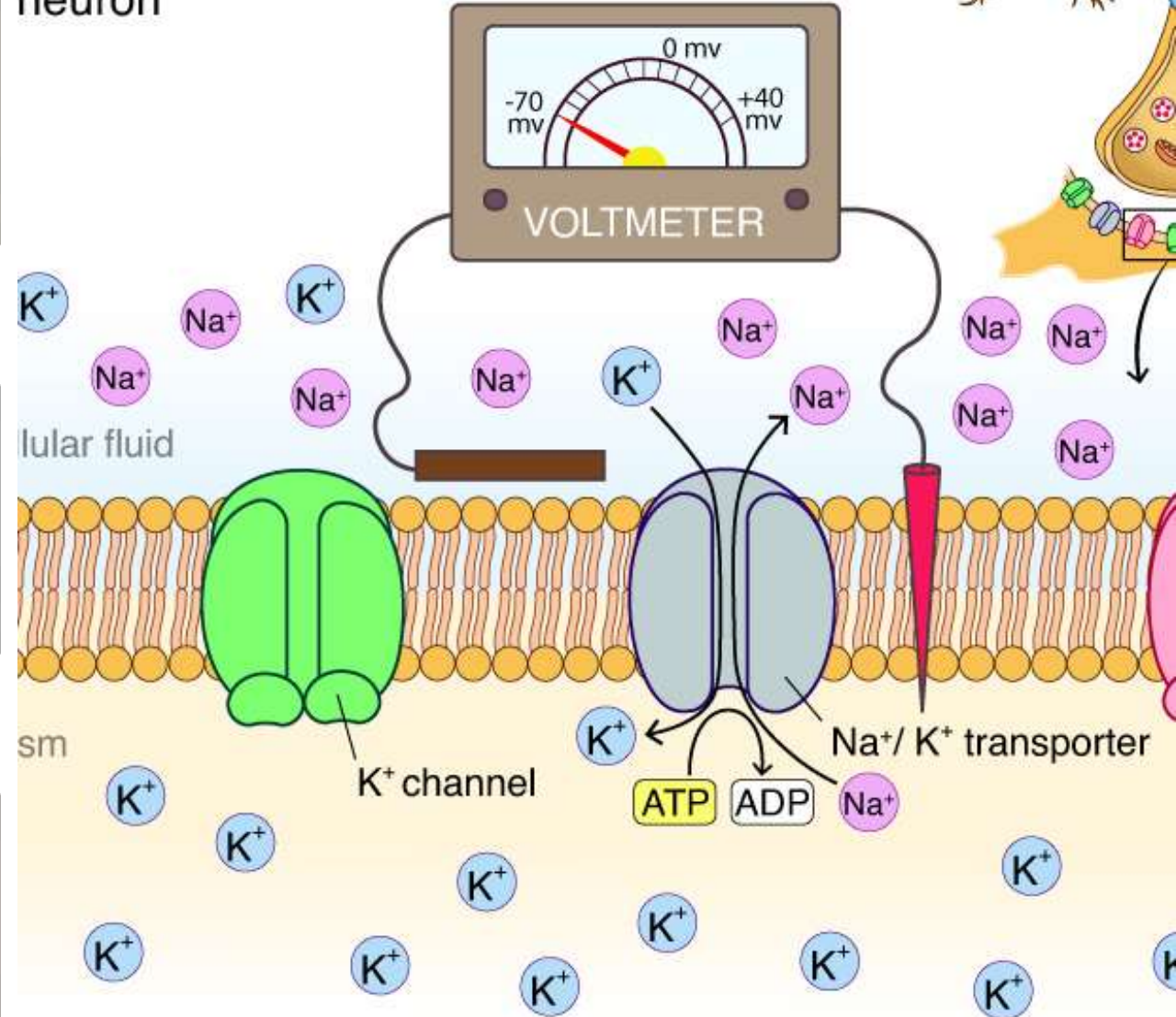
potential difference is maintained between the inside and outside of the axon.

There is more K^+ ions inside the cell

Na^+ ions are concentrated more on the outside

Resting Membrane Potential

Resting membrane potential of an inactive or neuron

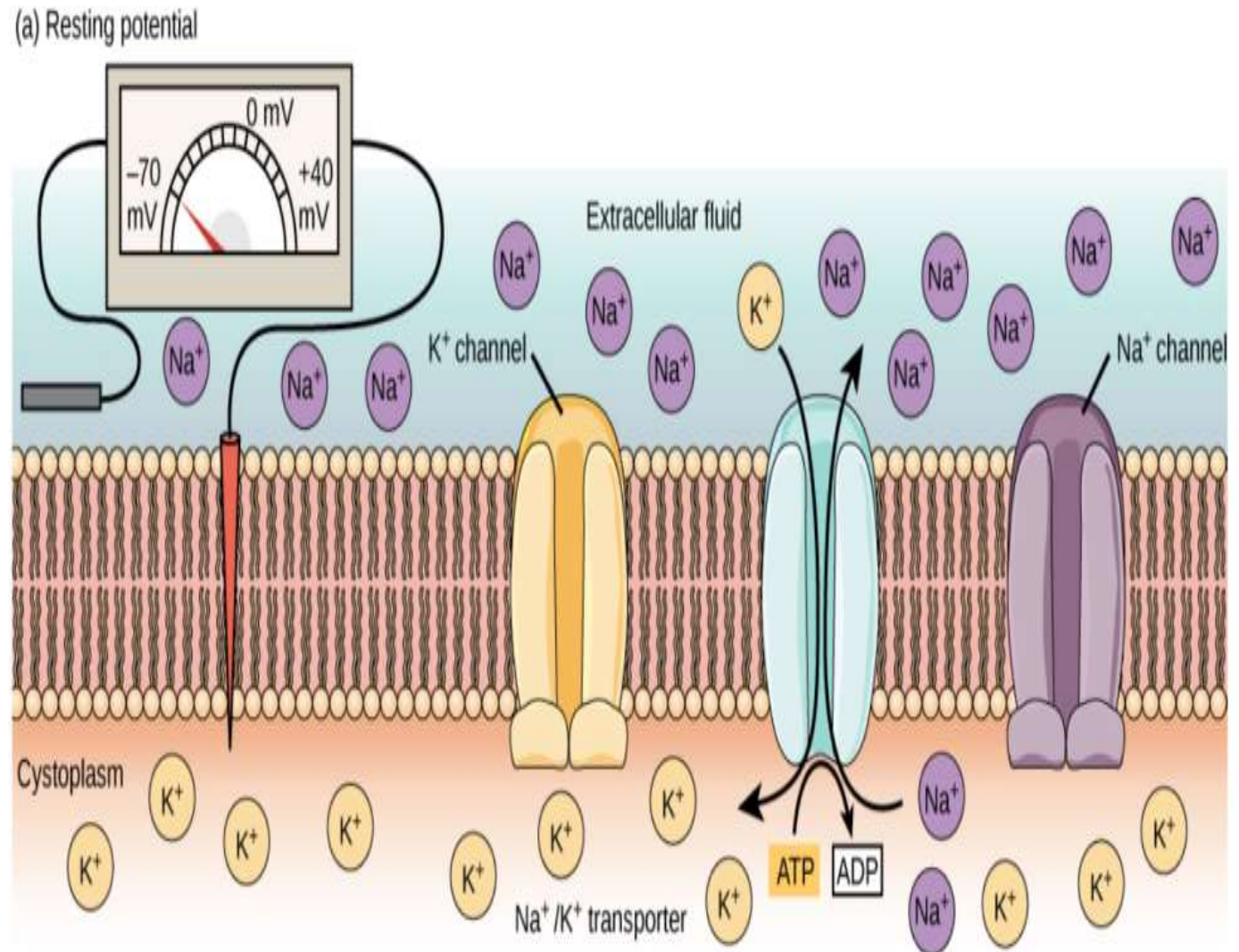


Resting Membrane Potential:

a difference about -70 mv.

This difference maintained by the Na^+/K^+ pump.

membrane is more permeable to K^+ .

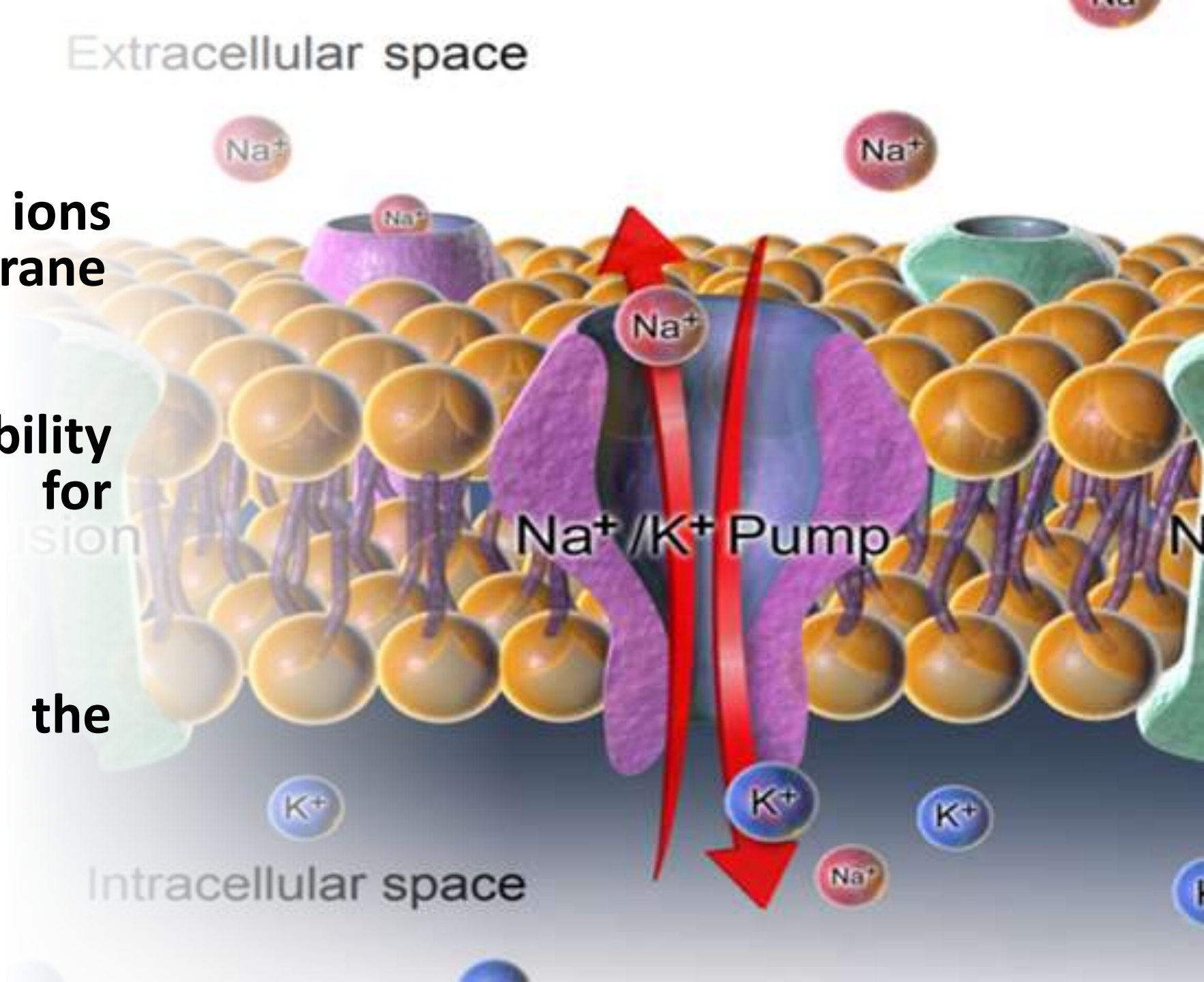


Resting membrane potential (RMP):

1-Distribution of ions across the cell membrane

2-Relative permeability of the membrane for each ion

3-Contribution of the Na^+/K^+ Pump



Action Potential

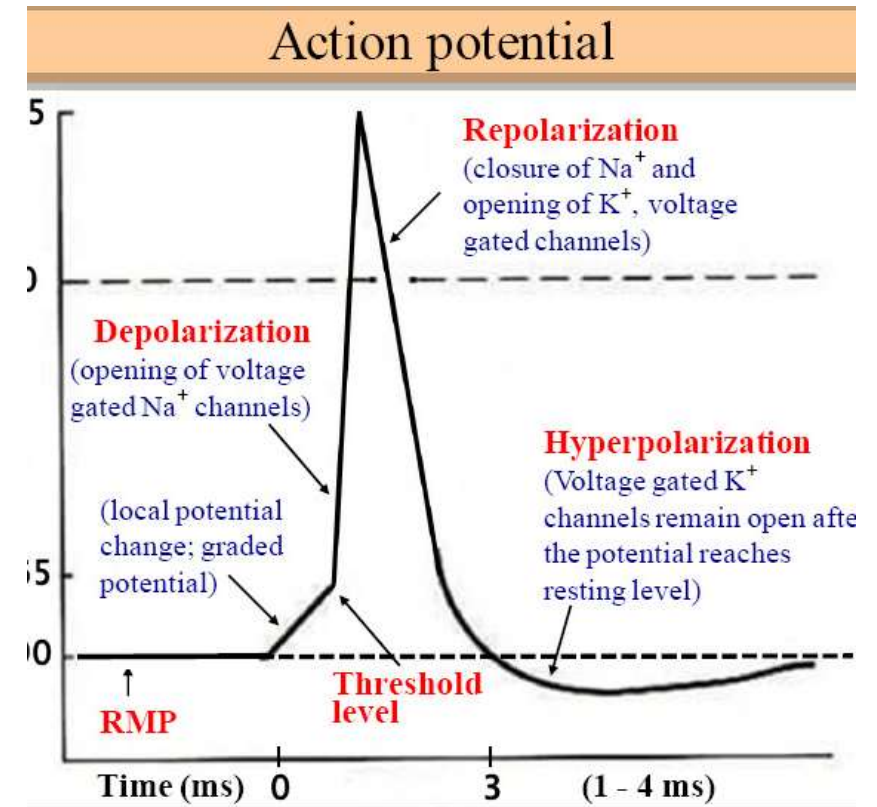
Rapid changes in the membrane potential that spread rapidly along the nerve fiber membrane.



Stages of action potential:

Latent period:

Depolarization
Repolarization
hyperpolarization



Excitability Changes during the action potential:

A period of in-excitability accompanies the phases of action potential that is called the **refractory period** and typically lasts for about 3 millisecond.

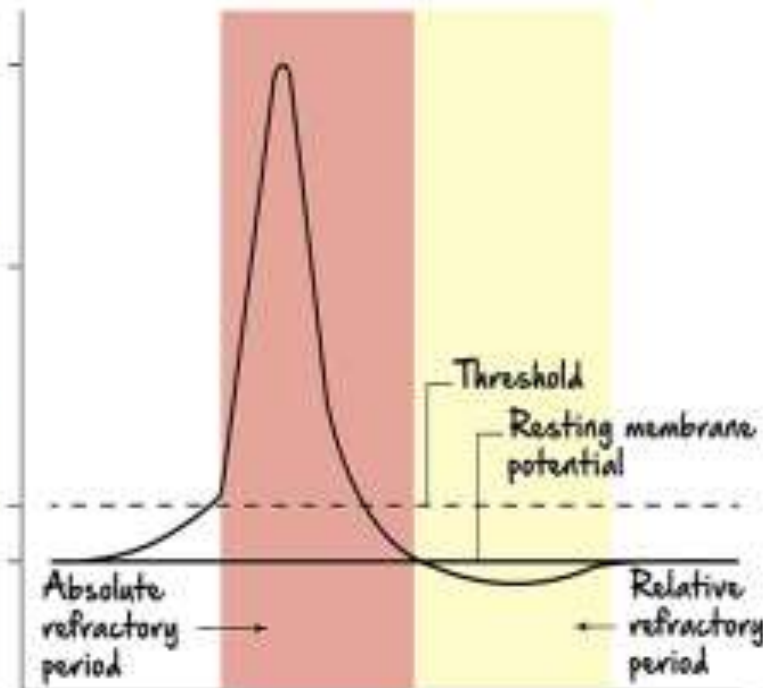
1) Absolute refractory period:

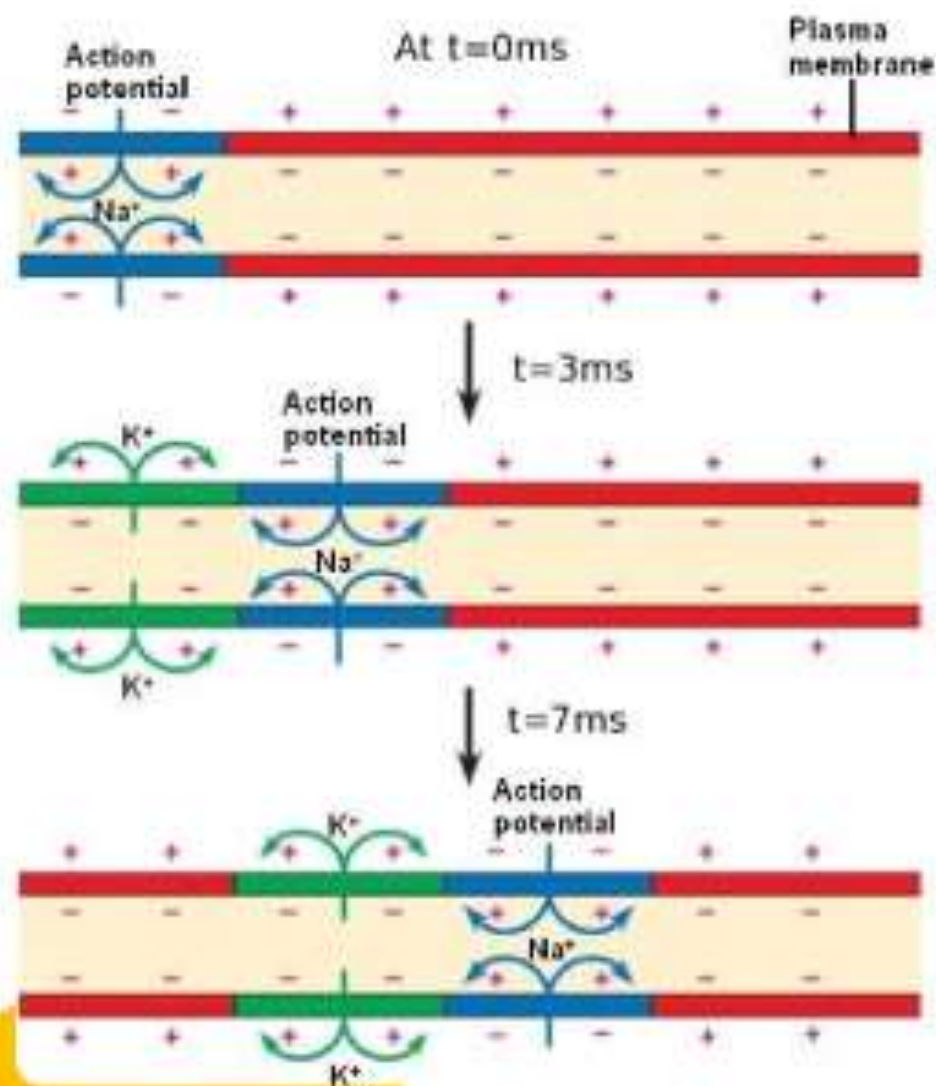
- A time during which the axon is completely incapable of transmitting another impulse irrespective of the strength of the stimulus being higher than the threshold potential.
- It coincides with depolarization phase and first part of the repolarization phase.

2) Relative refractory period:

- During which it is possible to generate an impulse provided that the stimulus is stronger than the usual.
- It coincides with the rest of repolarization phase and the hyperpolarization phase.

Refractory Periods





Propagation of action potential (Axonal conduction):

The nerve impulse (An action potential) is a wave of depolarization which passes along the axon, from the axon hillock to the axon terminal.

The action potential can only travel in one direction - from the cell body towards the axon terminal.



Types of axonal conduction



1) Current sink or continuous conduction:

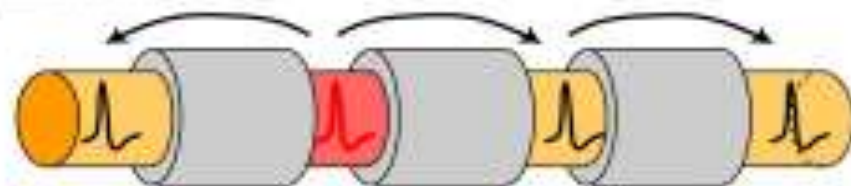
Takes place in non-myelinated axon.

The impulse moves along in one direction like a self-propagating wave till it reaches the end of the axon.

non-myelinated axon:



myelinated axon:



2) Saltatory conduction:

Takes place in myelinated axons.

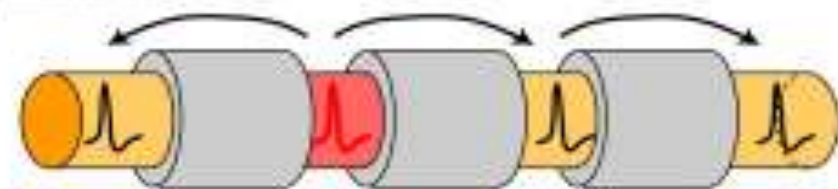
The presence of the myelin sheath aids in faster conduction of nerve impulse as it acts as insulation.

The impulse jumps from one node of Ranvier to the next as there are numerous voltage gated Na^+ channels at these regions.

non-myelinated axon:



myelinated axon:



A rectangular, light brown cardboard tag with a hole on the left side, through which a dark, thin string is threaded. The tag is placed on a rustic, weathered wooden surface. To the right of the tag is a single, vibrant white daisy with a bright yellow center. In the background, two more similar daisies are visible but out of focus.

Thank
you!