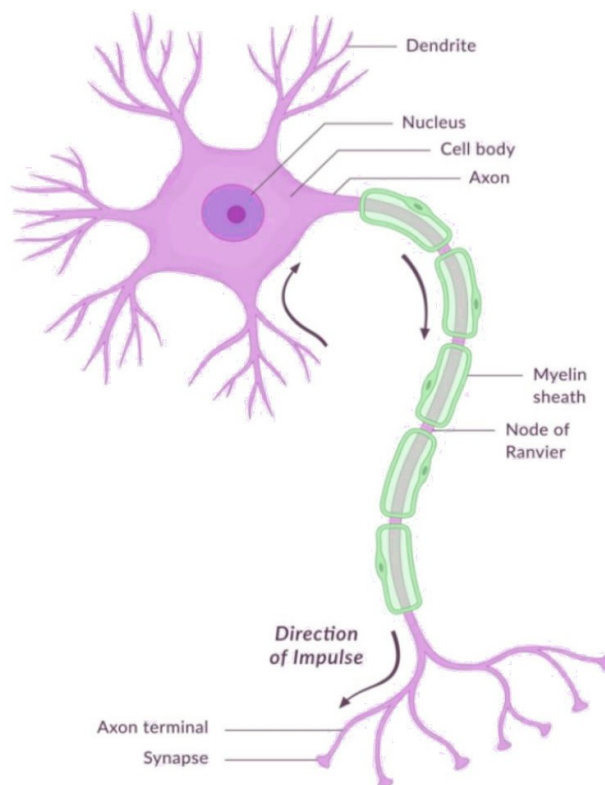


Neuron

Neurons are highly specialized cells in nervous system, which can detect, receive and transmit different kinds of stimuli.

Every neuron is made of a cell body (also called a soma), dendrites and an axon. Dendrites and axons are nerve fibres.

The nerve fibre or axon is like a cylinder, the interior of which is filled with axoplasm (i.e., the cytoplasm of the nerve cell) and the exterior of which is covered with a thin membrane, the axon membrane or axolemma.



Nerve Impulse:

A nerve impulse is a wave of electrical activity that passes from one end of a neuron to the other.

Conduction of nerve impulse is an electro-chemical process. Membrane of a non-conducting nerve cell or neuron is positive on the outside and negative inside. The difference in charge is about 70 to 90 millivolts which is called as resting potential and the membrane is said to be polarized. To maintain resting potential, sodium potassium metabolic pump operates.

When a stimulus (may be mechanical, electrical or chemical) is applied to the membrane of the nerve fibre, its permeability changes and sodium potassium pump stop operating. Sodium ions rush inside and potassium ions rush outside. This results in the positive charge inside and negative charge outside.

The speed of nerve impulses varies enormously in different types of neurons. The fastest travel at about 250 mph, faster than a Formula 1 racing car. For the impulse to travel quickly, the axon needs to be thick and well insulated.

<http://whoami.sciencemuseum.org.uk/whoami/findoutmore/yourbrain/howdoesyourbrainwork/howdoesyournervoussystemwork/whatarenerveimpulses>

Generation and Conduction of Nerve impulse:

The membranes of neurons (axon membrane or axolemma) are in polarized [state](#).

Different types of ion channels are present on the neural membrane.

These ion channels are selectively permeable to different ions.

When the neuron is not conducting any impulse, the axonal membrane is more permeable to potassium ions and nearly impermeable to sodium ions.

Membrane is impermeable to negatively charged proteins present in axoplasm.

Axoplasm inside the axon contains high concentration of K^+ and negatively charged proteins and low concentration of Na^+ .

The fluid outside the axon contains low concentration of K^+ and high concentration of Na^+ , this forms a [concentration gradient](#) across the membrane.

These ionic gradients across the resting membrane are maintained by the active transport of ions by the sodium-potassium pump which transports 3 Na^+ outwards for 2 K^+ into the cell.

As a result, the outer surface of the axonal membrane possesses a positive charge while its inner surface becomes negatively charged and therefore is polarized.

The electrical potential difference across the resting plasma membrane is called as the [resting potential](#).

[Repolarization](#) occurs when the K^+ channels open and K^+ moves out of the axon, creating a change in polarity between the outside of the cell and the inside.

The impulse travels down the axon in one direction only, to the [axon terminal](#) where it signals other neurons.