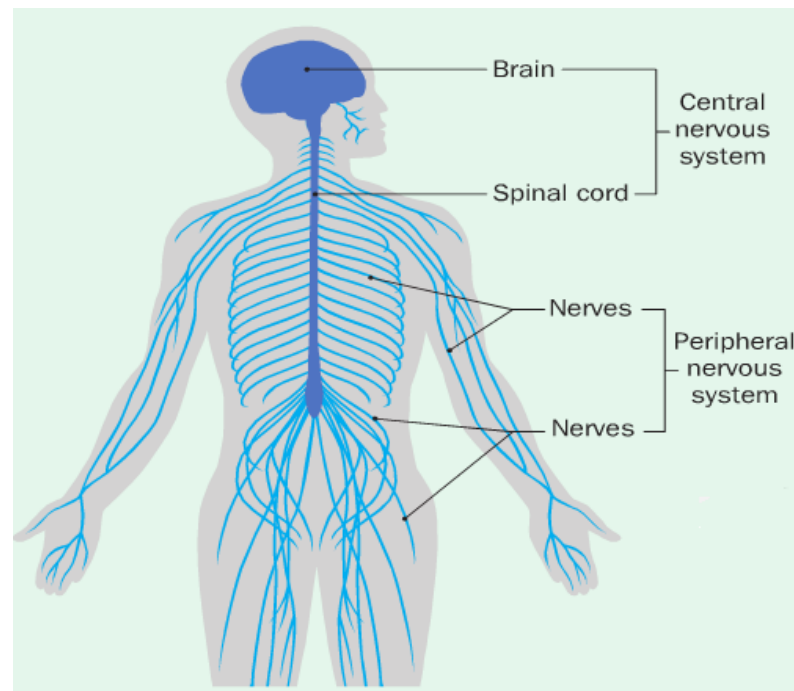


Chapter 34 - The Nervous System

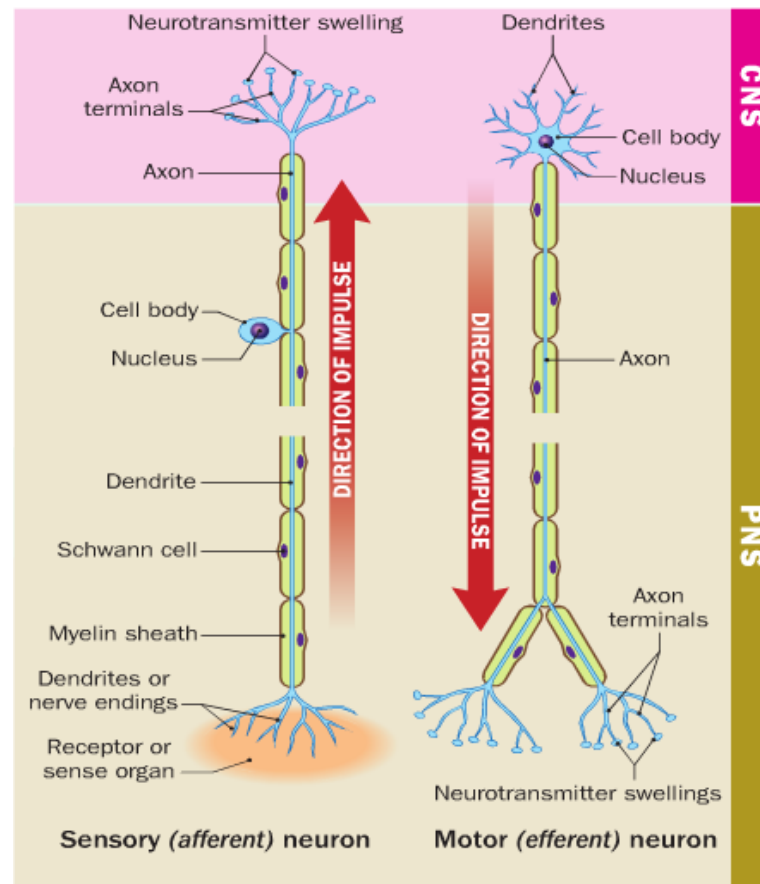
- the **central nervous system (CNS)**, which consists of the brain and spinal cord
- the **peripheral nervous system (PNS)**, which consists of a vast network of nerves that carry messages between the CNS and the rest of the body



The Nerves

There are 2 types of nerves,

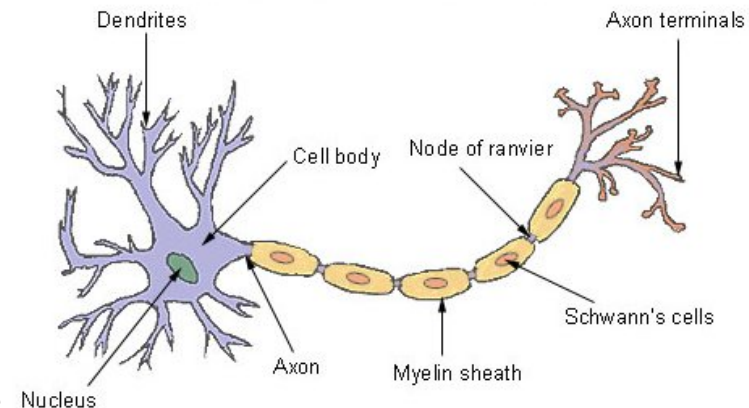
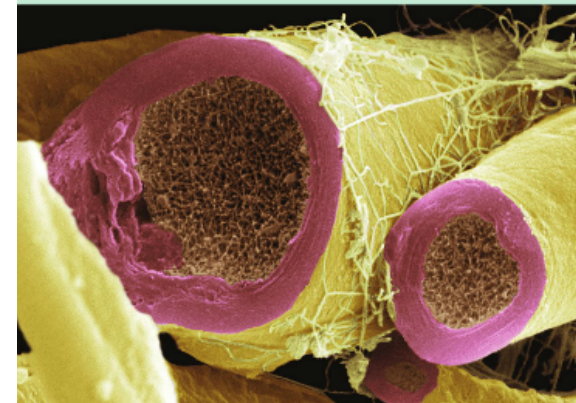
1. **Sensory Nerves** - messages from nerves to the brain.
2. **Motor Nerves** - messages from brain to the muscles.



Functions of the parts of neurons

- A receptor is a cell or group of cells that detects a stimulus.
- Nerve endings connect sensory neurons to receptor cells or sense organs.
- Dendrites are fibres (often highly branched) that carry impulses **toward** the cell body.
- Axons carry impulses **away from** cell bodies.
- Schwann cells are located along the length of neurons. They make the myelin sheath.
- The myelin sheath is a fat-rich membrane that insulates the electrical impulses.

34.5 Nerve fibres: connective tissue (yellow), myelin (pink) and axon (brown)



- The cell body contains a nucleus and cell organelles. It forms the dendrites and axons that may emerge from it as well as neurotransmitter

Nerve Endings

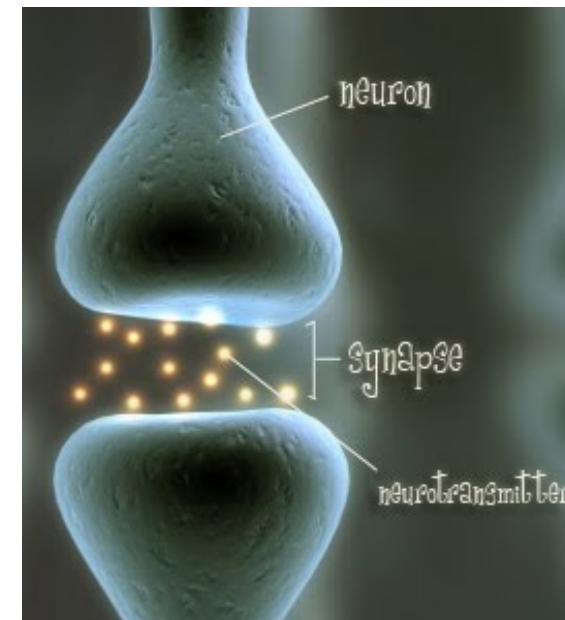
- The end of each axon breaks up into many axon terminals. Each of these small branches ends in a swelling called a neurotransmitter swelling.

These swellings release chemicals that carry the impulse from one nerve cell to another. The chemicals are called neurotransmitters. Neurotransmitters are stored in vesicles in the swellings.

The **threshold** is the minimum stimulus needed to cause an impulse to be carried.



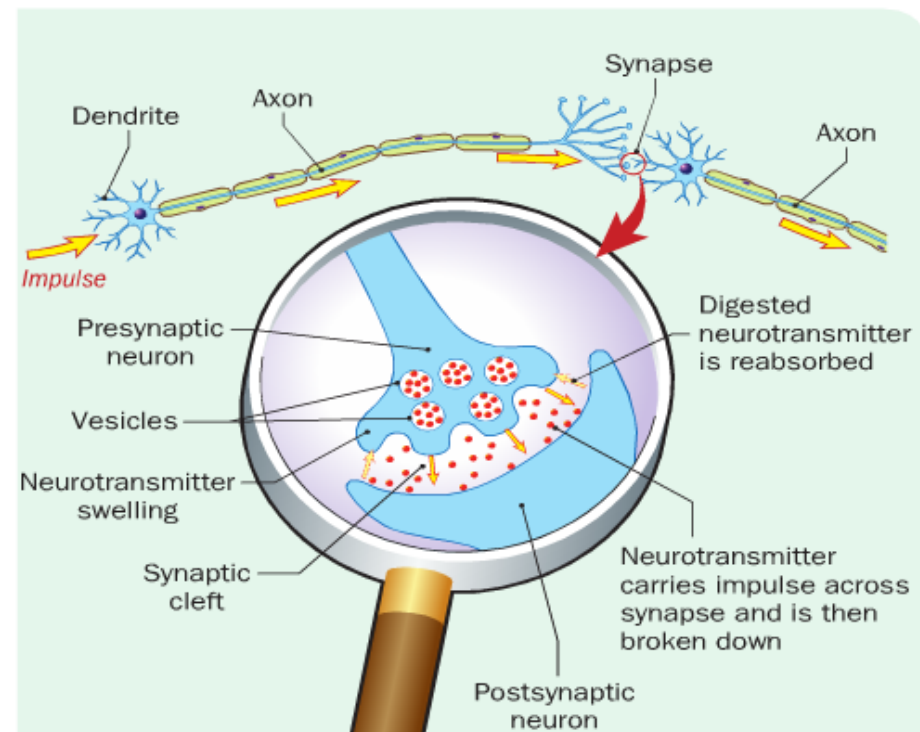
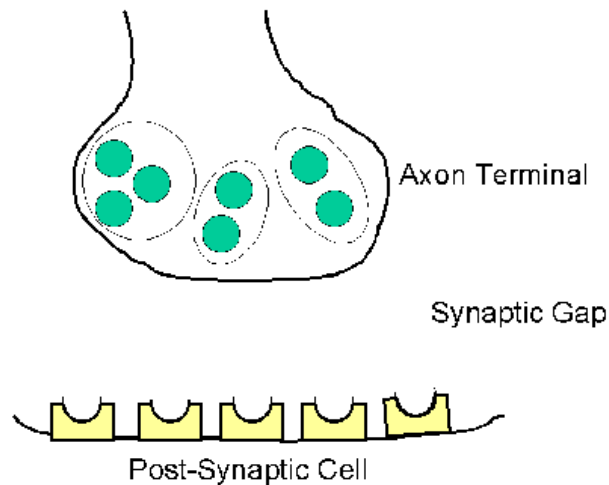
The '**all or nothing law**' states that if the threshold is reached an impulse is carried, but if the threshold is not reached no impulse is carried.



Transmitters

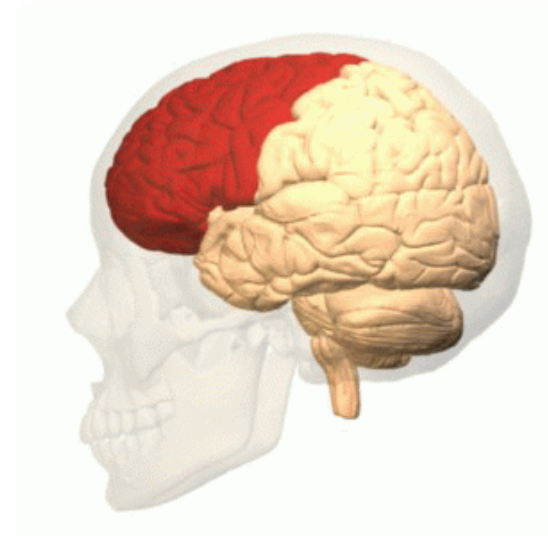
Over 60 different neurotransmitters are known, the most common being acetylcholine (ACh) and noradrenalin (also called norepinephrine).

The neurotransmitter diffuses across the synaptic cleft. It then combines with receptors on the postsynaptic neuron. This causes the electrical impulse to be regenerated.

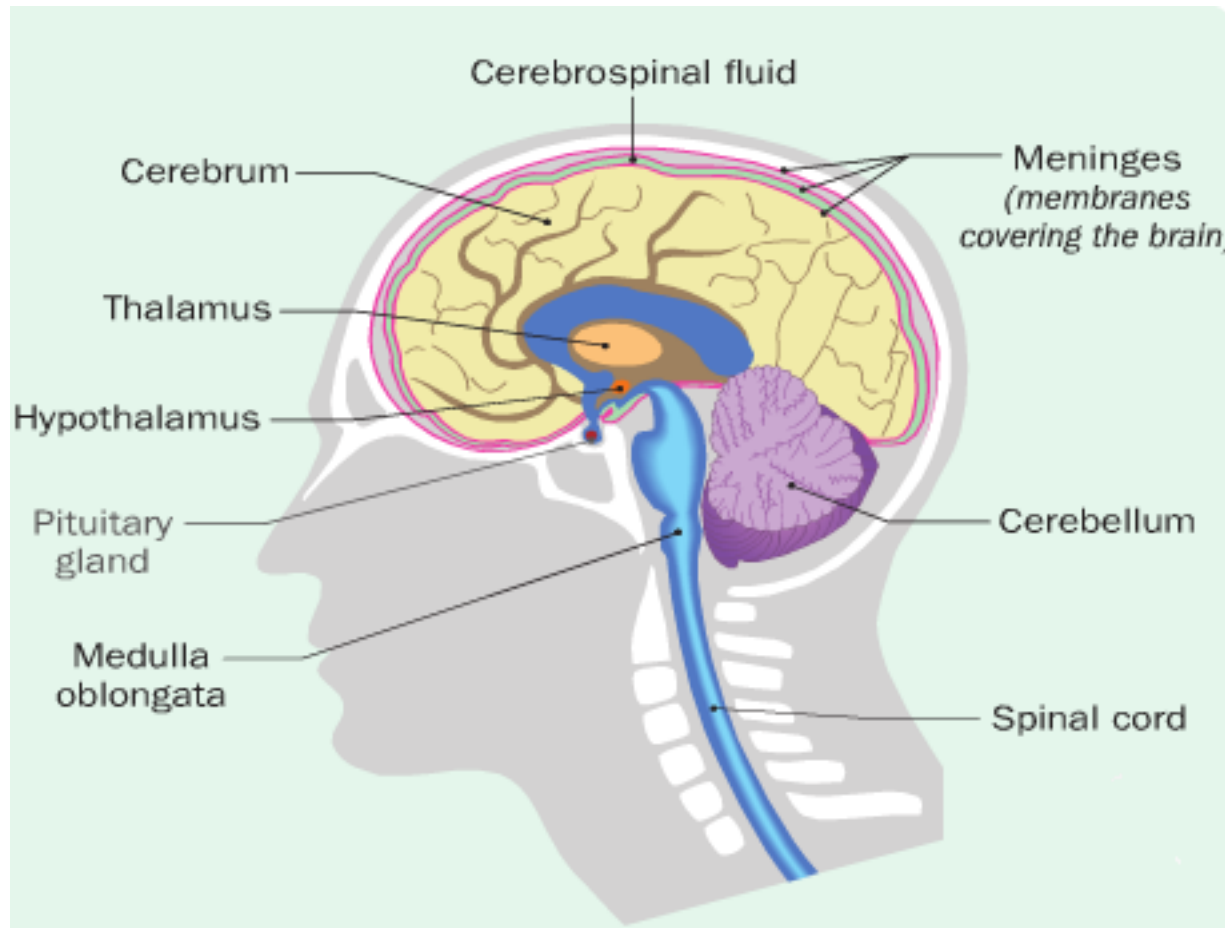


The Brain

Functions of the parts of the brain	
Part of brain	Function
Cerebrum	Controls voluntary muscles. Receives impulses from sense organs. Intelligence, memory, language, emotions, judgement & personality.
Cerebellum	Controls muscular coordination, balance.
Medulla	Controls involuntary actions.
Thalamus	Sends messages to different parts of the brain.
Hypothalamus	Controls internal environment of the body.



Parts of the Brain



Disorder of the Nervous System

Parkinson's disease:

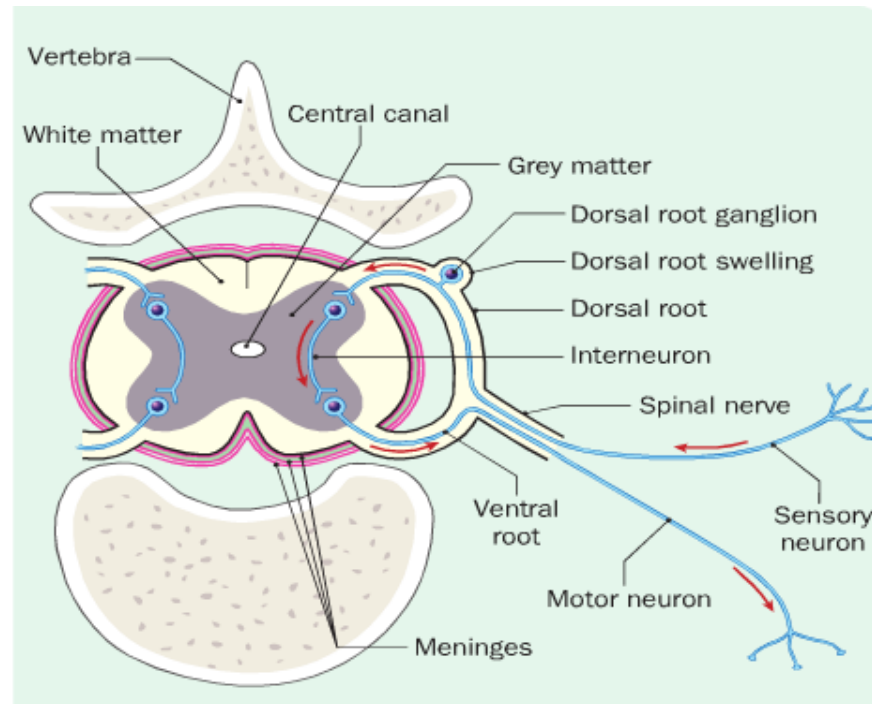
- is a nervous disorder caused by a lack of dopamine in the brain
- results in trembling limbs, a rigid body and inability to walk properly
- cannot be prevented
- is treated by physiotherapy and drugs



The Spinal Cord

In the spinal cord:

- sensory neurons enter through dorsal roots
- the dorsal root ganglion contains the cell bodies of the sensory neurons
- white matter contains axons
- grey matter contains cell bodies and dendrites
- interneurons connect sensory and motor neurons
- motor neurons emerge through ventral roots



The Reflex

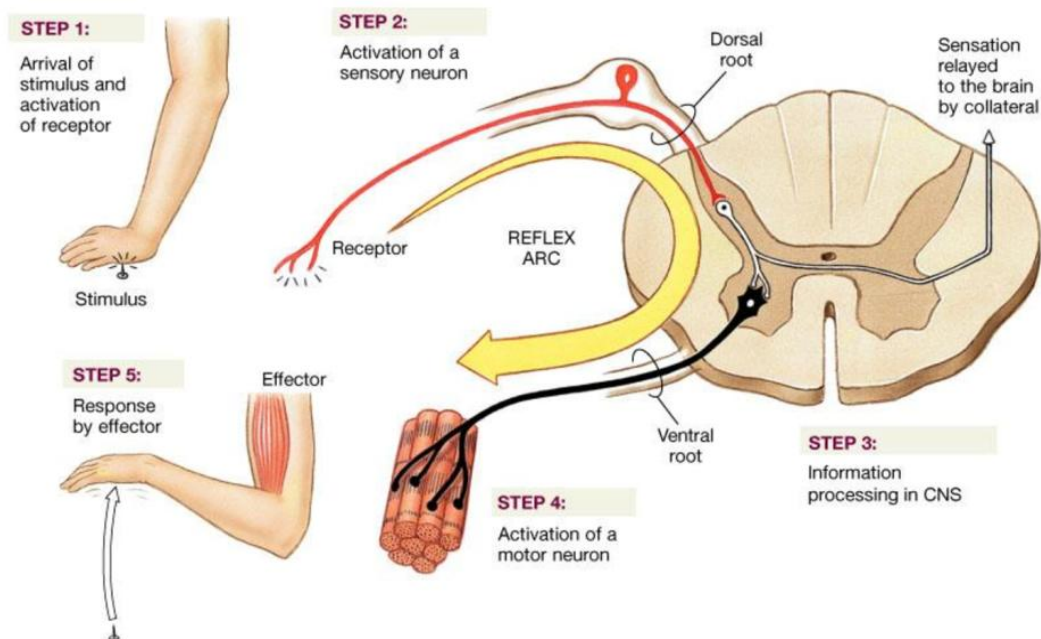
A reflex action is an automatic response to a stimulus.

Reflex actions are:

- fast responses
- designed to protect the body



Review of reflex arc.



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The **reflex arc** is when a message is sent to the spine.

The message is so strong that the arm is told to move by the spine before the brain has received and processed the message.