

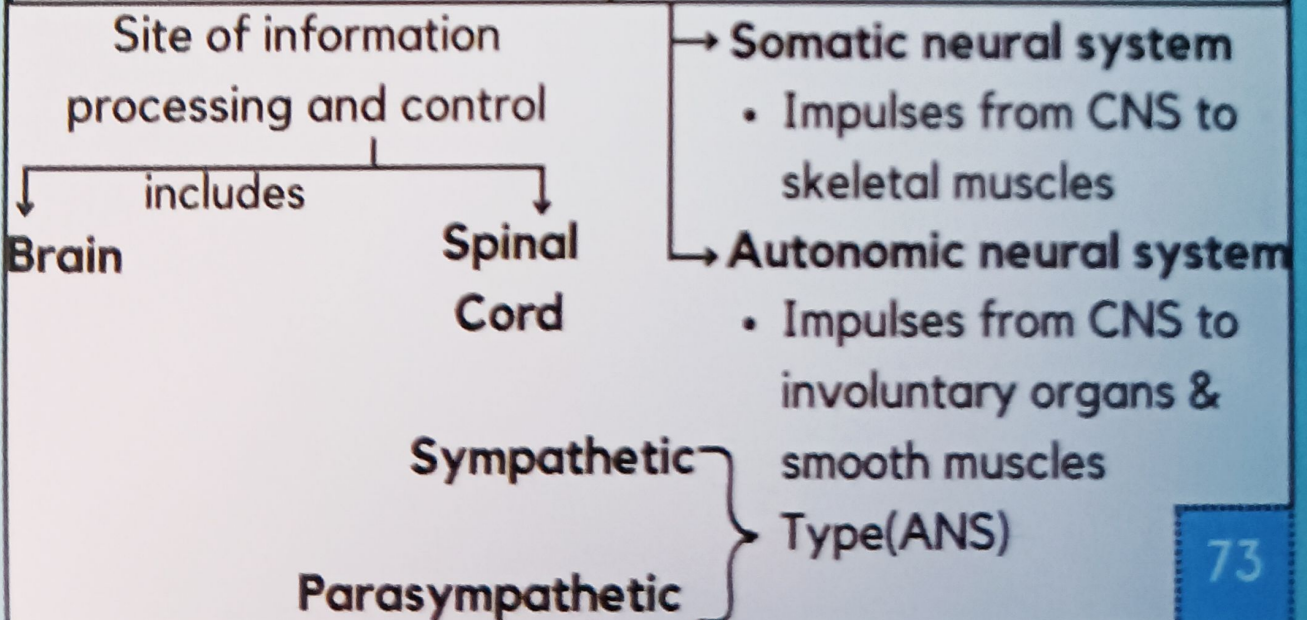
NEURAL CONTROL & COORDINATION

Coordination	<ul style="list-style-type: none"> Interactions b/w organs, in order to complement the function of one another
Neurons	<ul style="list-style-type: none"> Specialised cells forming the neural system which can detect, receive and transmit different kinds of stimuli.
Organsims	Neural System
Hydra	Network of neurons
Insects	Brain + ganglia + neural tissue
Vertebrate	Developed neural system



Human Neural System

Central Neural system (CNS)	Peripheral Neural system (PNS)
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Visceral Nervous System

Also a part of PNS, consisting of nerves, fibres, ganglia & plexus travelling from CNS to viscera

Neuron (Structural & functional unit of Neural System)

3 parts : **Cell body, dendrites and axon**

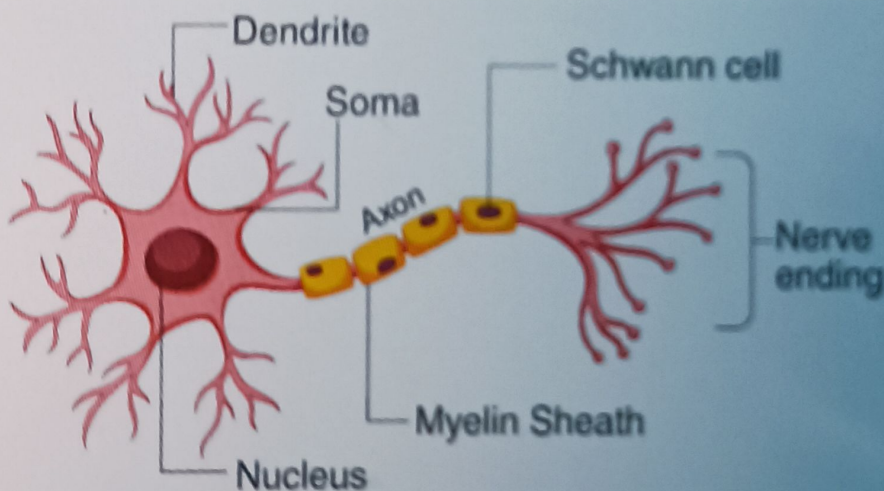
1. **Cell body** → Cytoplasm → organelles(+)
→ Nissl's granules

2. **Dendrites**

- Fibres projecting out of cell body helps transmitting impulses
- Nissl's granules(+)

3. **Axon**

- Long fibre; branched at distal end
- Ends into synaptic knob(contains synaptic vesicles), storing neurotransmitters



Neuron Diagram

TYPES OF AXON

Myelinated

- Enveloped with schwann cells (from myelin sheath)
- Gaps b/w adjacent myelin sheath-node of Ranvier
- Present in spinal & cranial nerves

Non-Myelinated

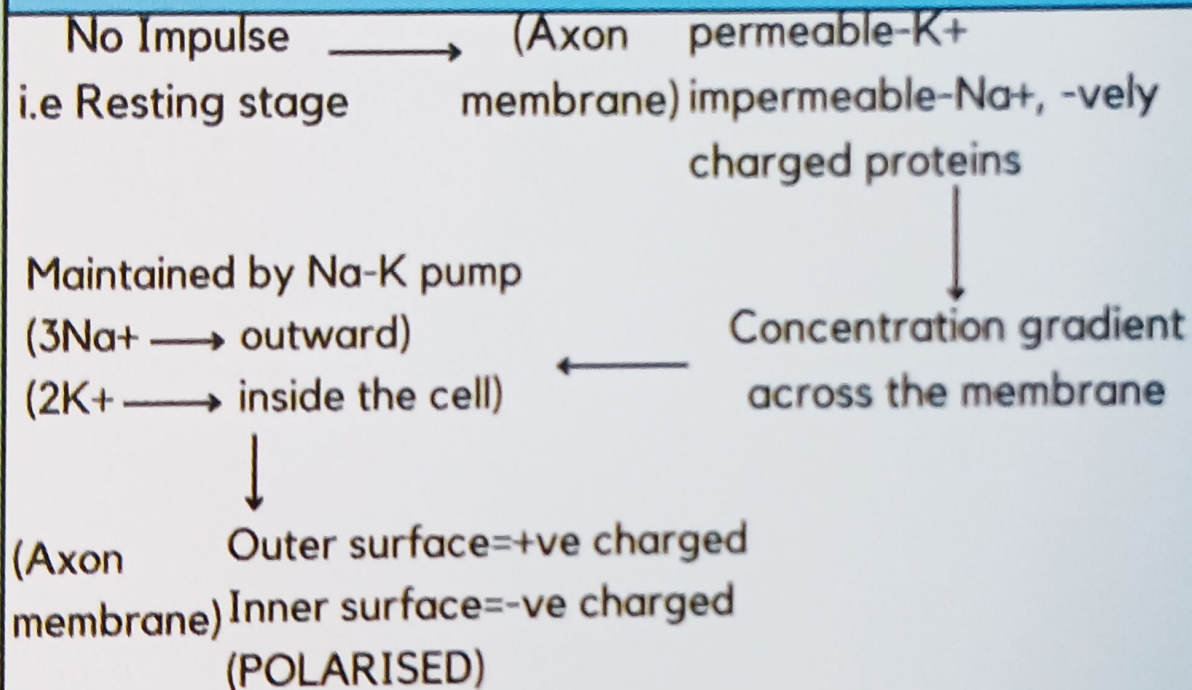
- Enclosed by schwann cells but don't form myelin sheath
- Present in autonomous & somatic neural system



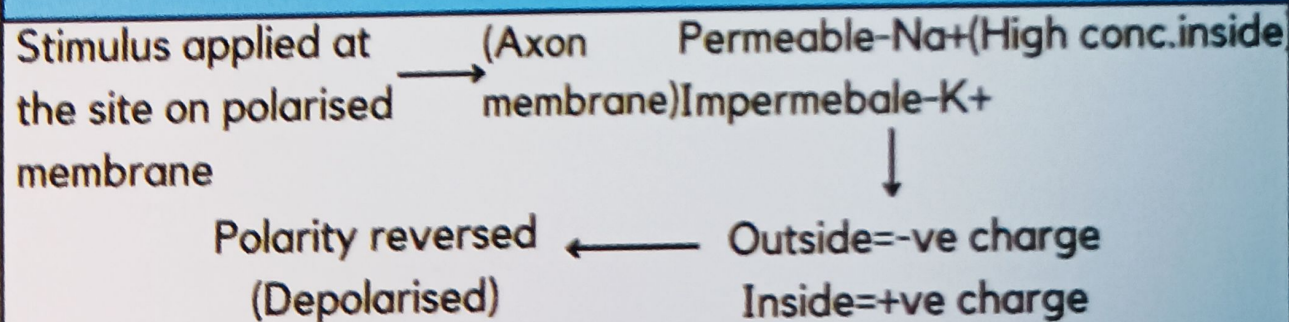
TYPES OF NEURONS

Unipolar	Bipolar	Multipolar
<ul style="list-style-type: none"> 1 axon only In embryo 	<ul style="list-style-type: none"> 1 axon + 1 dendrite In eye retina 	<ul style="list-style-type: none"> 1 axon + many dendrites In cerebral cortex

Generation of Nerve Impulse



Depolarisation



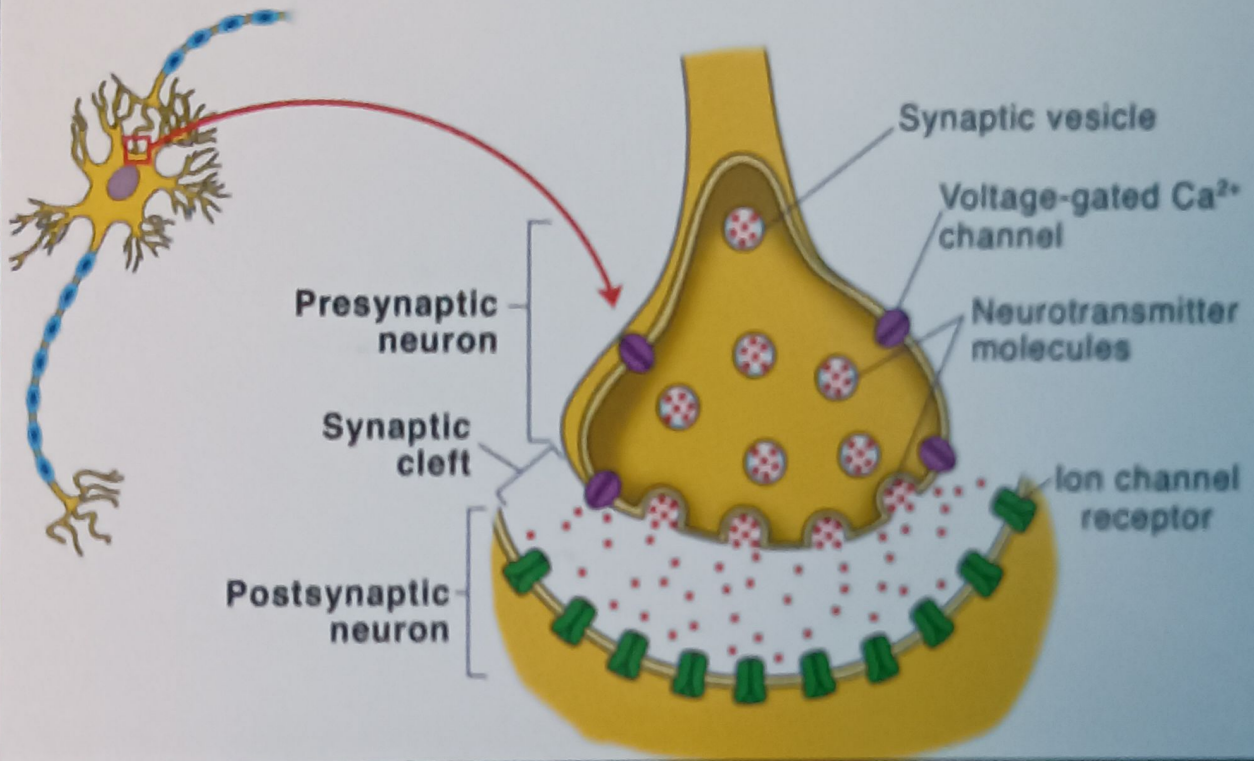
Repolarisation

Stimulus-induced permeability increases for Na⁺ for very short period of time; followed permeability for K⁺

Transmitting Impulse

SYNAPSE - An area of functional contact formed by the membranes of pre-synaptic neuron & post synaptic neuron.

Gap = Synaptic cleft



TYPES OF SYNAPSE

Electrical Synapse

- Pre & post synaptic membranes very close
- Electric current flows directly
- Fast and rare

Chemical synapse

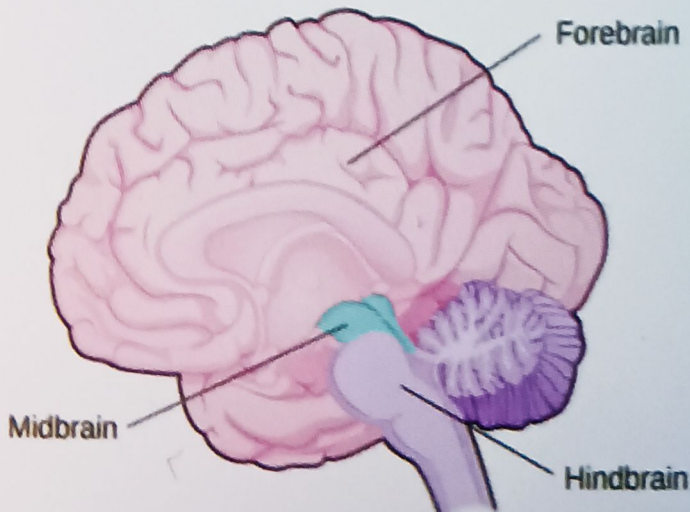
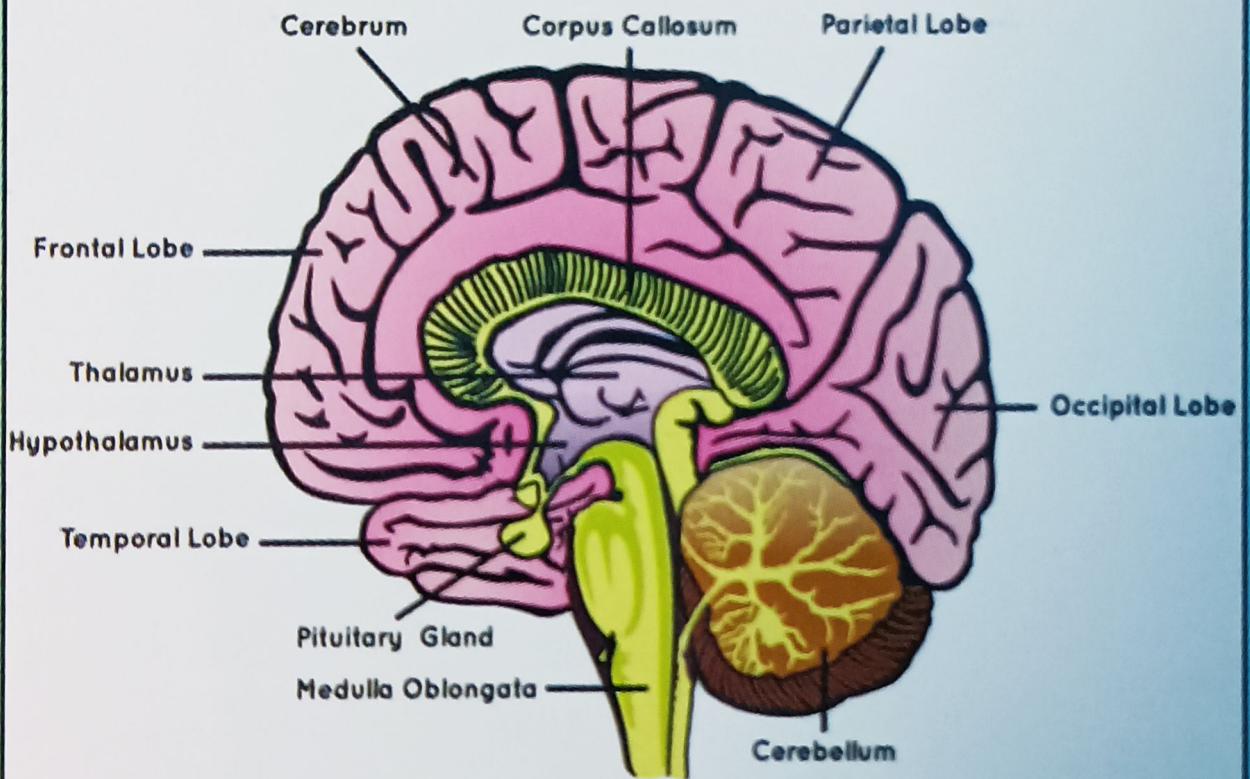
- Proper synaptic cleft(+)
- Involve neurotransmitters; binding to specific receptors
- Transmission via synaptic vesicles



CENTRAL NERVOUS SYSTEM - BRAIN

- Central information processing organ and is the 'command & control system'
- Protected by skull; covered by cranial meninges

Duramater (outerlayer) Arachnoid (middle layer) Piamater (Inner layer)



BRAIN
Forebrain
Midbrain
Hindbrain

FOREBRAIN

- Cerebrum

- Diencephalon

Thalamus

Hypothalamus

CEREBRUM

Cerebral hemisphere (divided by cleft, connected by corpus callosum, covered by cerebral cortex)

Cerebral hemisphere

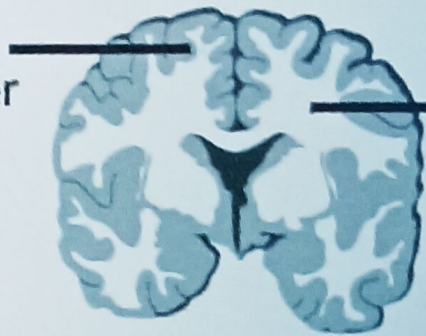
Grey matter

- Consist of cerebral cortex (folds)
- High concentration of cell bodies of neurons
- Contains
 - Motor area
 - Sensory area
 - Association area (Memory, communication)

White matter

- Inner part consisting of fibres/tracts covered by myelin sheath

Grey matter



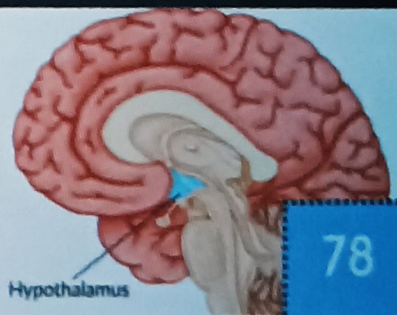
White matter

THALAMUS

- Major coordination centre for sensory & motor signalling
- Cerebrum wraps around it

HYPOTHALAMUS

- Present at base of thalamus
- Controls body temperature, urge of eating etc.
- Secretes hormones



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MIDBRAIN

- Location - b/w thalamus (forebrain) & pons (hindbrain)
- Cerebral aqueduct - canal passing via midbrain
- Corpora quadrigemina - 4 round swellings at dorsal part.
- Functions
 - Maintains consciousness
 - Generates somatic motor responses
 - Process visual & auditory data

HINDBRAIN

Pons

Cerebellum

Medulla

Pons - Fibres that interconnect different parts of brain

Cerebellum - convoluted surface; maintains muscle tone & body balance

Medulla oblongata

- Connected to spinal cord; major pathway for impulses that enter skull
- Centres control respiration, cardiovascular reflexes, gastric secretions.

Brain stem = mid brain + pons + medulla oblongata

Reflex Action

The involuntary response to a peripheral nervous stimulation

