BHARATHIDASAN UNIVERSITY

Program: M.Sc., Biomedical Science

Course Title: Neurobiology

Anatomy of neuron

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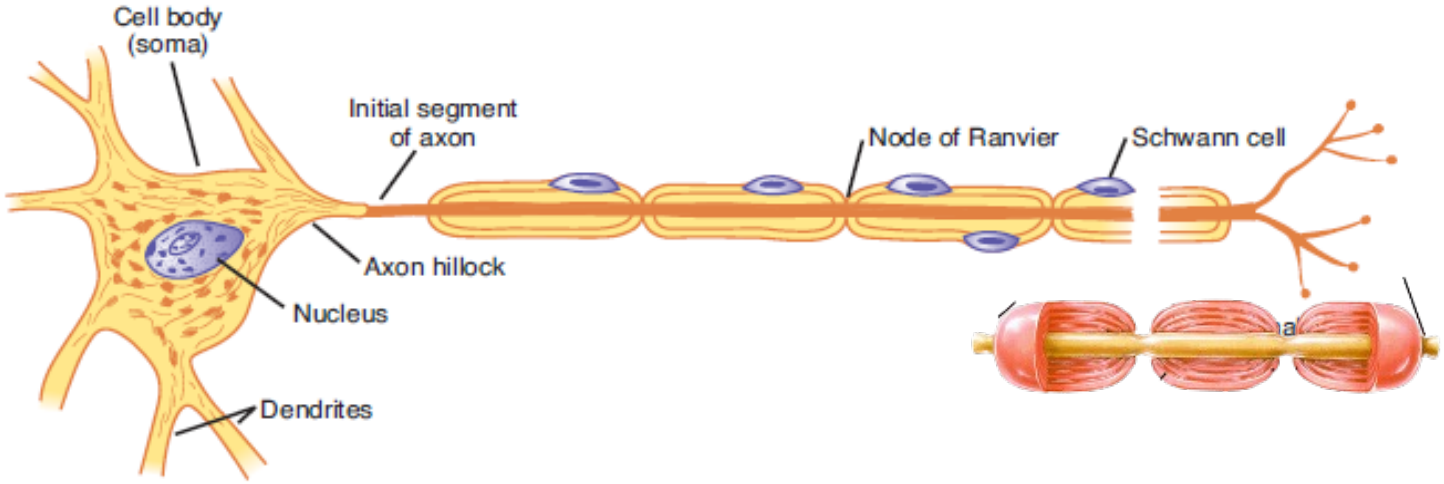
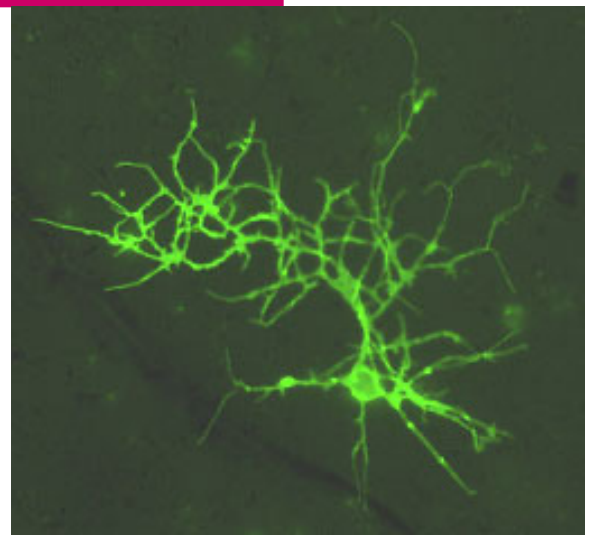
Dept. of Biomedical Science

Anatomy of a neuron

Neuron Structure





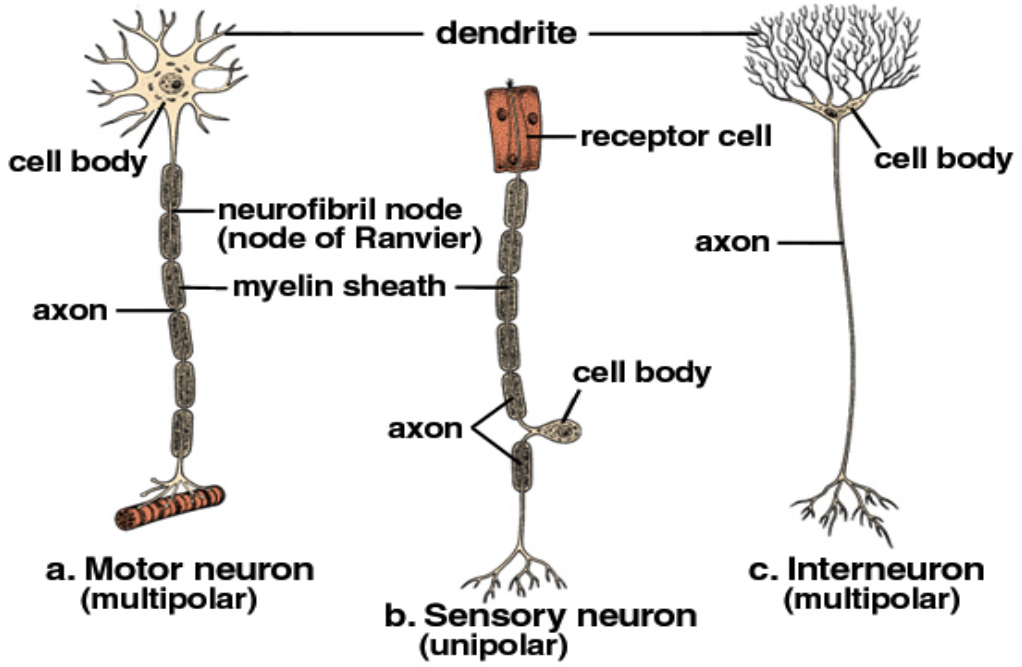
- The basic functional unit of the nervous system. Function: Send impulses to and from the CNS and PNS and the effectors (muscles/glands)

Dendrite → Fine hair-like extensions on the end of a neuron. *Function*: receive incoming stimuli.
Cell Body or Soma → The control center of the neuron. *Function: Directs impulses from the dendrites to the axon.*
Nucleus → Control center of the Soma. *Function*: Tells the soma what to do.
Axon→ Pathway for the nerve impulse (electrical message) from the soma to the opposite end of the neuron.
Myelin Sheath → An insulating layer around an axon. Made up of Schwann cells.
Nodes of Ranvier → Gaps between Schwann cells. *Function*: Saltatory Conduction (Situation where speed of an impulse is greatly increased by the message 'jumping' the gaps in an axon).

Types of Neurons

- There are 3 types of neurons. (**Functional Classification of Neurons**)

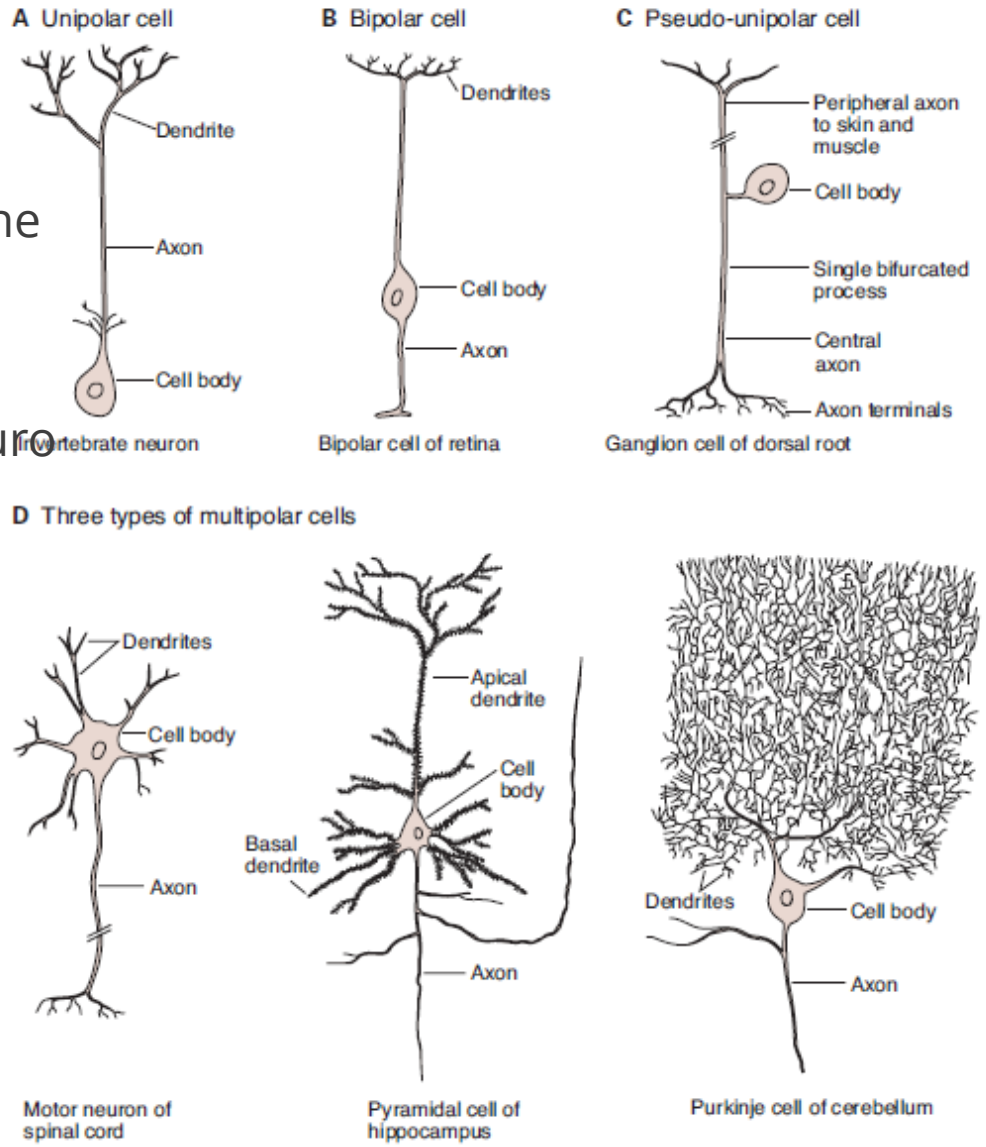
1. **Sensory Neurons** → Neurons located near *receptor* organs (skin, eyes, ears).
   Function: receive incoming stimuli from the environment.
2. **Motor Neurons** → Neurons located near *effectors (*muscles and glands)
   Function: Carry impulses to effectors to initiate a response.
3. **Interneurons** → Neurons that relay messages between other neurons such as sensory and motor neurons. (found most often in Brain and Spinal chord).



Types of Neurons (based on structure)

Structural classification of neurons is based upon the number of processes that extend out from the cell body.

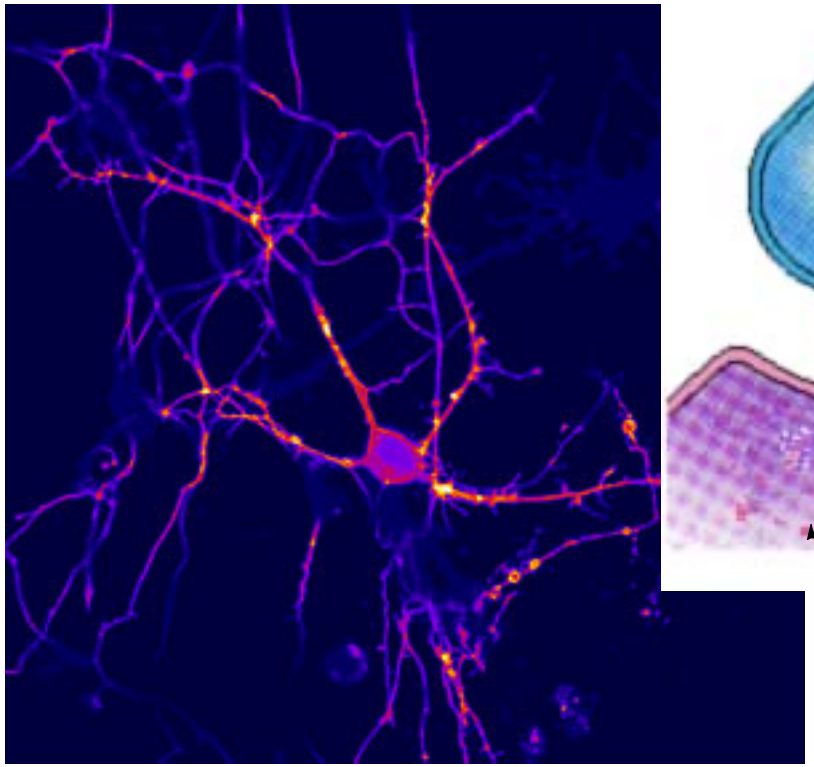
Three major groups arise from this classification: **multipolar**, **bipolar,** and **unipolar** neurons.

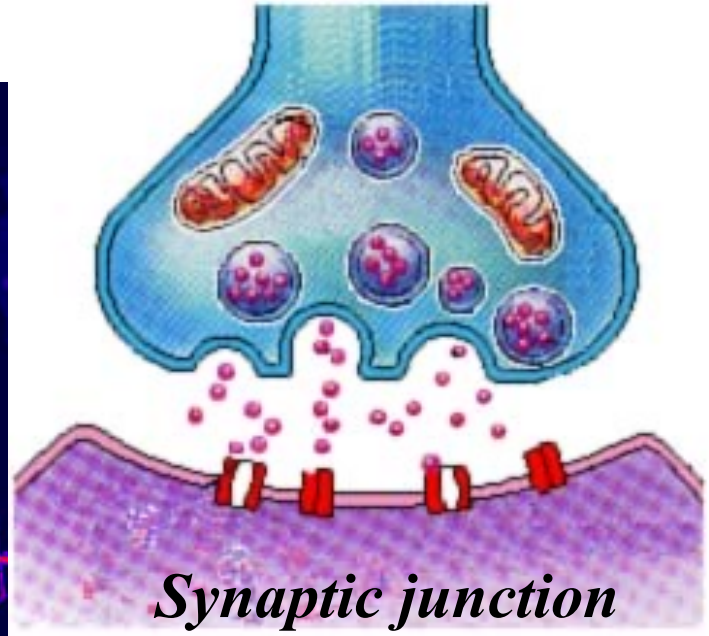


Types of Neurons (based on NT secreation)

- **Neurons** are also **classified by** their effect on target **neurons**.
- A **neuron** releases a **neurotransmitter** that binds to chemical receptors on the target **neuron**. The combination **of neurotransmitter** and receptor properties results in an excitatory, inhibitory, or modulatory change to the target **neuron**

The Nerve Cell





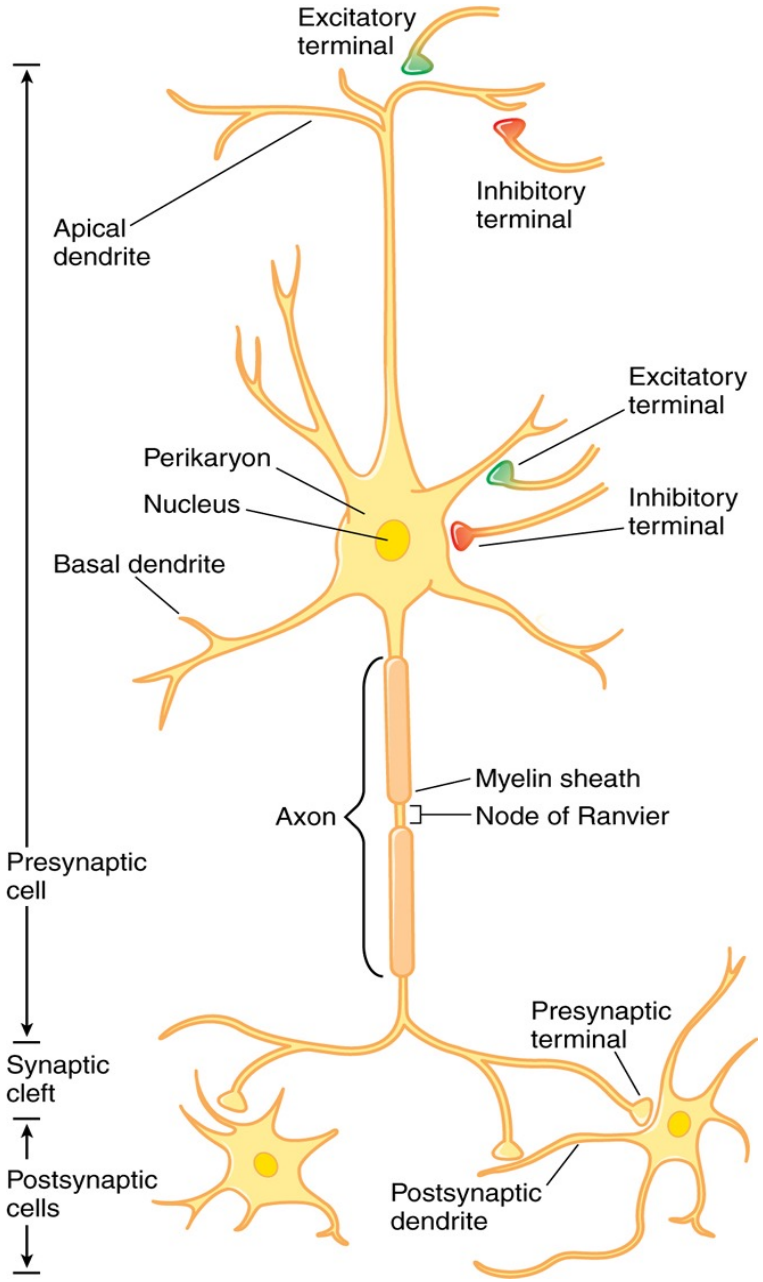
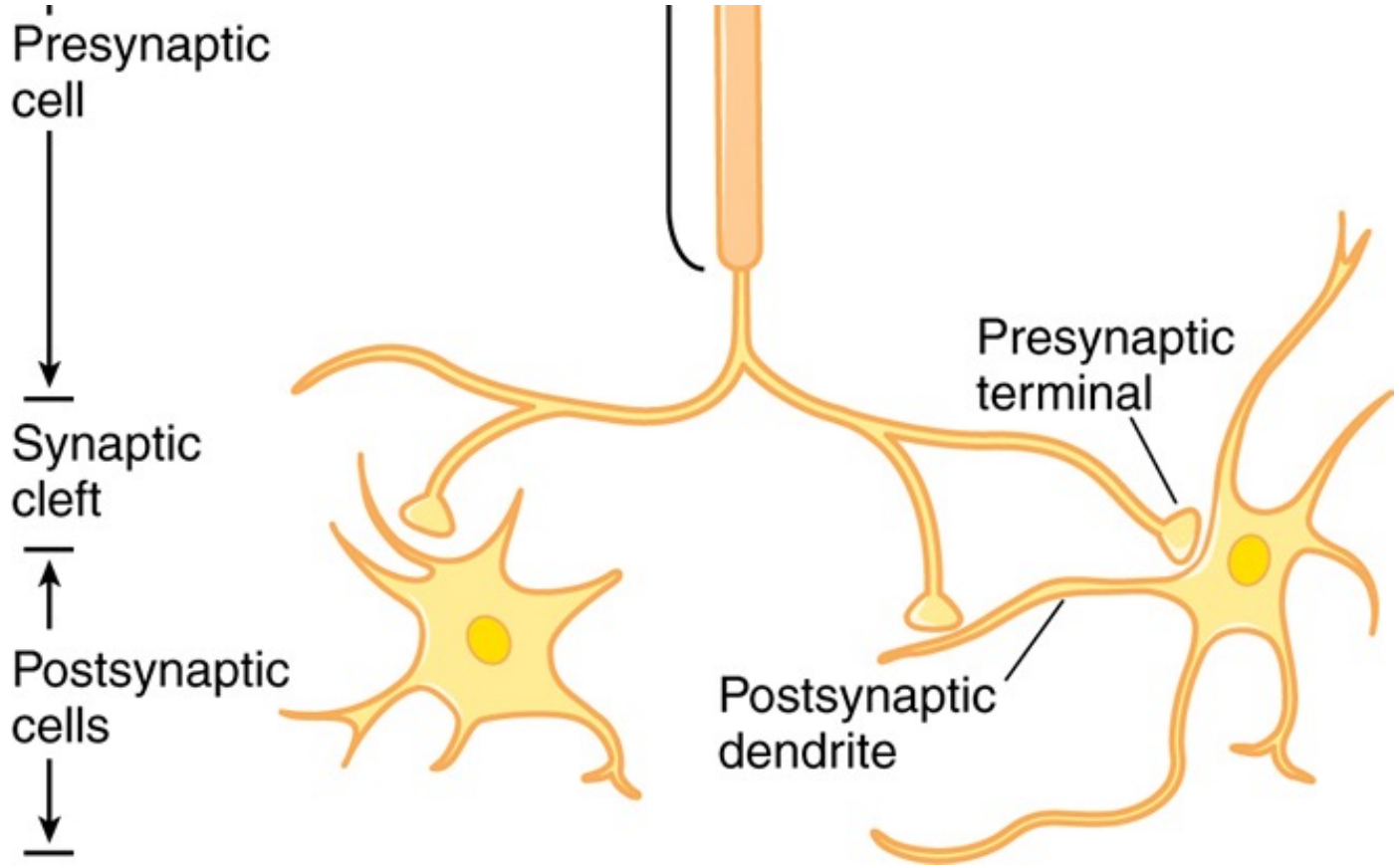

Excitatory terminal
Inhibitory terminal
Apical dendrite
Excitatory terminal
Perikaryon
Nucleus
Inhibitory terminal
Basal dendrite
Myelin sheath
Axon
Node of Ranvier
Presynaptic cell
Presynaptic terminal
Synaptic cleft
Postsynaptic cells
Postsynaptic dendrite

Figure 1.


Presynaptic cell
Synaptic cleft
Postsynaptic cells
Presynaptic terminal
Postsynaptic dendrite

Nerves

- Nerves → Collections of neurons that are joined together by connective tissue.

- Responsible for transferring impulses from receptors to CNS and back to effectors.

Sympathetic Effects

- Fight, Fright or flight response

  Release of Neurotransmitters (NT)-

  - Norepinephrine (NT) from postganglionic fibers
  - Epinephrine (NT) from adrenal medulla

- Mass activation prepares for intense activity
  1. Heart rate (HR) increases
  2. Bronchioles dilate (increase relaxation)
  3. Blood [glucose] increases
  4. GI motility decreases
  5. Contraction of sphincters
  6. Relaxation of a. Detrusor muscle, b,Ciliary muscle
  7. Mydriasis

Parasympathetic Effects

- Normally not activated as a whole
  - ➢Stimulation of separate parasympathetic nerves.
- Release ACh as NT
- Relaxing effects-
  1. Decreases HR.
  2. Dilates visceral blood vessels.
  3. Increases digestive activity.
  4. Bronchonstriction
  5. GI motility increases
  6. Relaxation of sphincters
  7. Contraction of a. Detrusor muscle, b.Ciliary muscle
  8. Miosis