

neurons.

- ✓ neurons are excitable cells.
- ✓ neuroglial cells protect, support and nourish the neurons. (more than one half volume of neural tissue)
- ✓ **nissl granules** are the granular bodies also present in branched projections of the cell body called **dendrites**.
- ✓ dendrites transmit impulses towards cell body
- ✓ distal branched ends of **axon** are bulb-like structures called **synaptic knob**. they possess vesicles that release neurotransmitters.
- ✓ axons transmit nerve impulse away from cell body to **synapse** a neuro-muscular junction.

types of axons

1. **myelinated nerve fibres.**
schwann cells that form a myelin sheath around the axon.
gaps b/w two adjacent myelin sheaths are **nodes of ranvier**
these nerves are found in spinal and cranial nerves.
2. **unmyelinated nerve fibre**
schwann cells present but do not form a myelin sheath.
found in ANS and SNS.

hindbrain

- > **pons**
-consists of fibre tracts that interconnect different regions of the brain
- > **cerebellum**

hindbrain (cont)

- provides additional space for more neurons
- > **medulla**
-connected to the spinal cord
-centres that control respiration, cardiovascular reflex, gastric secretions
- > **brain stem**
-midbrain, pons, medulla oblongata

ear

- > **1. outer ear**
-**pinna and external auditory meatus (canal)**
-pinna collects vibrations in the air
-canal has fine hairs and wax-secreting ceruminous gland
- tympenic membrane** composed of connective tissue with skin outside and mucus membrane inside.
- > **2. middle ear**
-3 ossicles called malleus, incus, stapes.
-malleus attached to tympanic membrane and stapes to oval window of the **cochlea**
- eustachian tube** connects the middle ear cavity to **pharynx**
-it helps in equalizing the pressures
- > **3. inner ear**

ear (cont)

- fluid filled ear is called **labyrinth** which can be divided into bony and membranous
- bony labyrinth is a series of channels inside which lies membranous labyrinth surrounded by **perilymph**
- membranous labyrinth is filled with the fluid **endolymph**
- coiled portion of the labyrinth is called **cochlea**
- reissner's and basilar** divide the perilymph into upper scala vestibuli and lower scala vestibuli
- space within cochlea is called scala media
- organ of corti** is located on the basilar membrane contains hair cells acting as auditory receptors.

types of neurons

unipolar	bipolar	multipolar
1 axon only	1 axon	1 axon
0 dendrites	1 dendrite	2/more dendrites
embryonic stage	retina of eye	cerebral cortex

brain overview.

- ✓ information processing organ-command and control system

brain overview. (cont)

- ✓ voluntary and involuntary movements, balance, thermo-regulation, hunger thirst, circadian, endocrine and behaviour.
- ✓ cranial meninges- outer layer **dura mater**, thin middle layer **arachnoid**, inner layer in contact with brain tissue **pia mater**

midbrain

- located between **hypothalamus** of the forebrain and **pons** of the hindbrain
- cerebral aqueduct**, a canal passes through midbrain
- dorsal portion consists of 4 round lobes called **corpora quadrigemina**

! important info !

- cranial nerves (12 pairs)
- spinal nerves (31 pairs)
- > reflex pathway.
-atleast 1 afferent neuron (receptor) and one efferent neuron in series.
- afferent neuron receives signal from sensory organ via dorsal nerve root into CNS
- efferent neurons then carry the signals from CNS to effector and this mechanism is called the **reflex arc**



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rods and cones

rods	cones
scotopic	photopic
rhodopsin	red light
derived from vit. A	green light
opsin + retinal	blue light

generates action potentials in ganglion cells through bipolar cells

ear pt.2

-basal end of hair is in close contact with the afferent nerves
 -a large no. of processes called stereo cilia are projected from the apical part of each hair cell.
 -thin elastic membrane above hair cells **tectorial membrane**
 -above the cochlea, a complex system called **vestibular apparatus**
 which is composed of **3 semi-circular canals** and **otolith**
 -projecting ridge containing hair cells **crista ampullaris**
 -sacculle and utricle contain a projecting ridge called **macula**
 -crista and macula are specific receptors of vestibular apparatus. maintenance of body and posture

generation and conduction of nerve impulses

✓ ion channels are **selectively permeable**
 1. *resting state*
 K⁺ more permeable and Na⁺, -ve proteins impermeable.
 axoplasm inside has high conc of K⁺ and -ve proteins and low conc of Na⁺.
 ECF (extra cellular fluid) has low K⁺ and -ve proteins but more Na⁺ therefore forms a **concentration gradient**
 ionic gradient maintained by *active transport* and sodium potassium pump by 3Na⁺ out 2K⁺ in.
outer surface = +ve charge *inner surface* = -ve charge
polarised state has a potential difference of -70mV resting potential
 2. *depolarisation*
 site permeable to Na⁺ causing rapid influx therefore **reversal of polarity**
outer = -ve charge *inner* = +ve charge
 this is now called **action potential** or nerve impulse
 3. *repolarisation*
 Na⁺ permeability was short lived, therefore, followed by a rise in permeability of K⁺

generation and conduction of nerve impulses (cont)

where K⁺ diffuses outside restoring the resting potential.

parts of an eye

> **1. sclera**
 -dense connective tissue
 -anterior portion turns transparent and is then called **cornea**
 > **2. choroid**
 -middle layer, many blood vessels
 -thin posterior, anterior thick which forms the **ciliary body**
 > **3. ciliary body**
 -continues forward to form a pigmented opaque structure **iris**
 -eye call contains transparent crystalline lens held in place by ligaments
 > **4. retina**
 -3 layer of neural cells **ganglion cells, bipolar cells, photoreceptor cells**
 -blind spot = no photoreceptor cells present
 -macula lutea- fovea, concentration of cones
 -space b/w cornea and lens = **aqueous chamber** containing aqueous humor
 - space b/w lens and retina = **vitreous chamber**

forebrain

> **cerebrum**
 - 2 halves called the left and right cerebral hemispheres
 - tract of nerve fibres that connect the hemispheres **corpus callosum** covered with myelin sheath, giving whitish appearance therefore called **white matter**
 -layer that covers cerebral hemisphere and forms prominent folds is **cerebral cortex**
 -cerebral cortex referred to as **grey matter** due to concentration of neurons there.
 -contains motor areas, sensory areas, and association areas (neither motor nor sensory)
 -cerebral cortex is responsible for intersensory associations, memory and communication.
 > **thalamus**
 -cerebrum wraps around this structure
 - major coordinating structure for sensory and motor signaling
 > **hypothalamus**
 -lies at the base of thalamus
 -body temp, eating, thirst



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forebrain (cont)

- groups of neurosecretory cells secrete hormones called *hypothalamic hormones*
- > limbic system
- inner parts of cerebral hemispheres and structures like **amygdala**, **hippocampus**, etc
- along with hypothalamus involved in rage, pleasure, motivation, sexual behaviour

nose and tongue

> nose

- contains mucus-coated receptors called **olfactory receptors**

- made of olfactory epithelium that consist of 3 kinds of cells
- neurons of olfactory epithelium extend directly in broad bean-sized organs called **olfactory bulb** this is an extension of the brain's limbic system.

> tongue

- detection through tastebuds that contain **gustatory receptors**
- both nose and tongue detect dissolved chemicals.



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