

* Embryology :-

* Development of CNS -

1] Neural tubes -

⇒ Developed from neural plate from ectoderm (dorsal) to notochord ⇒ (spinal cord in fetus).

(plate → groove → tube) then separate from ectoderm.
neural pit

* neural crest ⇒ (dorsolateral).

(plate border → fold → crest).

a) The part ^{cranial} → 4th somite → form brain.

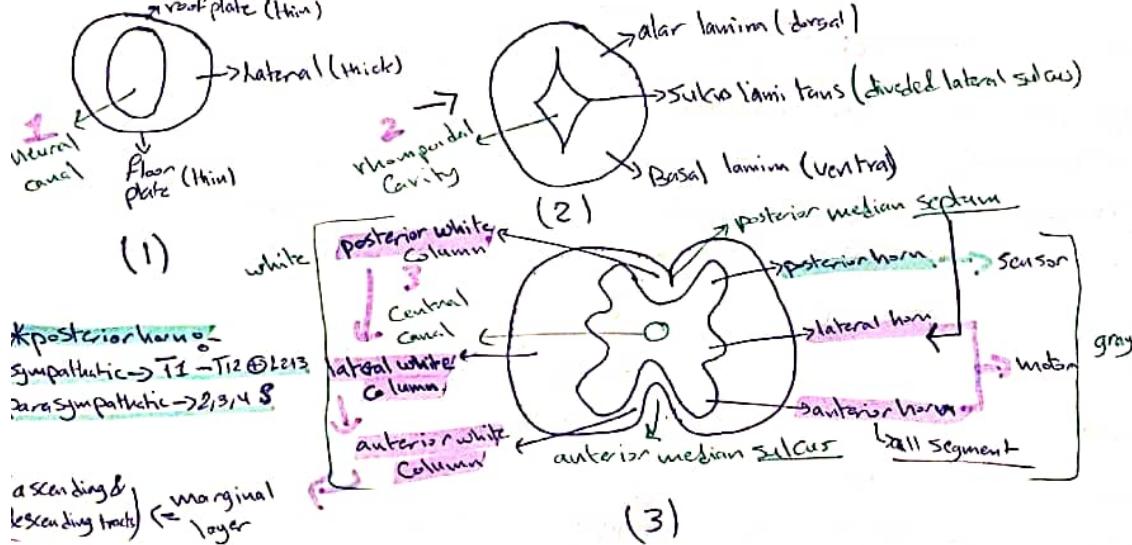
b) The part ^{caudal} → 4th somite → form spinal cord.

2] Spinal Cord -

a) ependymal layer ⇒ inner

b) Mantle layer ⇒ form gray matter

c) Marginal layer ⇒ form white matter



* posterior horn: sympathetic → T1-T12 ⊕ L1-3, 2 are sympathetic → 2, 3, 4 S

ascending & descending tracts ⇒ marginal layer

* Termination :-

1] 3rd month of intrauterine life ⇒ tip of coccyx

2] at birth ⇒ L3/L4

3] adult ⇒ L1/L2

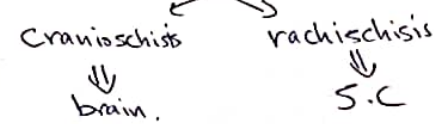
* roots of L + S + Cx ⇒ Cauda equina (L2-C1) ⇒ longer & more oblique ⇒ S.C & V.C shorter

* Spina bifida \Rightarrow defect to skin \rightarrow failure of fusion of neural arch of vertebra.

* Types -

- 1) Spina bifida occulta \Rightarrow S.b with normal spinal cord (see)
- 2) Meningocele \Rightarrow bulge of meninges through S.b
- 3) Meningo-myelocele \Rightarrow bulge of meninges & spinal cord through S.b
- 4) Myelocele \Rightarrow S.C. exposed directly to the spina bifida. (no skin).

* Cranio rachischisis \Rightarrow failure of closure of neural tube \rightarrow longitudinal cleft



2] Brain -

A] Forebrain vesicle (prosencephalon) :-

- a) median part (diencephalon) \Rightarrow thalamus & hypothalamus
 epi thalamus, metathalamus ↑
3rd ventricle
- b) lateral part \Rightarrow Cerebrum & lateral ventricles

B] Midbrain vesicle (mesencephalon) :-

\Rightarrow midbrain

C] Hindbrain vesicle (Rhombencephalon) :-

- a) Cranial \Rightarrow metencephalon \Rightarrow pons & cerebellum & 4th ventricle
- b) Caudal \Rightarrow myelencephalon \Rightarrow medulla oblongata

* Meningocele \Rightarrow herniation of part of meninges.

* Meningoencephalocele \Rightarrow herniation of M + brain

* Meningo-hydroencephalocele \Rightarrow // of M + B + CSF

* Anencephaly \Rightarrow X of development of greater part of brain & part of skull
 \Rightarrow because of failure of cephalic part of neural tube to close

* Hydrocephalus \Rightarrow \uparrow CSF in ventricular system \Rightarrow due to closure of CSF circulation

* Microcephaly \Rightarrow Small skull & cerebral hemisphere

* Cyclopia \Rightarrow 1 cerebral hemisphere, 1 ventricle, 1 median eye

* Neural crests -

- 1] Sensory cell of
- 2] pia & arachnoid matter

- \rightarrow para sympathetic ganglia (1973)
- \rightarrow sympathetic ganglia
- \rightarrow dorsal root of ganglia

- 2] Schwann cell \Rightarrow form myelin sheath
- 4] Chromaffin \Rightarrow suprarenal medulla
- 5] pigment \Rightarrow skin, iris, retina