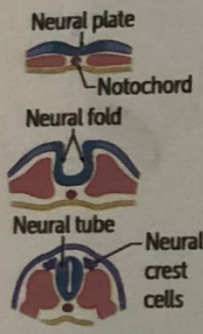
Neural development



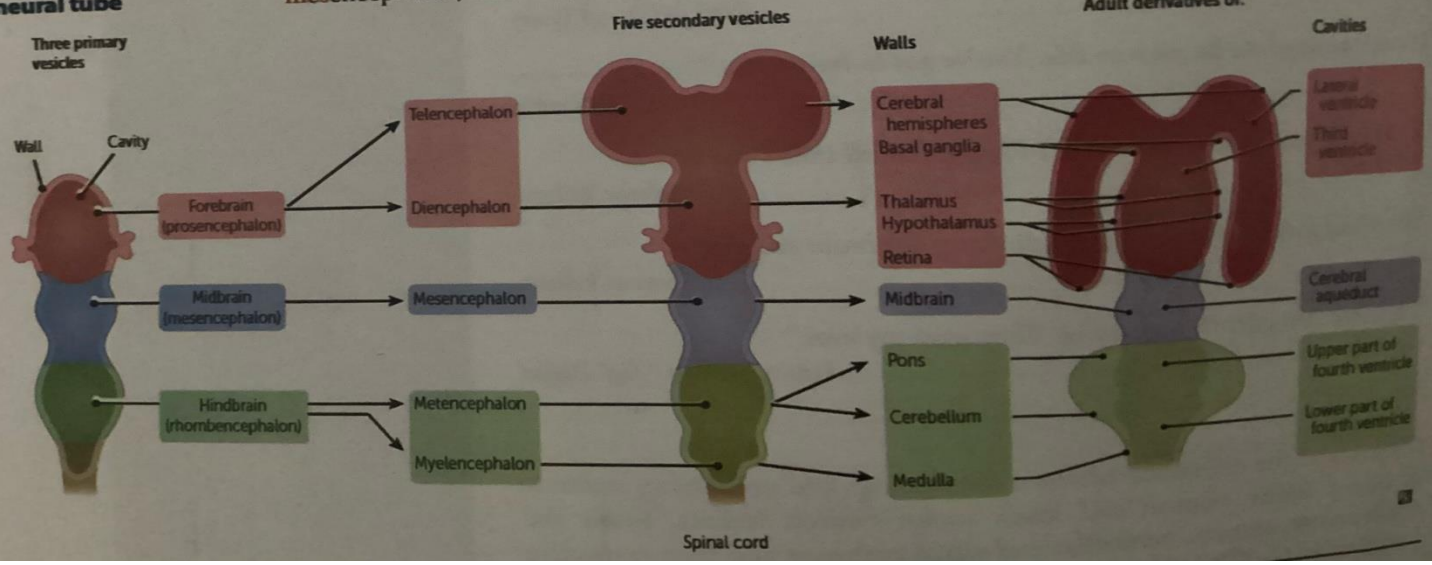
Notochord induces overlying ectoderm to differentiate into neuroectoderm and form neural plate.
Notochord becomes nucleus pulposus of intervertebral disc in adults.
Neural plate gives rise to neural tube and neural crest cells.
Lateral walls of neural tube are divided into alar and basal plates.

Alar plate (dorsal): sensory; induced by bone morphogenetic proteins (BMPs)
Basal plate (ventral): motor; induced by sonic hedgehog (SHH)

] Same orientation as spinal cord

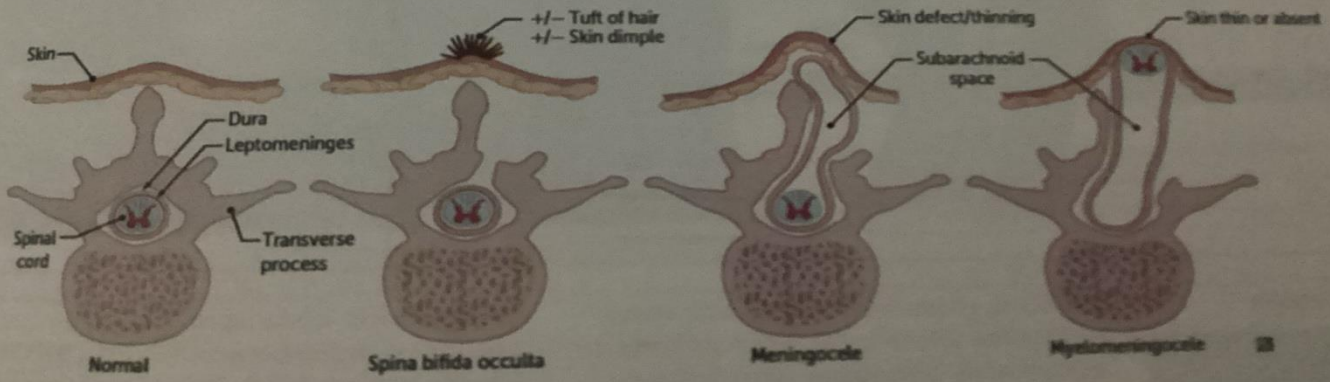
Regionalization of neural tube

Telencephalon is the 1st part. Diencephalon is the 2nd part. The rest are arranged alphabetically: mesencephalon, metencephalon, myelencephalon.



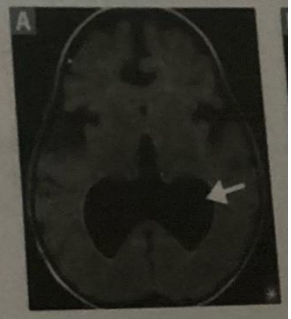
Central and peripheral nervous systems origins	Neuroepithelia in neural tube—CNS neurons, CNS glial cells (astrocytes, oligodendrocytes, ependymal cells). Neural crest—PNS neurons (dorsal root ganglia, autonomic ganglia [sympathetic, parasympathetic, enteric]), PNS glial cells (Schwann cells, satellite cells), adrenal medulla. Mesoderm—microglia (like macrophages).

Neural tube defects	Failure of neural tube to close completely by week 4 of development. Associated with maternal folate deficiency during pregnancy. Diagnosis: ultrasound, maternal serum AFP (↑ in open NTDs).
Spinal dysraphism	
Spina bifida occulta	Closed NTD. Failure of caudal neural tube to close, but no herniation. Dura is intact. Usually seen at lower vertebral levels. Associated with tuft of hair or skin dimple at level of bony defect.
Meningocele	Open NTD. Meninges (but no neural tissue) herniate through bony defect.
Myelomeningocele	Open NTD. Meninges and neural tissue (eg, cauda equina) herniate through bony defect.
Myeloschisis	Open NTD. Exposed, unfused neural tissue without skin/meningeal covering.
Cranial dysraphism	
Anencephaly	Open NTD. Failure of rostral neuropore to close → no forebrain, open calvarium. Often presents with polyhydramnios (↓ fetal swallowing due to lack of neural control).



Myeloschisis نفسهاmyelocele نفسهاrachischisis

Brain malformations	Often incompatible with postnatal life. Survivors may be profoundly disabled.
Holoprosencephaly	Failure of forebrain (prosencephalon) to divide into 2 cerebral hemispheres; developmental field defect usually occurring at weeks 3–4 of development. Associated with *SHH* mutations. May be seen in Patau syndrome (trisomy 13), fetal alcohol syndrome. Presents with midline defects: monoventricle **A**, fused basal ganglia, cleft lip/palate, hypotelorism, cyclopia, proboscis. ↑ risk for pituitary dysfunction (eg, diabetes insipidus).



2.microcephaly:poor growth of brain associated with mental retradation

3.meningocephaly:meninges:dura +arachnoid herniated through deficient skull part

4.meningoenchephalocele:meninges+brain herniated

5.meningo -hydro-enchephalocele: meninges+brain+part of ventricles with in the brain tissue herniated

6.exencephaly: brain is exposed due to failure of closure anterior neuropore (anencephaly :the brain is degenerated)

7.hydrocephalus:excessive accumulation of CSF

Embroyology:

1.Which match between the structure and part of the brain is false:

a. Thalamus- diencephalons

b. Cerebellum- rhombencephalons

c. Corpus callosum- telencephalon.

d. Pons- mesencephalon.

e. Tectum- mesencephalon

Answer:d

2.Rhombencephalon gives rise to:

a.medulla

b.midbrain

c.thalamus

d.cerebral aqueduct

e.cerebral cortex

Answer:a

3.one of the following isn't a division of rhombencephalon:

a.medulla

b.midbrain

c.pons

d.cerebellum

e. 4th ventricle

Answer:b