Development and teratology of the endocrine and nervous system

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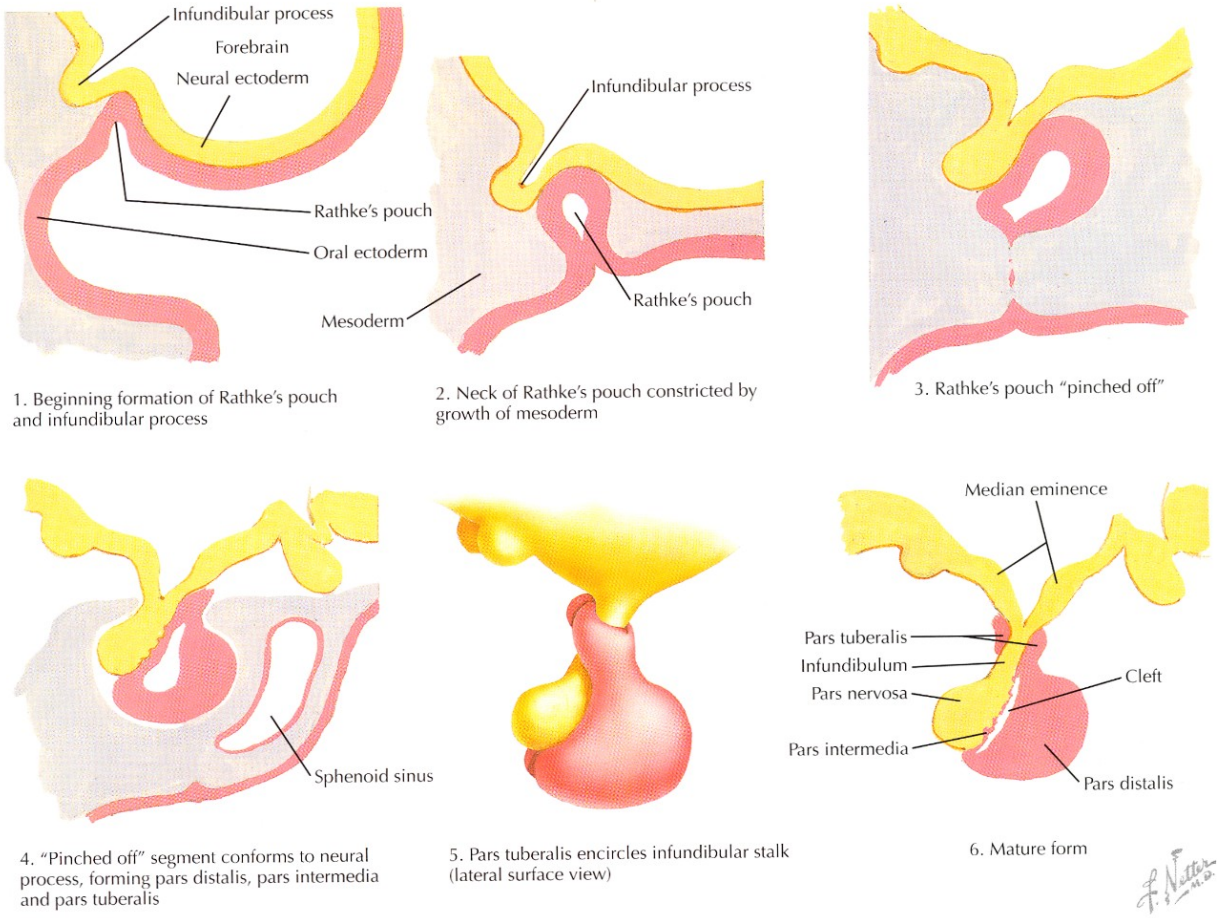
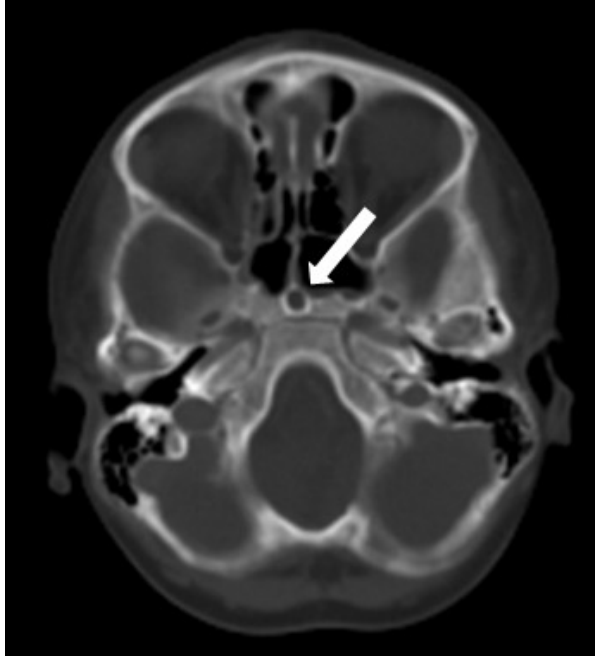
Pituitary gland

- Ectoderm (Rathke's pouch)
- Neuroectoderm of ventral wall of diencephalon



Development of the Hypophysis



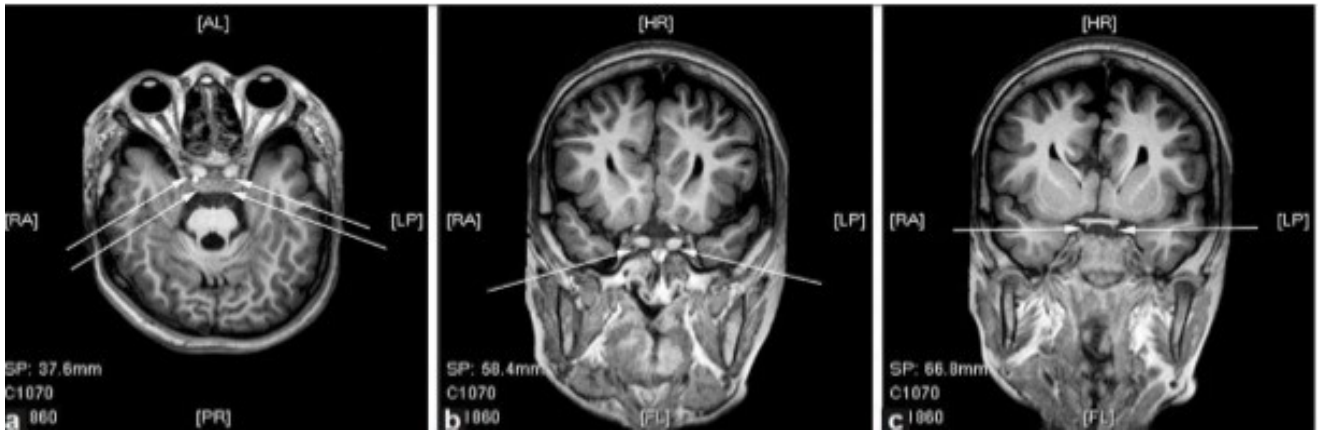
Craniopharyngeal canal

Pharyngeal hypophysis

Agenesis/hypoplasia - agenesis is incompatible with life; panhypopituitarism

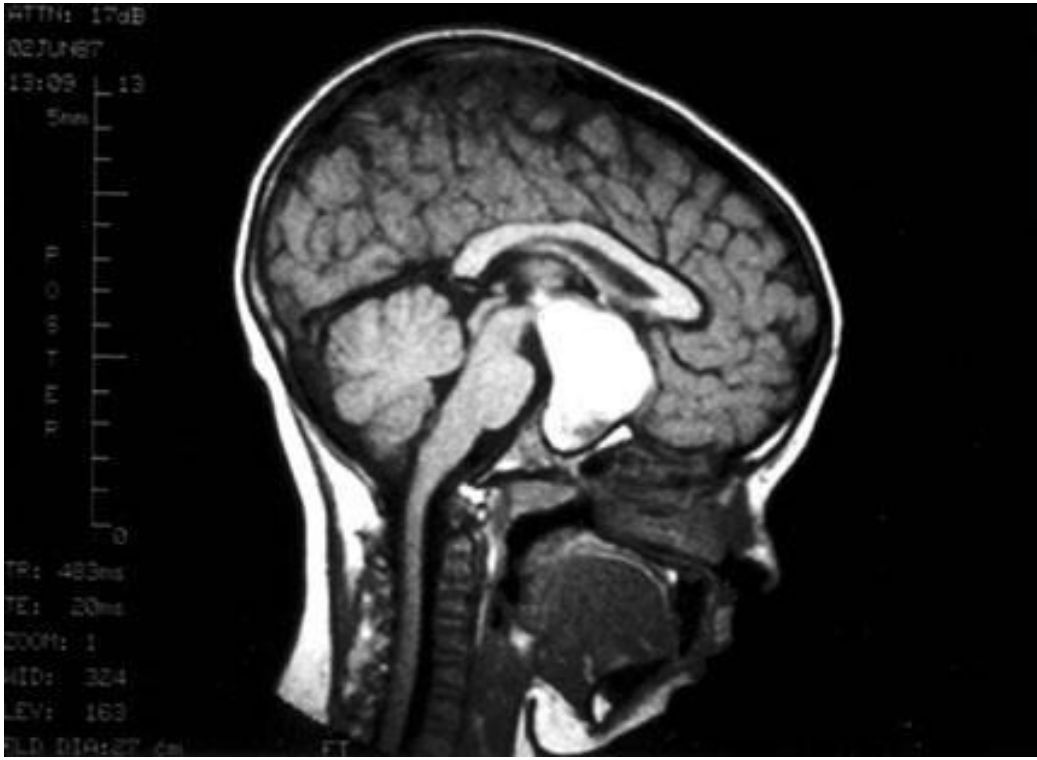
Duplication of the gland – very rare

Ectopic posterior pituitary – pituitary dwarfism



Duplication of the pituitary gland associated with multiple blastogenesis defects: Duplication of the pituitary gland (DPG)-plus syndrome. Case report and review of literature - Surgical Neurology International

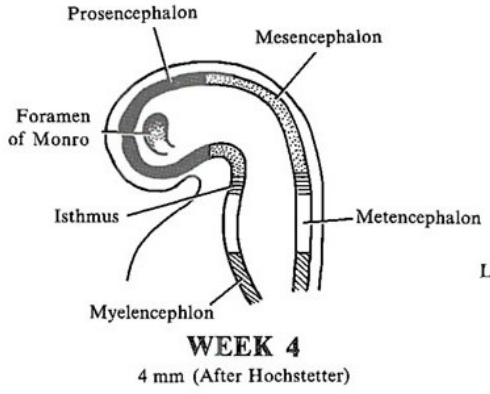
Craniopharyngiomas – usually lie above the sella; cause hydrocephalus, growth failure, diabetes insipidus, lose of peripheral vision

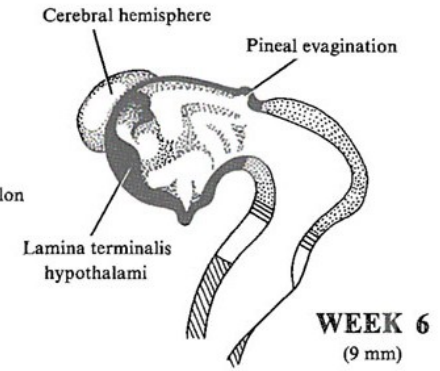


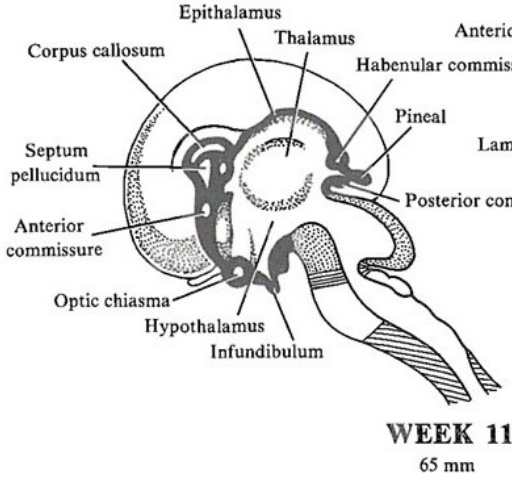
Pediatric Craniopharyngioma: Background, Pathophysiology, Epidemiology (medscape.com)

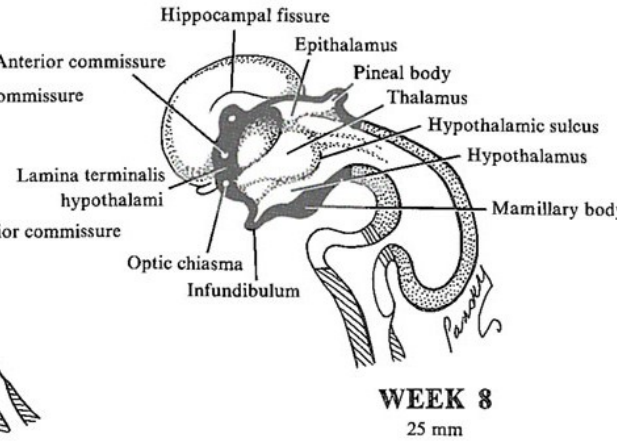
Epiphysis

- thickening of caudal part of ependyma that does not contribute to development of choroid plexus at the roof of diencephalon
- neuroectoderm









Pineal gland agenesis – mutations PAX6 (paired box gene 6)

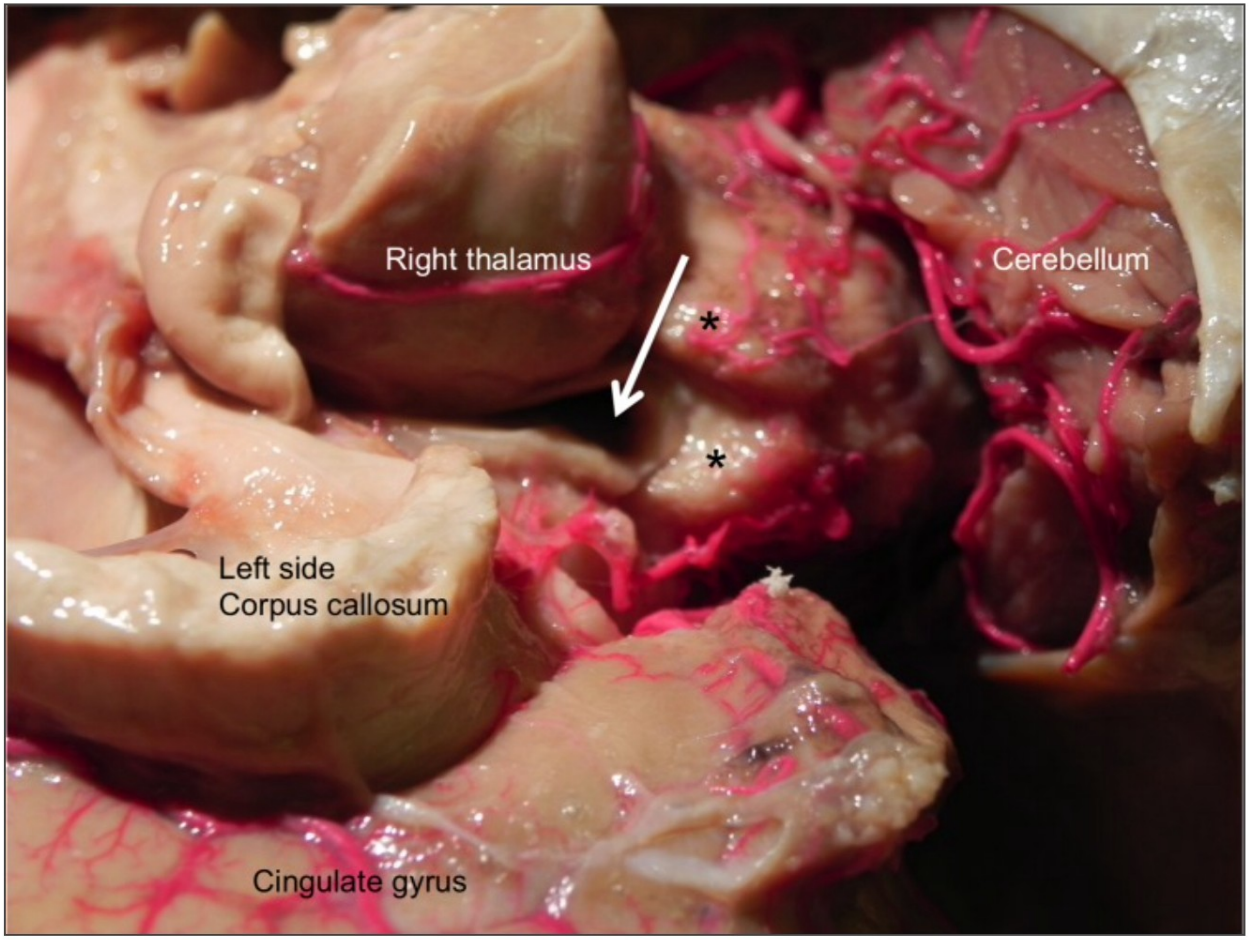


Figure 1

Absent Pineal Gland

Cureus | Pineal Gland Agenesis: Review and Case Illustration

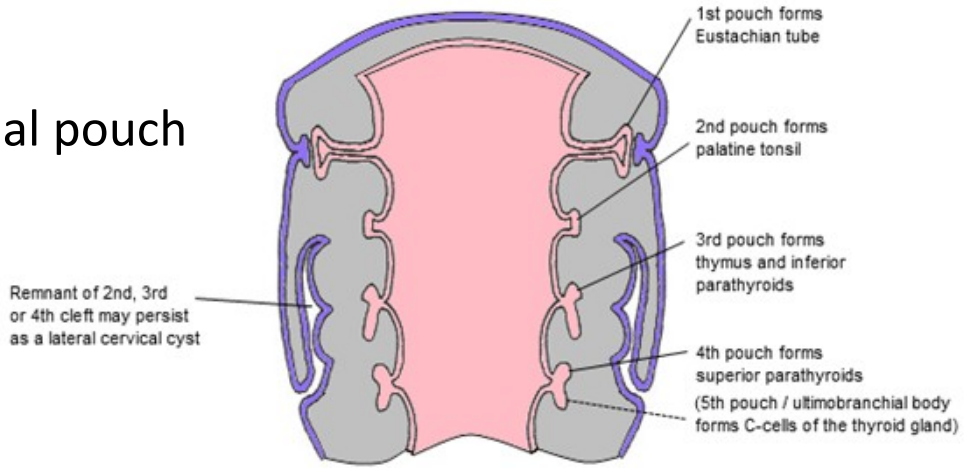
Thyroid gland

- endodermal proliferation of pharyngeal floor between tuberculum impar and copula

- obliterating ductus thyreoglossus
- foramen caecum

- bilobed diverticulum
- lobus pyramidalis

- C-cells
- neural crest origin
- ultimobranchial body of 5th pharyngeal pouch



Pyramidal lobe – in 50 % of population

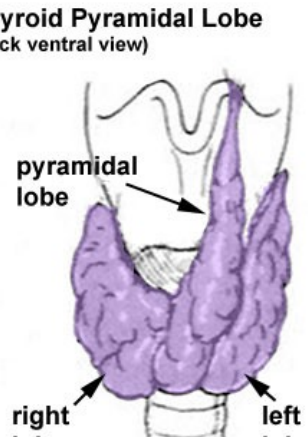
Congenital hypothyroidism (1/3000)

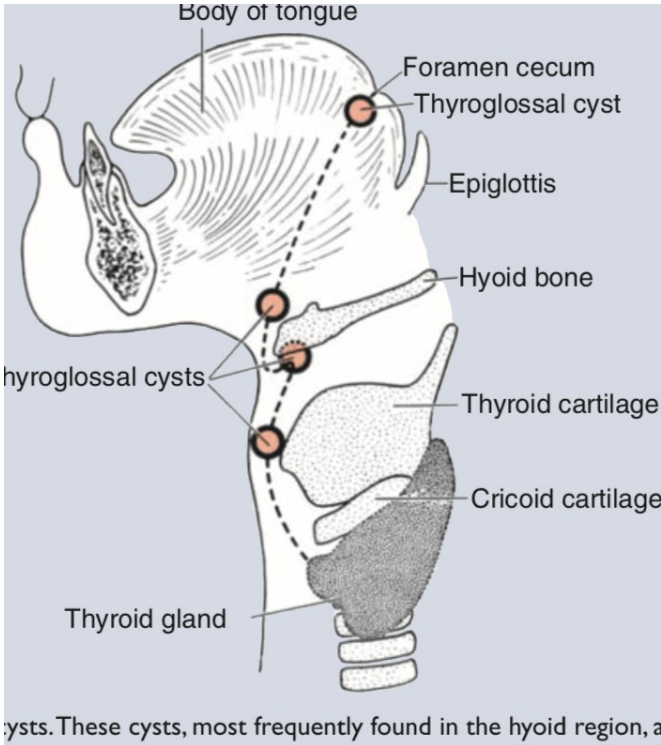
- ectopic thyroid
- hypoplasia, agenesis
- TSH deficiency

Ectopic thyroid gland – in 90 % cases it is lingual thyroid gland; sublingual thyroid gland

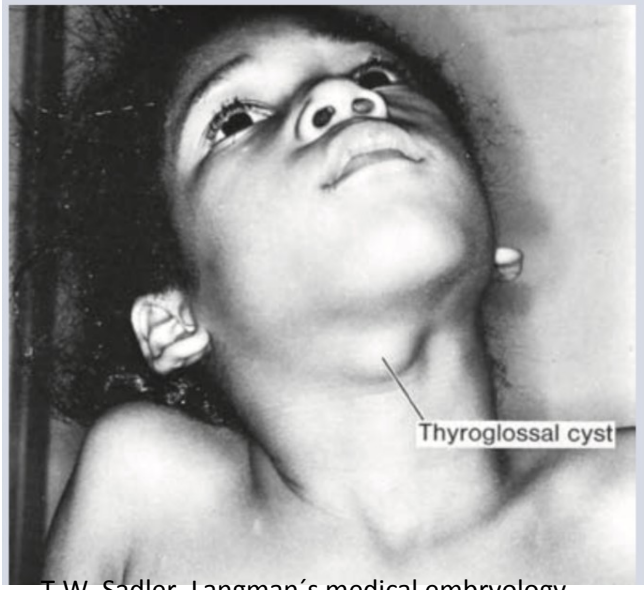
Thyroglossal duct cyst – clinica important to distinguish from ectopic thyroid gland!

Thyroglossal fistula





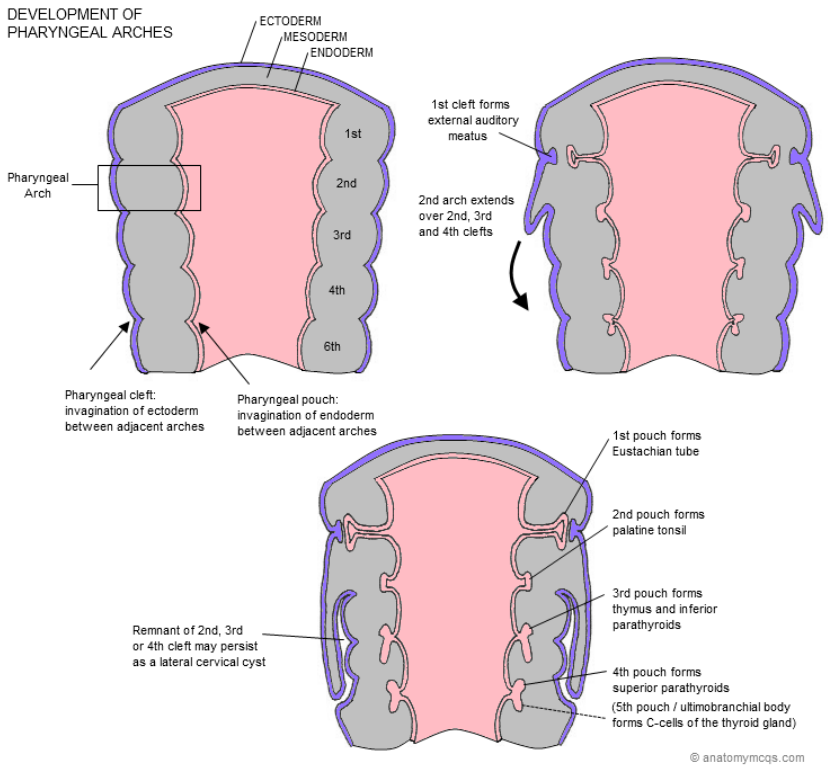
ysts. These cysts, most frequently found in the hyoid region, a



T.W. Sadler, Langman´s medical embryology, 12th edition

Embryonic development of parathyroid gland

- glandulae parathyroideae superiores from endoderm of 4th pharyngeal pouch
- glandulae parathyroideae inferiores from dorsal process of 3rd pharyngeal pouch
- together with thymus descend to lower poles of thyroid



Ectopic parathyroid tissue – the inferior parathyroids are more variable in their position

Supranumerary parathyroid glands

Suprarenal gland

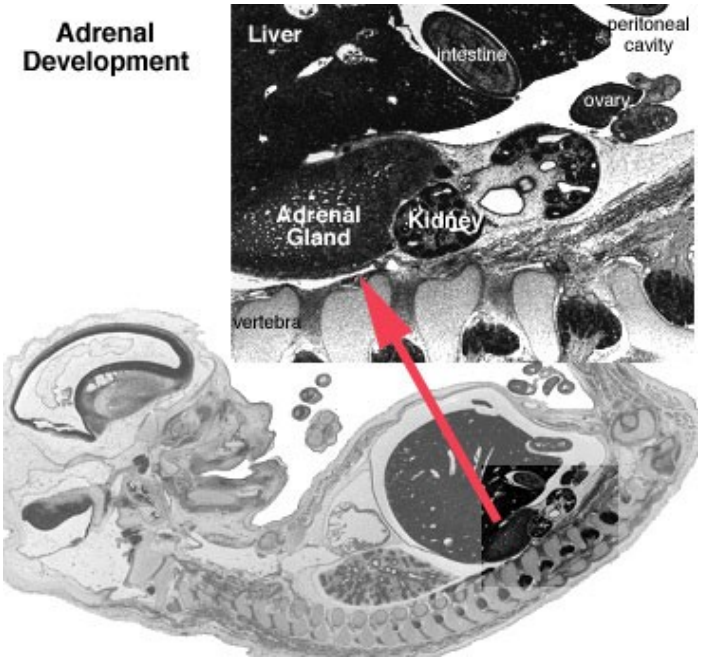
Cortex

- Mesoderm ---> coelomic epithelium
- primitive fetal cortex 5-6th week

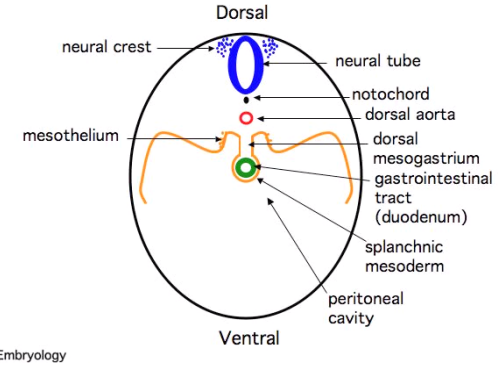
- definitive cortex
- zona reticularis fully differentiates within 3 years

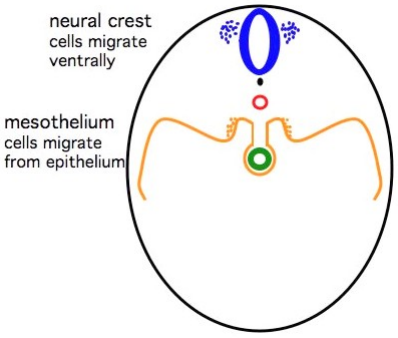
Medulla

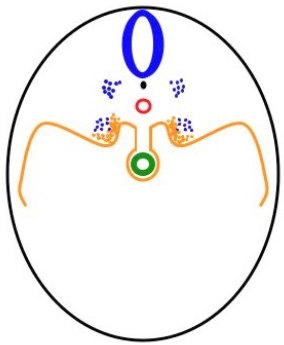
- neural crest

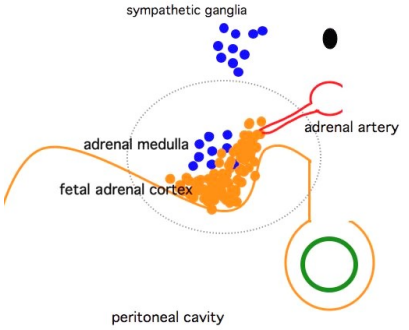


[Week10 adrenal - Endocrine - Adrenal Development - Embryology (unsw.edu.au)]



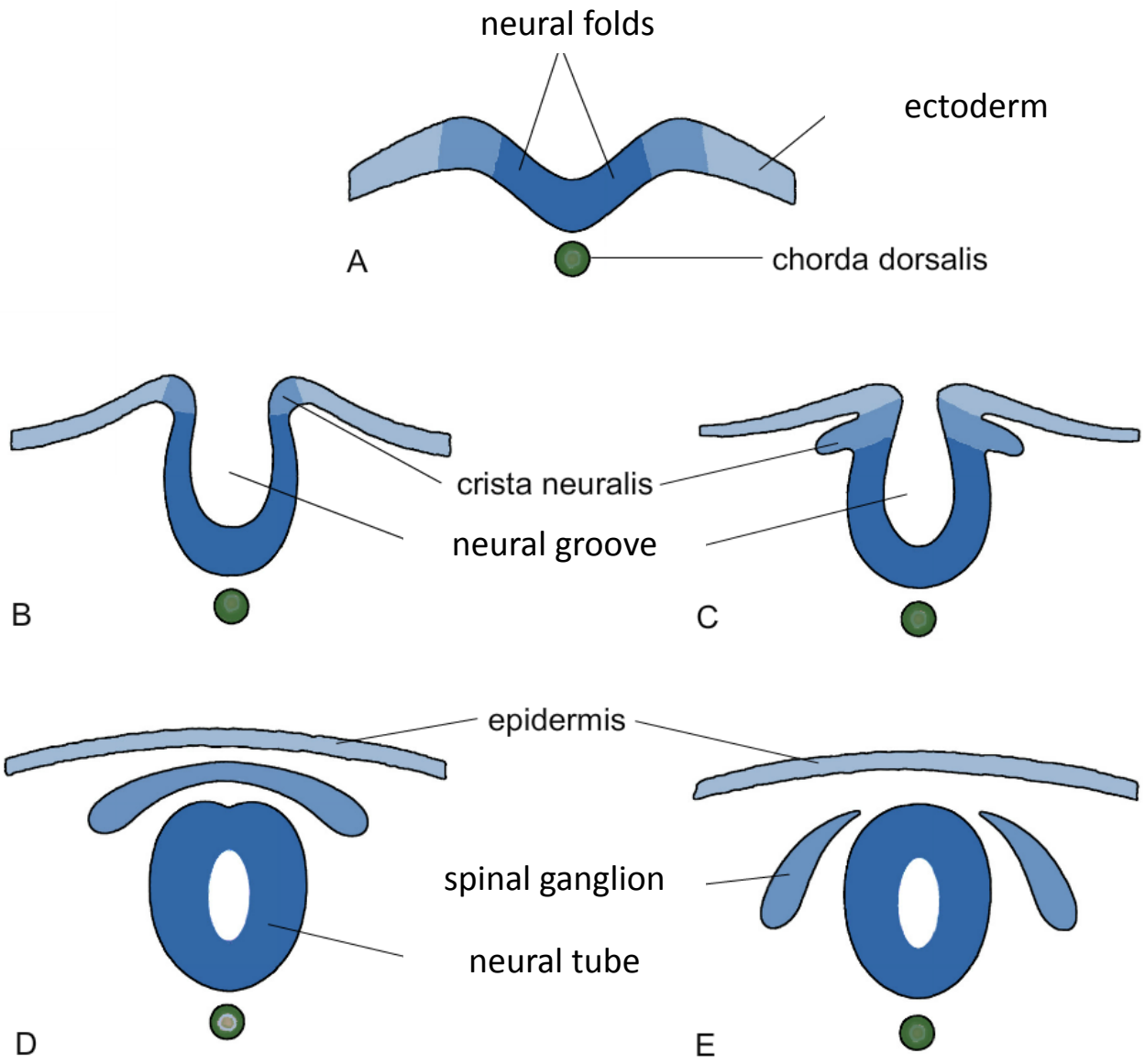




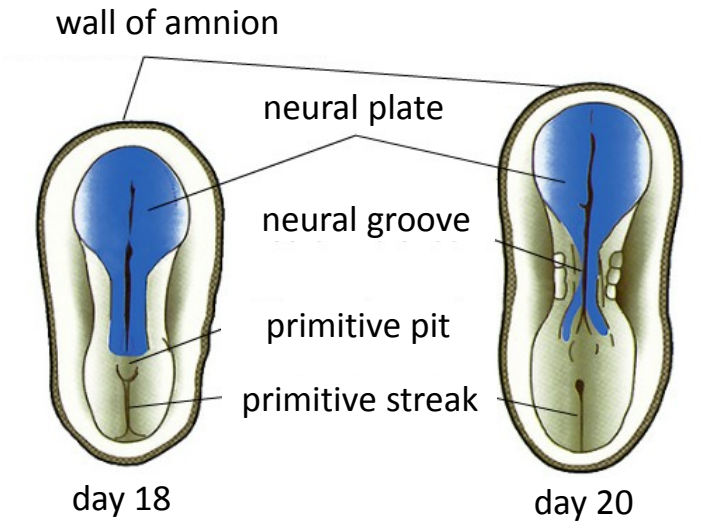


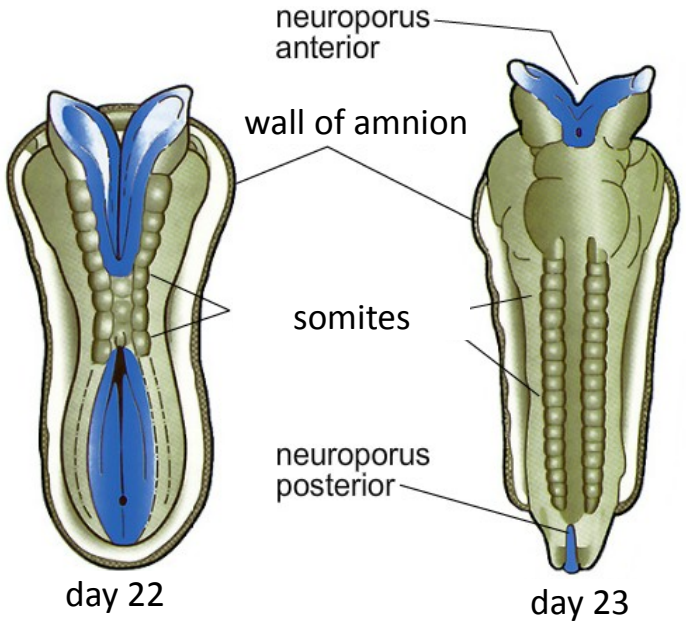
Congenital adrenal hyperplasia – group of autosomal recessive disorders – excessive production of androgenes: causes rapid growth and accelerated sceletal maturation in both sexes

Development of the neural tube

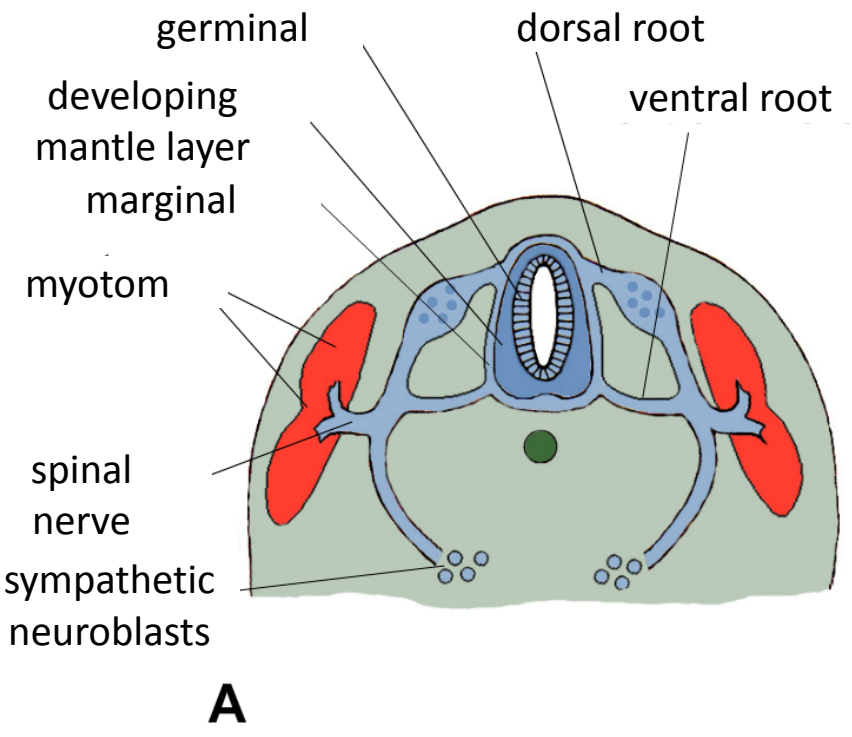


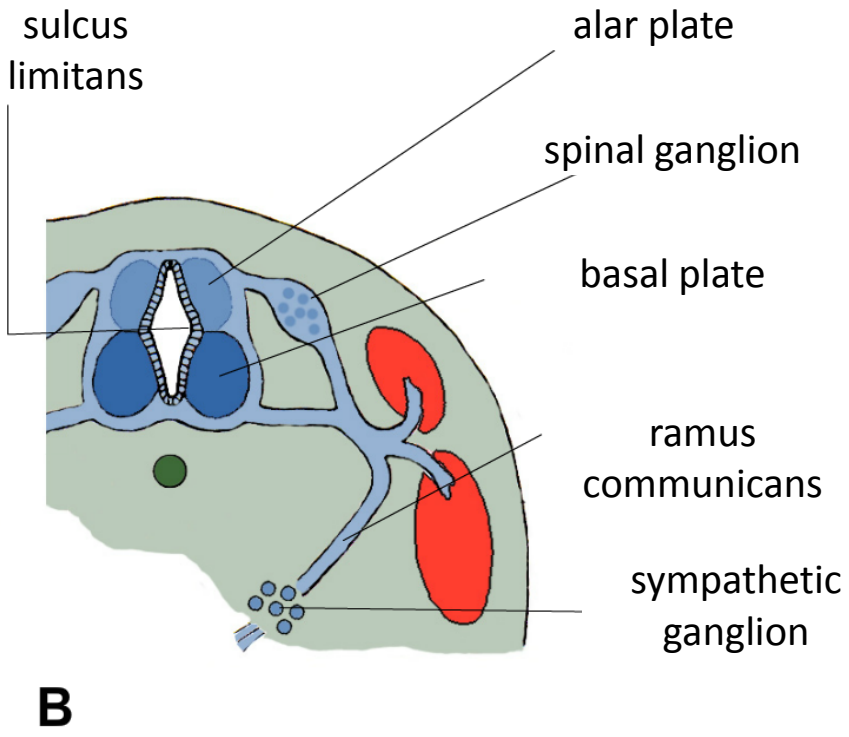
Closing of the neural tube



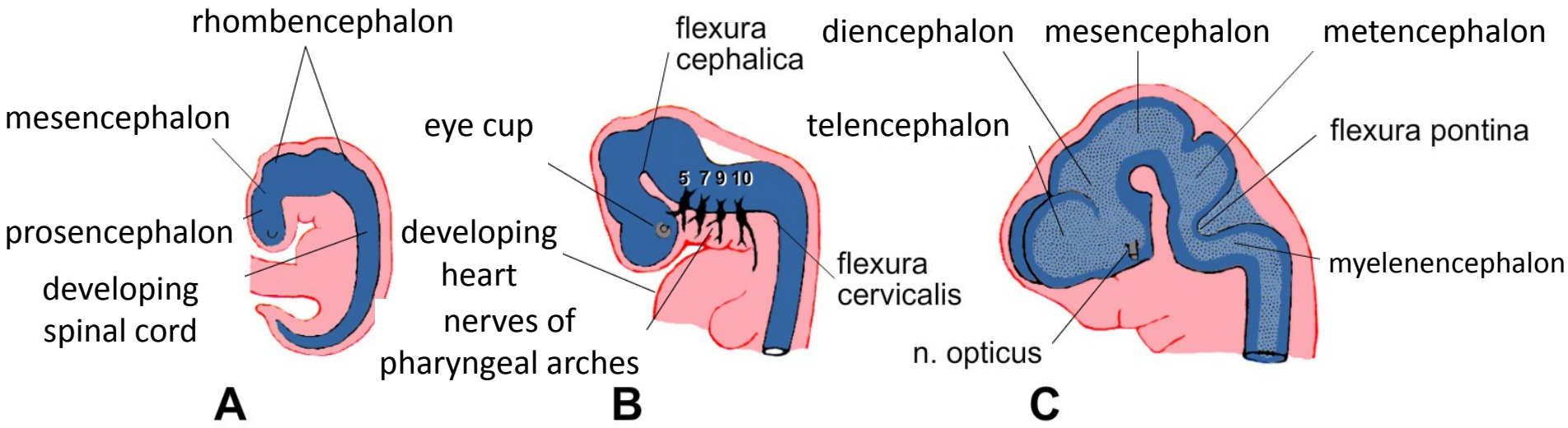


Development of the spinal cord

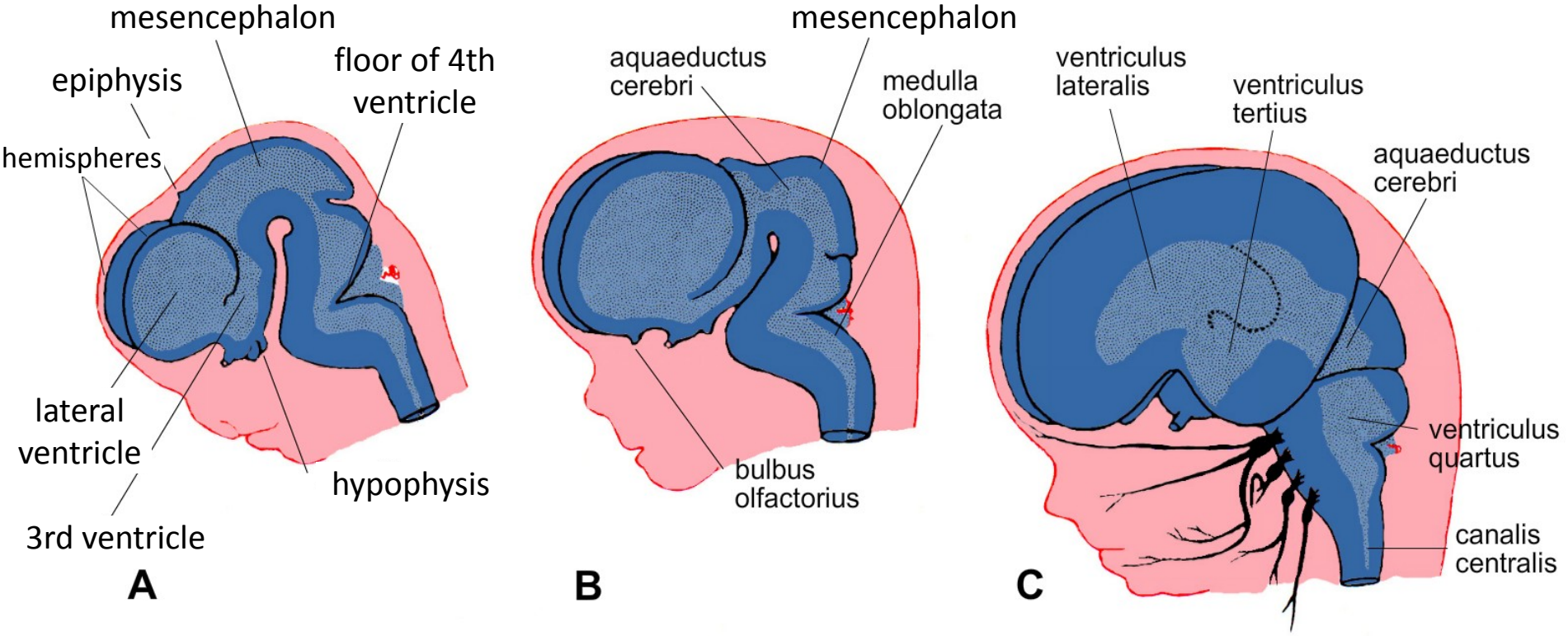




Development of the brain

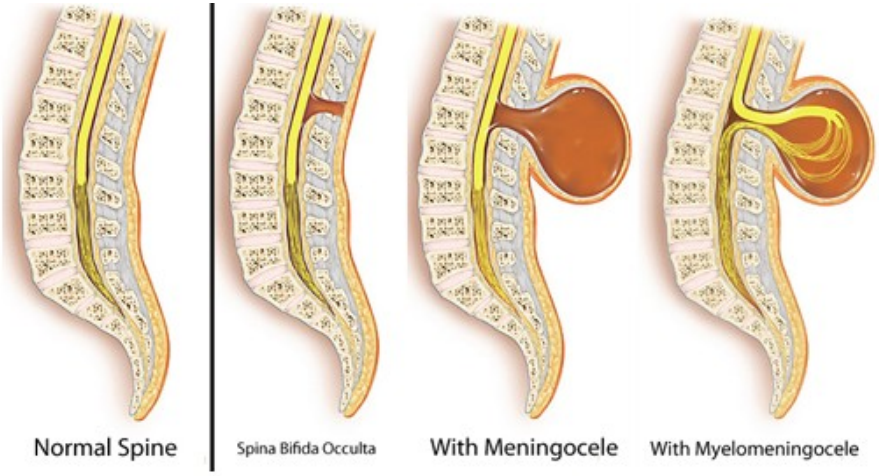


Development of the brain ventricles



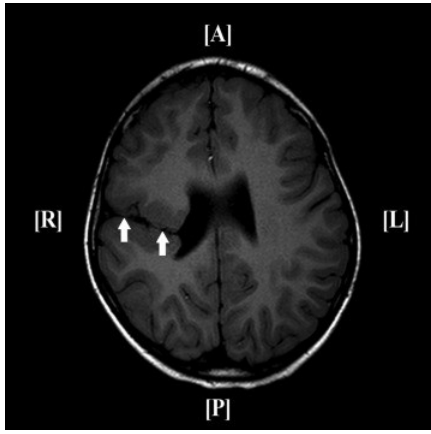
Neural tube defects (NTDs)

- Spina bifida: spina bifida occulta – defect of vertebral arches covered with skin and usually does not affect the neural tissue – 10 % of population; meningocele; meningomyelocele



- Rachischisis
- Hydrocephaly due to Arnold-Chiari malformation

Cranial defects



- Schisencephaly
- Holoprosencephaly (HPE) – 1 in 15000 (1 in 250 early miscarriage)
- Meningocele, meningoencephalocele, meningohydroencepahlocele – 1 in 12000
- Exencephaly: anencephaly (=meroencaphaly – 2-4 times more common in female foetuses), craniorachischisis – polyhydramnios
- Hydrocephaly – in most cases due to obstruction of the aqeduct of Sylvius (aqueductal stenosis)
- Microcephaly

The leading cause of intellectual disability is maternal alcohol abuse!