

Lec.6

Embryology

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The ectoderm is divided in to;

a. **neuroectoderm (above the notochord); which will form 3 parts;**

1. **Neural tube.**
2. **Neural crest** (cells are located between the neuroectoderm and the laterally located ectoderm. cells will leave the neuroectoderm by active migration to enter the underlying mesoderm. They migrate to different regions forming;
 - Ganglia; which are collection of nerve cells outside the nervous system, they divided in to ****sensory ganglia** ((spinal& cranial)) and ****autonomic ganglia** ((sympathetic and parasympathetic ganglia)) .
 - Arachnoid and pia mater.
 - Schwann cells.
 - Suprarenal medulla.
 - Melanocyte of the skin.
 - Odontoblast.
 - Facial skeleton.
3. **Otic and lens placodes;** By the time the neural tube is closed, two bilateral **ectodermal thickenings**, the **otic placodes** and the **lens placodes**, become visible in the cephalic region of the embryo.

b. **Laterally placed ectoderm: lies lateral to the neuroectoderm.**

In general terms, the ectodermal germ layer gives rise to organs and structures that maintain contact with the outside world:

- ✓ ● The central nervous system;
- ✓ ● The peripheral nervous system;
- ✓ ● The sensory epithelium of the ear, nose, and eye
- ✓ ● The epidermis, including the hair and nails.
- ✓ ● Subcutaneous glands,
- ✓ ● The mammary glands,

- ✓ • The pituitary gland,
- ✓ • enamel of the teeth.

Neural tube defects.

Failure of closure of the anterior neuropore leads to anencephaly. Failure of closure of the posterior neuropore leads to spina bifida.

400 microgram per day of folic acid is required to prevent NTDs.



Derivatives of the Mesodermal Germ Layer

1. Paraxial mesoderm

Transverse grooves appear at about 20th day of pregnancy dividing it in to small blocks (somites), these somites appear in cranio-caudal direction.

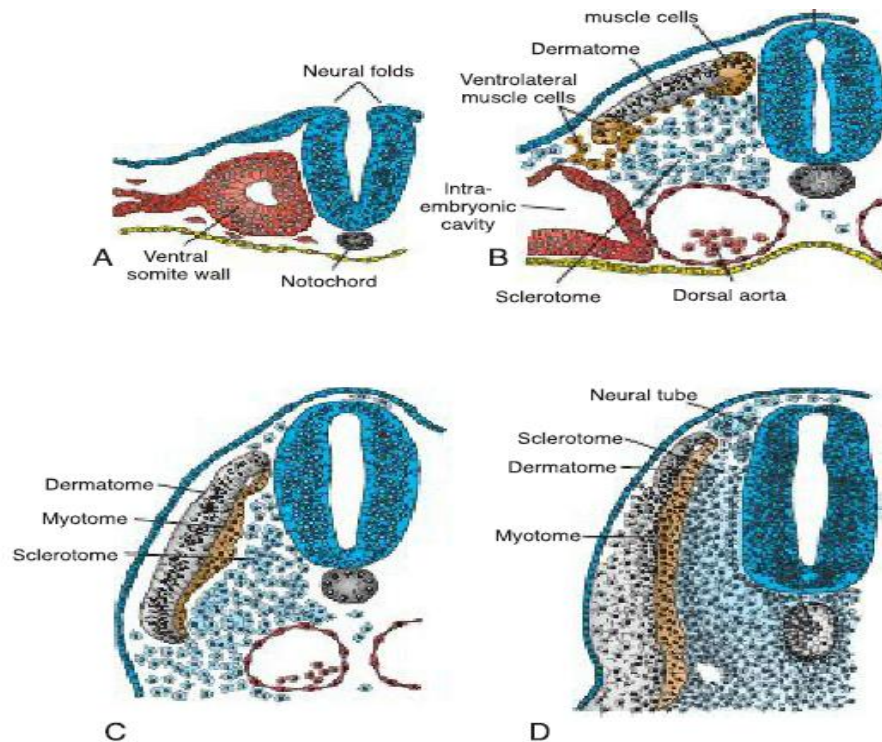
Three somites are formed by 20th day, until the total number of somites reached (42 -44 pairs) by the 40th day of pregnancy. These

are arranged as 4 occipital, 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, 8-10 coccygeal.

The 1st cervical somite disappear and the last 5- 7coccygeal somites also disappear. Each somite is divided in to two parts;

- + Sclerotome; ventromedial part, it surrounds the notochord and neural tube to form the **vertebrae**.
- + Dermatomyotome; dorsolateral part, divided in to;
 - Dermatome, form the **dermis** of the skin.
 - Myotome, forms the **muscles** of the trunk.

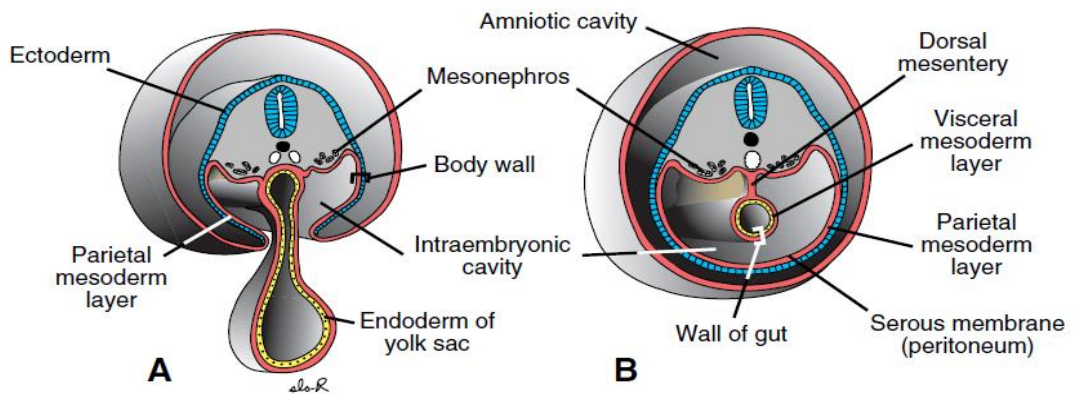
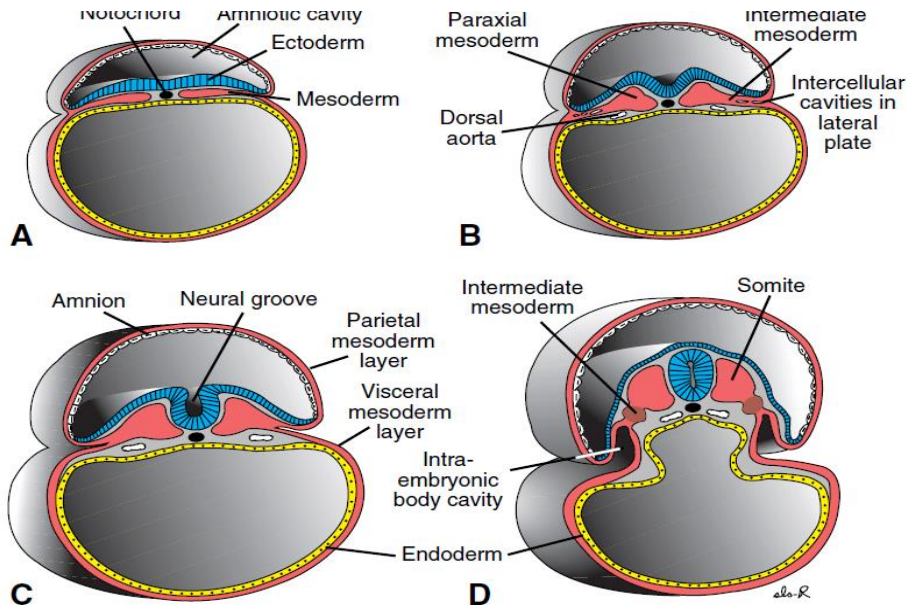
it's essential for the formation of the muscles of the trunk, muscles of the limbs, dermis of the skin and the axial skeleton (bone and cartilage).



2. intermediate mesoderm which is essential for the formation of cortex of the suprarenal gland, kidneys, and gonads (testes and ovaries).

3. Lateral plate mesoderm;

Lateral plate mesoderm splits into parietal and visceral layers, which line the intraembryonic cavity and surround the organs, respectively.



Derivatives of the Endodermal Germ Layer

The gastrointestinal tract is the main organ system derived from the endodermal germ layer.

During further development, it gives rise to (a) the epithelial lining of the respiratory tract; (b) the **parenchyma** of the thyroid, parathyroids, liver, and pancreas; (c) the reticular stroma of the tonsils and thymus; (d) the epithelial lining of the urinary bladder and urethra; and (e) the epithelial lining of the tympanic cavity and auditory tube.

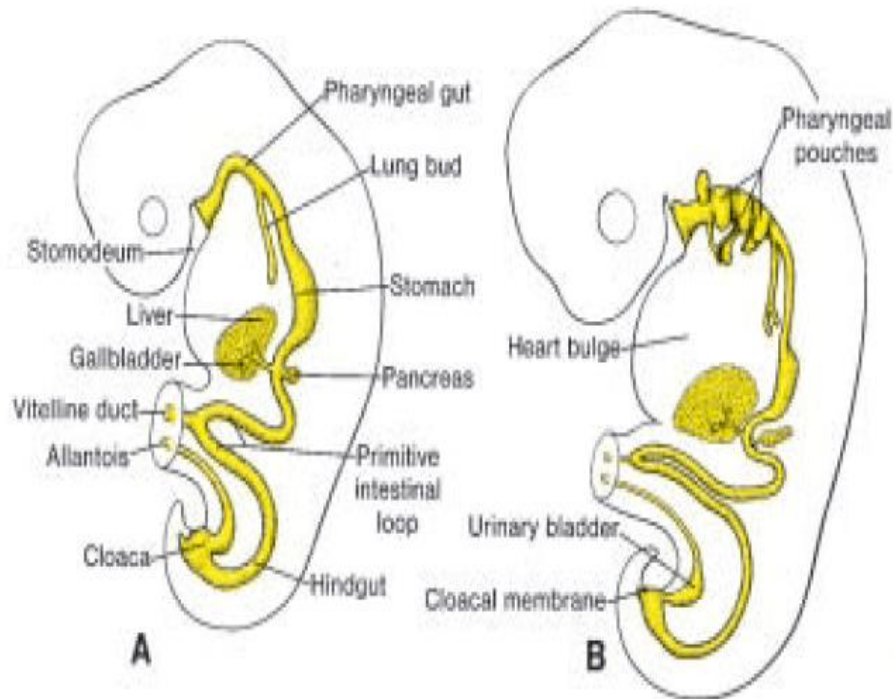


Figure 5.18 Sagittal sections through embryos showing derivatives of the endodermal germ layer. **A.** Pharyngeal pouches, epithelial lining of the lung buds and trachea, liver, gallbladder, and pancreas. **B.** The urinary bladder is derived from the cloaca and, at this stage of development, is in open connection with the allantois.