

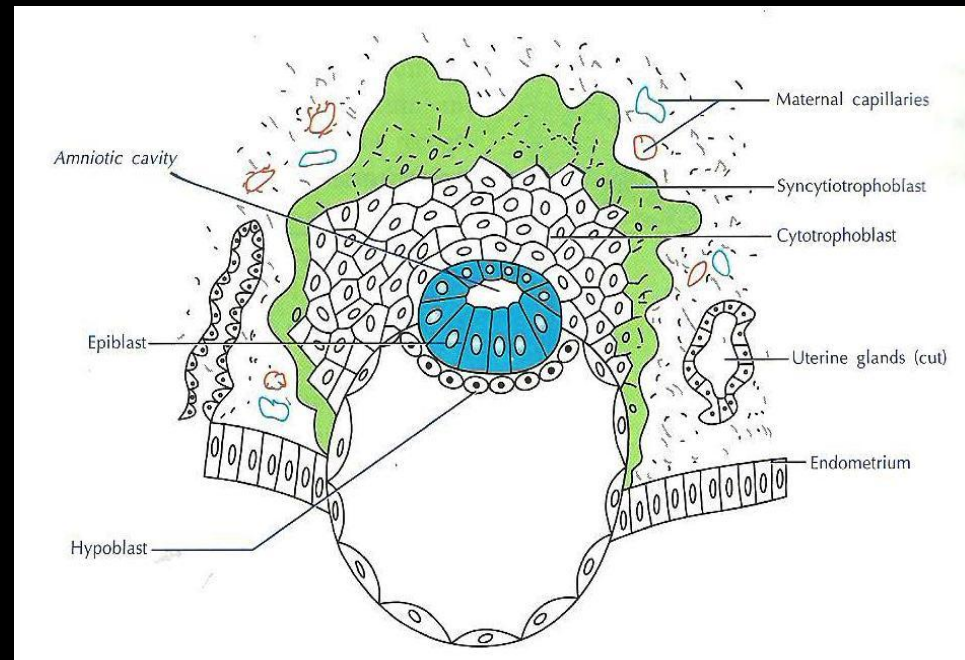
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Formation of Germ Layers (Second & Third week of Development)

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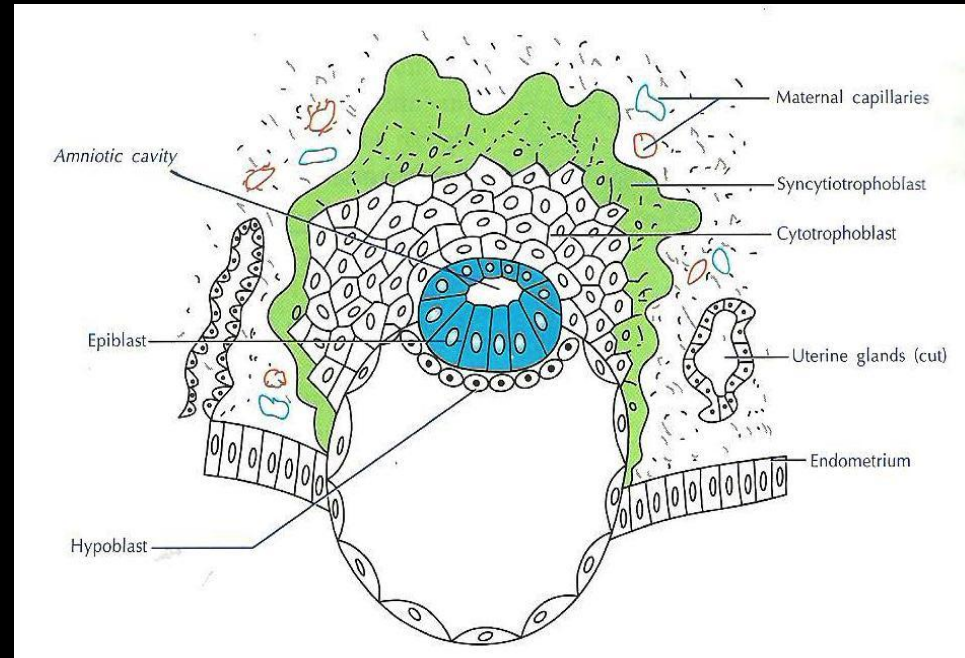
Day 8

- Blastocyst is partially embedded in the endometrial stroma.
- Trophoblast differentiates into 2 layers:
 - (i) Cytotrophoblast
 - (ii) Syncytiotrophoblast
- Cytotrophoblast shows mitotic division.



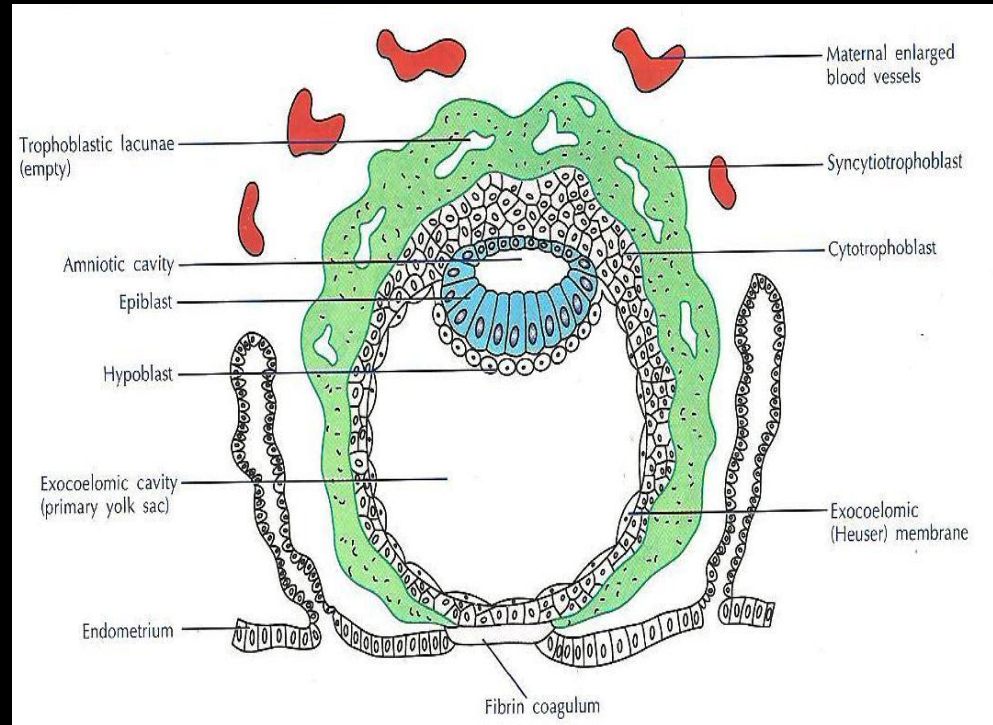
Day 8

- Cells of inner cell mass (embryoblast) also differentiate into 2 layers:
 - (i) Hypoblast layer
 - (ii) Epiblast layer
- Formation of amniotic cavity and embryonic disc.



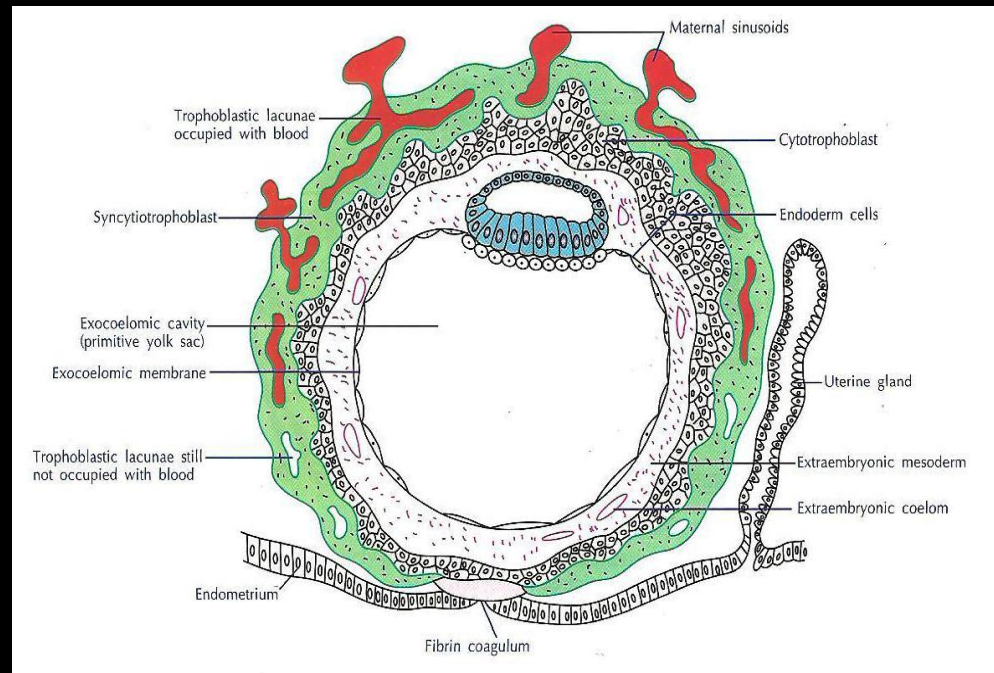
Day 9

- The blastocyst is more deeply embedded in the endometrium.
- The penetration defect in the surface epithelium is closed by a fibrin coagulum.



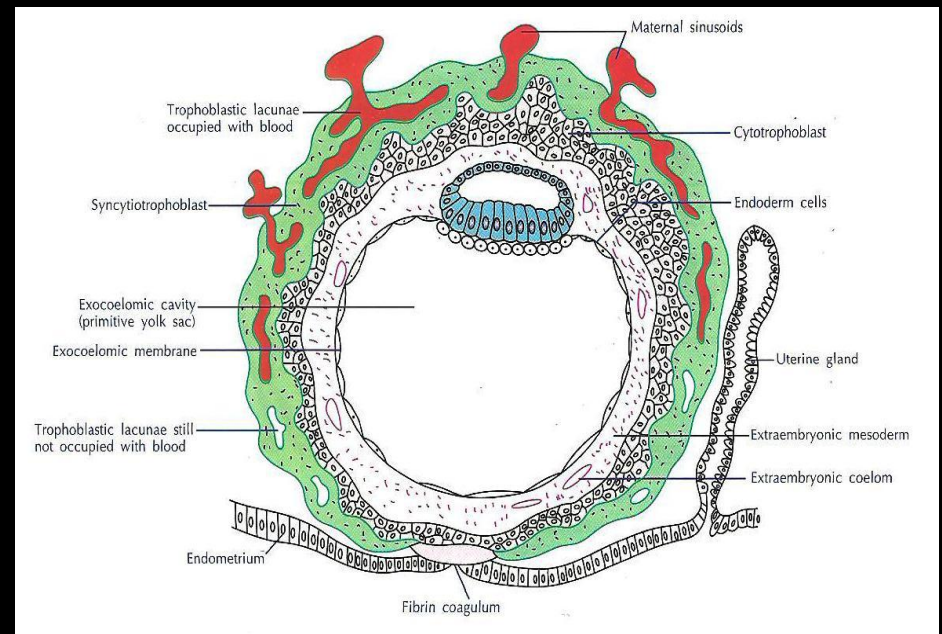
Day 9

- Large no. of vacuoles appear in syncytiotrophoblast which fuse to form lacunae which contains embryotroph.



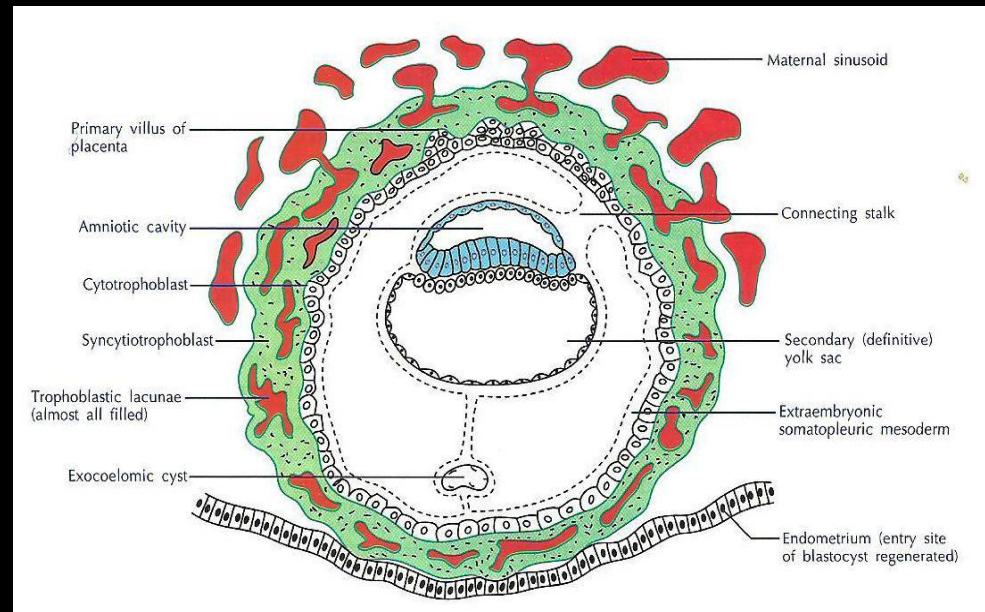
Day 9

- Hypoblast forms the roof of the exocoelomic cavity (primary yolk sac).
- Heuser's (exocoelomic membrane)
- Extraembryonic mesoderm



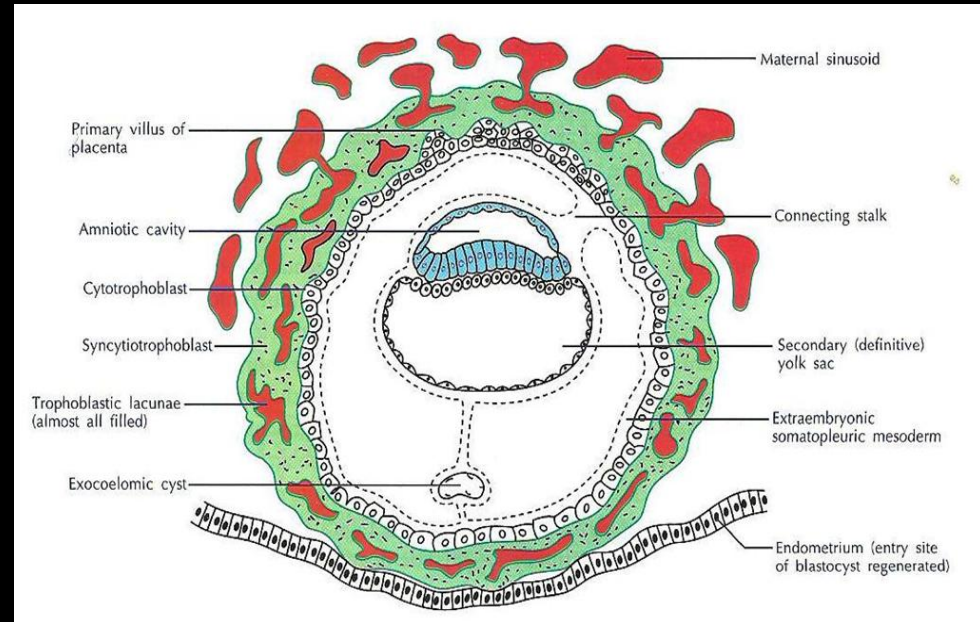
Day 11 & 12

- Formation of lacunar networks
- Extraembryonic coelom (chorionic cavity)
- Extraembryonic somatic mesoderm
- Extraembryonic splanchnic mesoderm
- **Chorion**



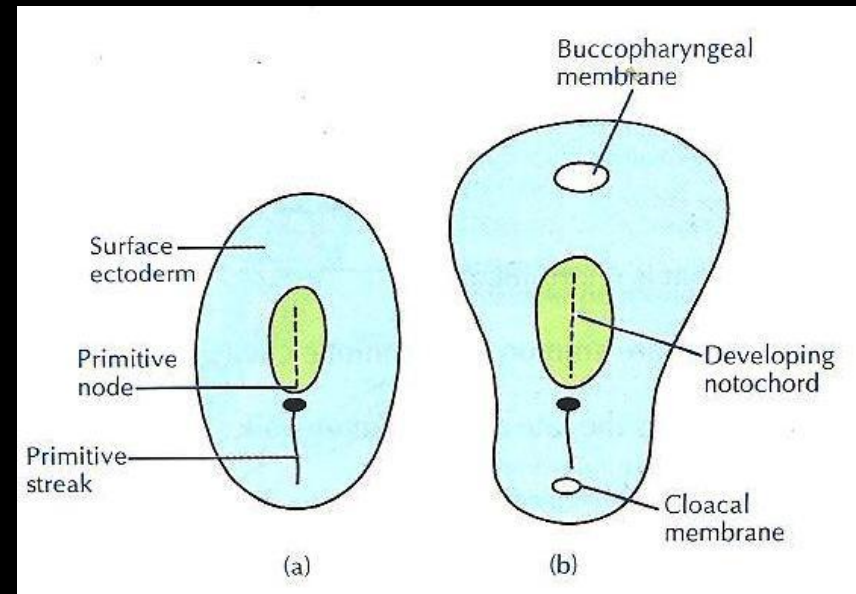
Day 13

- Implantation bleeding
- Villous structure of trophoblast.
- Formation of Primary villi
- Secondary (definitive) yolk sac
- Chorionic plate (extraembryonic mesoderm with cytotrophoblast)



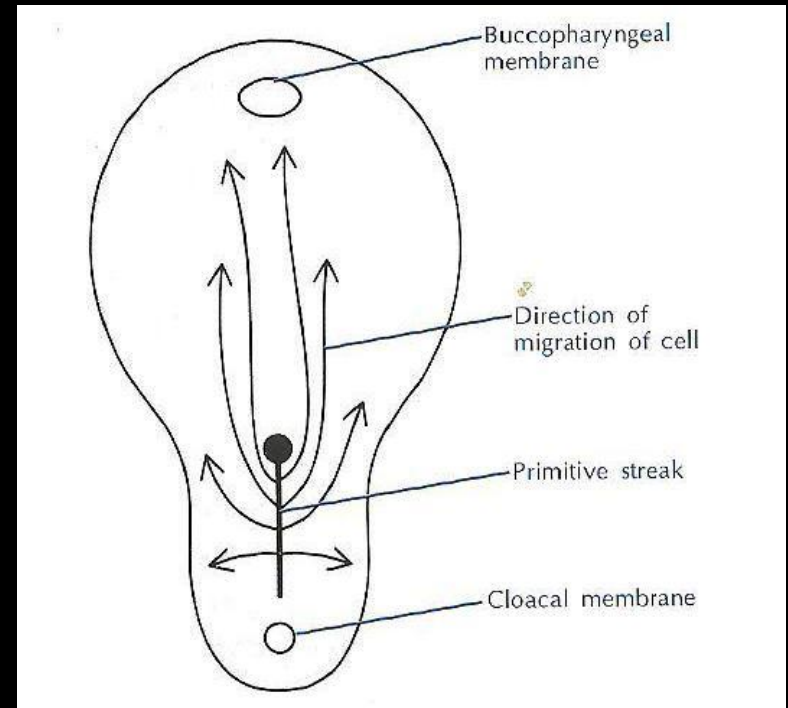
Third week of Development

- **Gastrulation** (formation of all 3 germ layers)
- Formation of primitive streak
- Formation of notochord
- Differentiation of 3 germ layers from **Bilaminar to Trilaminar germ disc**



Formation of Primitive Streak (PS)

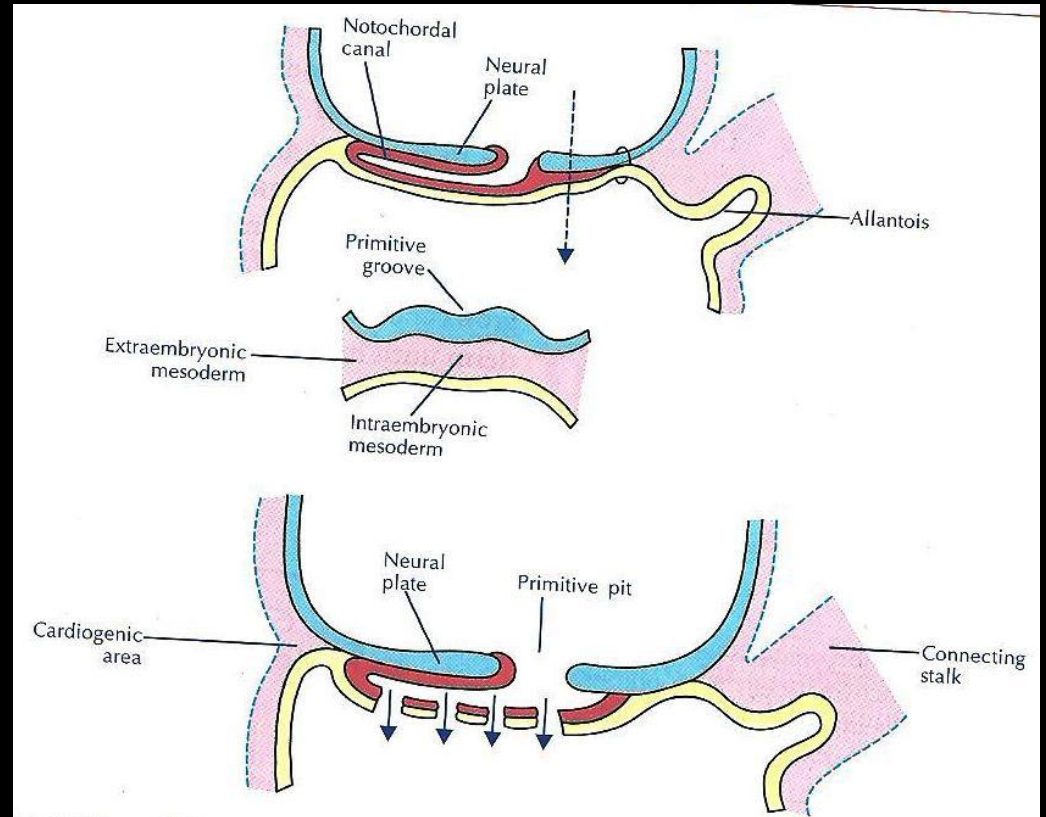
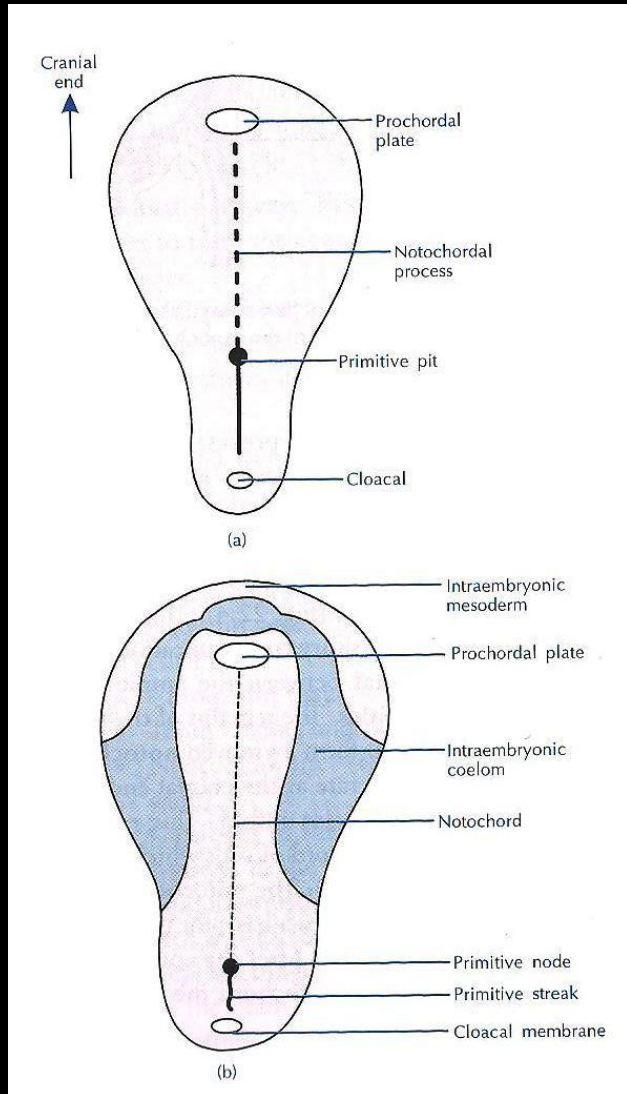
- First sign of gastrulation
- On 15th day
- Primitive node
- Primitive pit
- Formation of mesenchyme on 16th day
- Formation of embryonic endoderm
- Intraembryonic mesoderm
- Ectoderm
- **Epiblast is the source of all 3 germ layers**



Fate of Primitive Streak

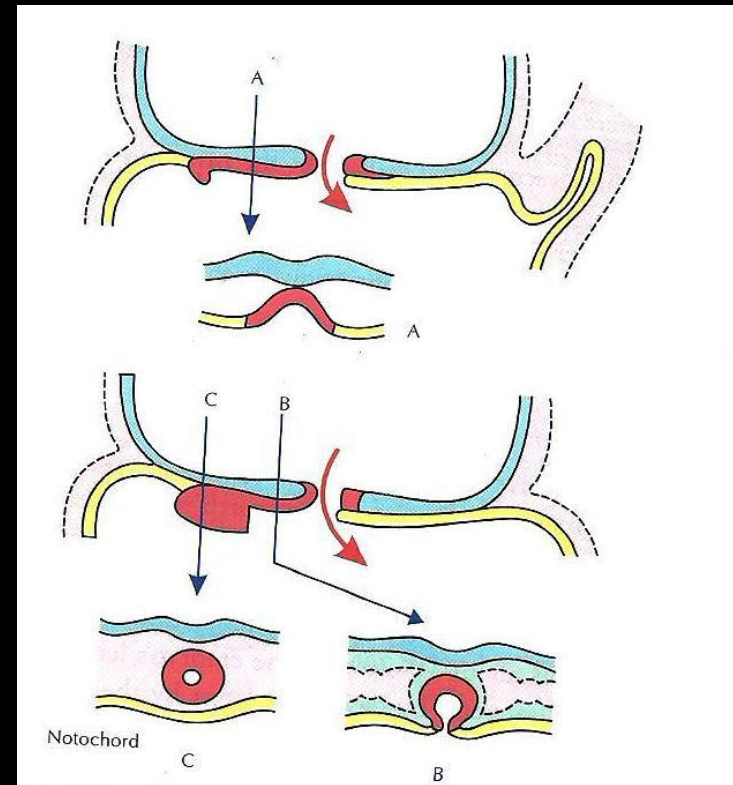
- Continues to form mesodermal cells upto early part of 4th week
- Normally, the PS degenerates & diminishes in size.
- By day 22, PS represents 10-20% of embryo's length.
- Finally, PS disappears by the end of 4th week.

Formation of Notochord



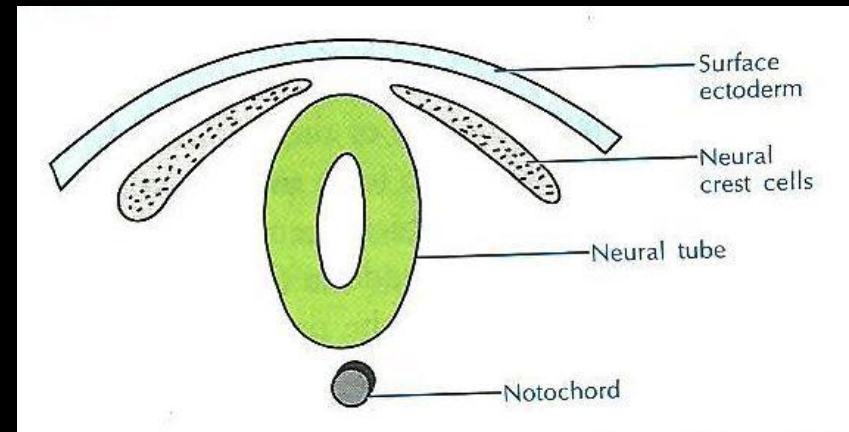
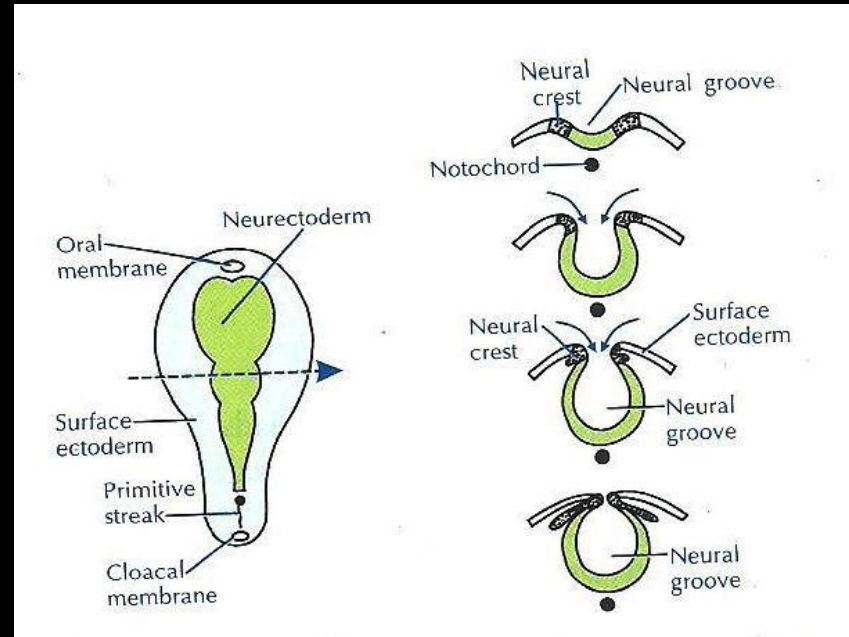
Formation of Notochord

- Neurenteric canal
- Notochordal plate
- **Notochord**



Formation of Notochord

- Neural plate (neurectoderm)
- Neurulation
- Neural folds
- Neural groove
- Neural tube
- Ant. & Post. Neuropores
- Neural crest
- Brain vesicles \implies Brain
- Spinal cord



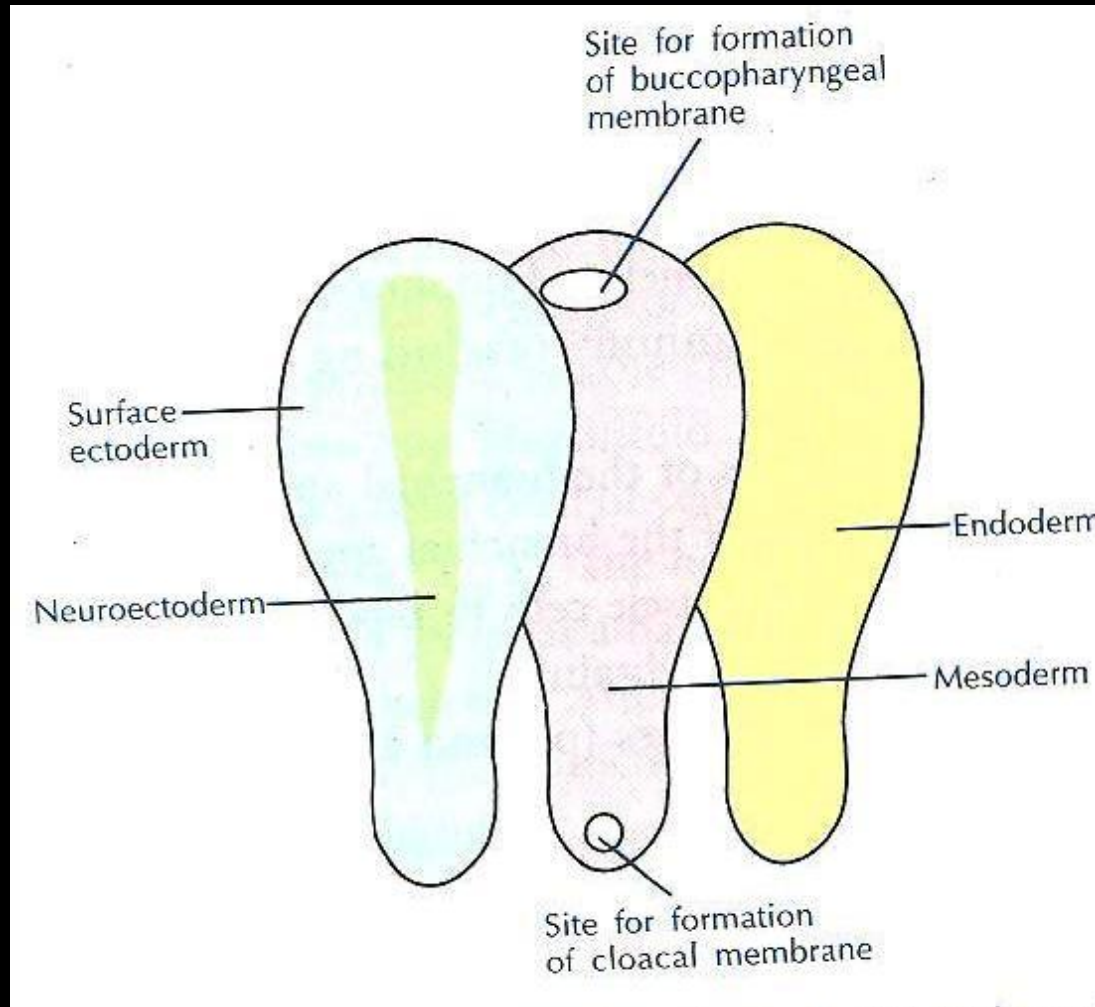
Derivatives of Neural Crest

- Connective tissue & bones of face and skull
- Sensory ganglia of 5th, 7th, 9th & 10th cranial nerves
- Spinal root ganglia
- C-cells of thyroid gland
- Sympathetic chain, autonomic ganglia & enteric neurons
- Schwann cells
- Glial cells
- Chromaffin tissue

Derivatives of Neural Crest

- Tooth enamel & odontoblasts
- Endocardial cushions of the heart
- Mesencephalic nucleus of 5th cranial nerve
- Adrenal medulla
- Meninges
- Melanocytes
- Smooth muscle cells to blood vessels of face & forebrain

Differentiation of Embryonic Disc



Derivatives of Embryonic Ectoderm

- CNS
- PNS
- Sensory epithelium of ear, nose & eye
- Skin & its appendages
- Enamel of teeth
- Pituitary gland
- Mammary glands
- Sweat glands

Derivatives of Embryonic Endoderm

- Epithelial lining of respiratory tract
- Epithelial lining of gastrointestinal tract
- Glandular cells of liver & pancreas
- Epithelium of urinary bladder
- Epithelial parts of trachea, bronchi and lungs
- Epithelial parts of pharynx, thyroid gland, tympanic cavity, eustachian tube tonsils & parathyroid glands

Derivatives of Paraxial Mesoderm

- Muscles of head
- Striated skeletal muscles of trunk & limbs
- Skeleton of the body (except cranium)
- Dermis of skin
- Connective tissue

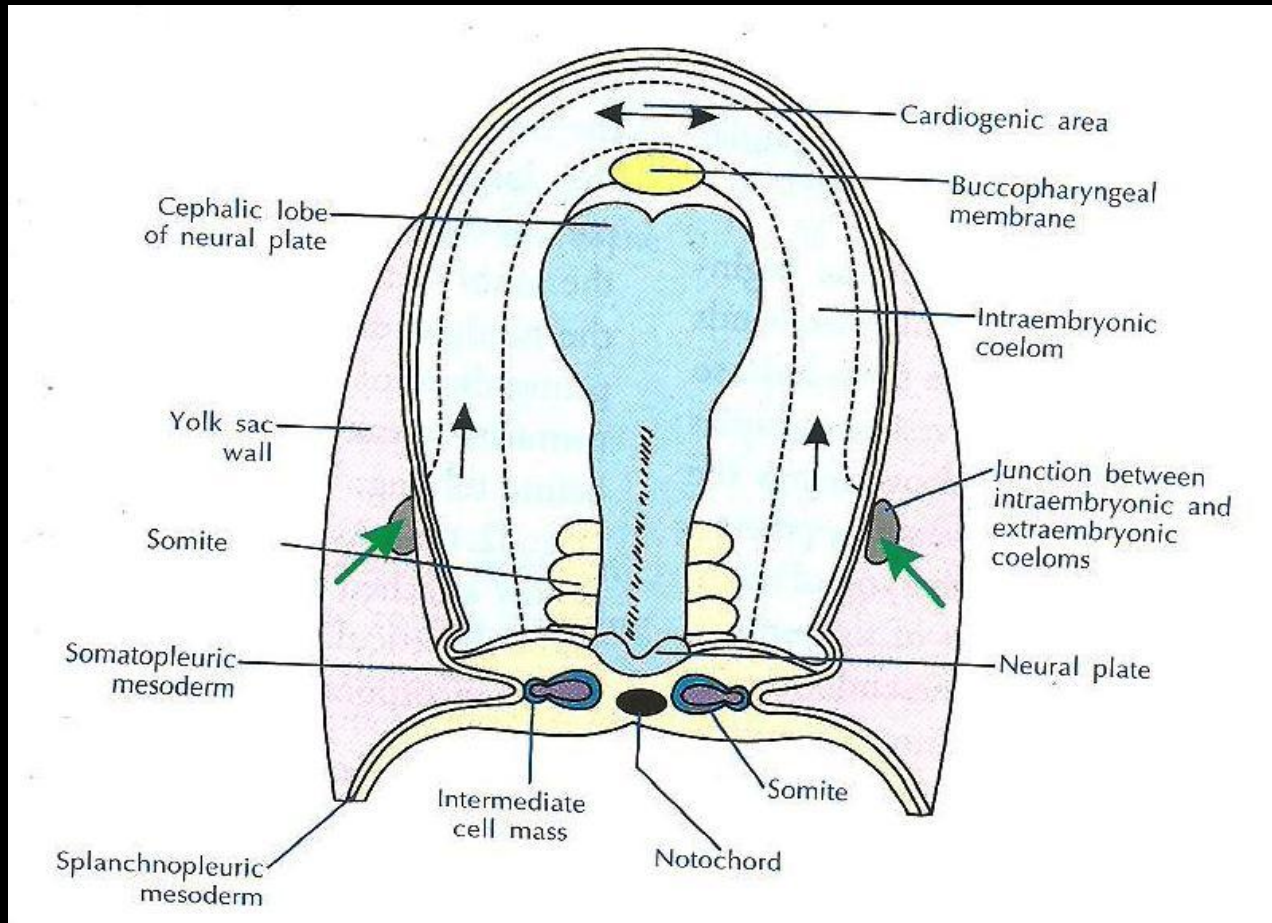
Derivatives of Intermediate Mesoderm

- Urogenital system including gonads
- Ducts & accessory glands of urogenital system

Derivatives of Lateral Plate Mesoderm

- Connective tissue & muscle of viscera
- Pleura, pericardium & peritoneum (serous membranes)
- Primordial heart
- Blood cells
- Lymphatic cells
- Spleen
- Adrenal cortex

Relationship between Intra & Extra-embryonic coelom



REFERENCES

1. Essentials of Anatomy for Dentistry Students.
D.R. Singh. 1st Edition.
2. Langman's Medical Embryology, 11th Edition.
3. I.B. Singh. Human Embryology, 5th Edition.

MCQs

1. The first germ layer to be formed is:

- a) Ectoderm
- b) Mesoderm
- c) Endoderm
- d) None of the above

MCQs

2. The cells of trophoblast give origin to a mass of cells called as:

- a) Amniogenic cells
- b) Extra-embryonic mesoderm
- c) Prochordal plate
- d) Primitive streak

MCQs

3. The cranial end of the primitive streak which becomes thickened is called as:

- a) Henson's node
- b) Blastopore
- c) Notochordal process
- d) Notochord

MCQs

4. All are derivatives of neural crest *except*:

- a) Tooth enamel
- b) Endocardial cushions of the heart
- c) Mesencephalic nucleus of 5th cranial nerve
- d) Adrenal cortex

MCQs

5. Which mesoderm is segmented to form somites:

- a) Paraxial
- b) Splanchnopleuric
- c) Intermediate
- d) Somatopleuric