

4th – 8th Weeks of EMBRYONIC PERIOD

(Period of organogenesis)

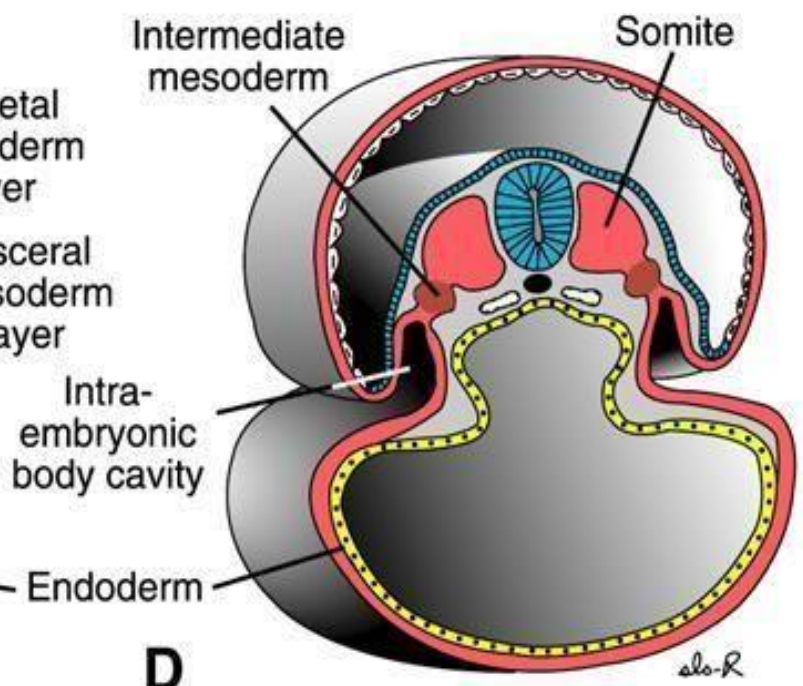
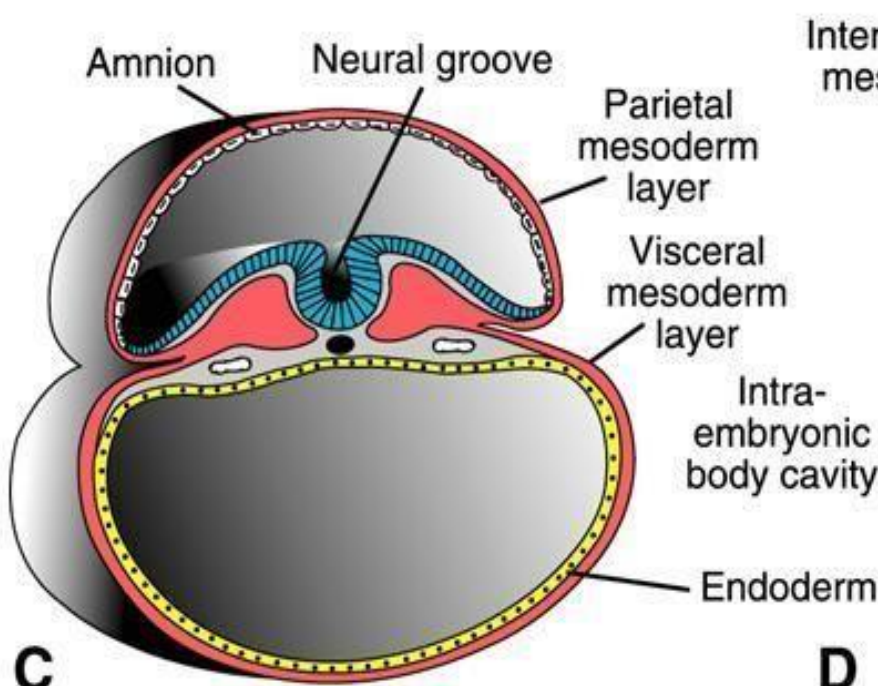
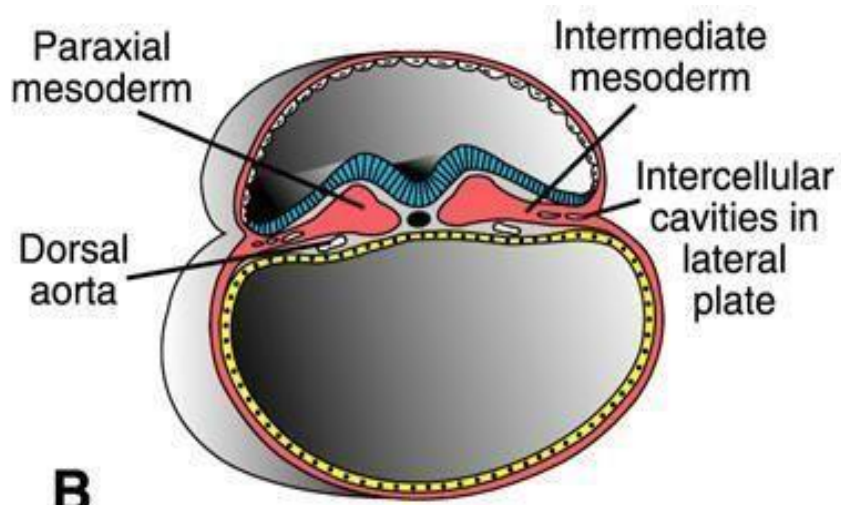
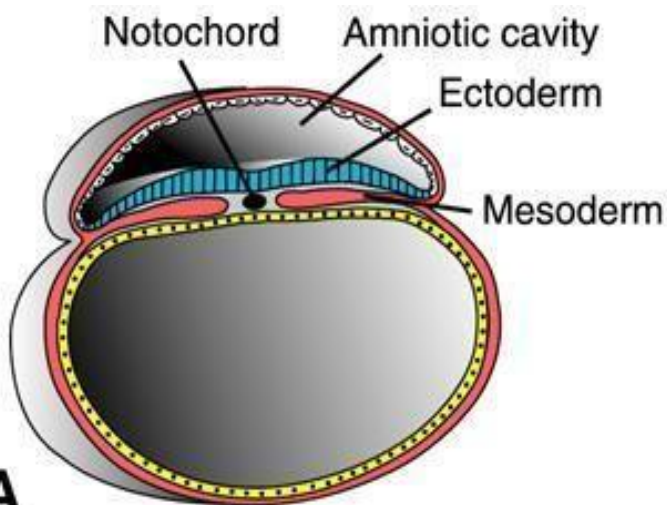
★ This part of embryonic period is characterized by **2 events** :

- I. **Organogenesis** : is formation of all organs from the 3 germ layers .
- II. **Morphogenesis** : formation of the shape of the embryo by folding and exchange of the external features .

I- DEVELOPMENT OF THE THREE GERM LAYERS :

a) DEVELOPMENT OF THE ECTODERM :

- **Early** , the ectoderm forms the **dorsal** layer of the germ disc and forms the **floor** of the amniotic cavity .
- **After folding** , the ectoderm becomes the outer layer of the embryo.



- The ectoderm germ layer differentiates into the following structures :

1- **The epidermis of the skin** including skin glands ,hair & nails .

1- **Nervous system** :

- **The neural tube** gives brain , spinal cord , retina and posterior lobe of pituitary gland .
- Peripheral nerves.
- **Pia & arachnoid mater** .
- **Sensory** epithelium of sensory organs eg. Olfactory epithelium and taste buds .

2- **Ear** : external auditory meatus & outer layer of ear drum .

3- **Respiratory** system : nasal epithelium .

4- **GIT** : anterior part of oral cavity and lower ½ of anal canal .

5- **Glands** : suprarenal medulla and pituitary glands .

6- **Urinary** tract : terminal part of male urethra.

b) DEVELOPMENT OF THE ENDODERM :

- **Early** , the endoderm forms the **ventral** layer of the germ disc and forms the **roof** of the yolk sac .

- **After folding** , the upper part of yolk sac becomes incorporated into the embryo , forming the **primitive gut** which differentiates into the following structures :

1- **Epithelium lining of:**

- **Digestive system** except anterior part of oral cavity and lower ½ of anal canal .
- **Respiratory tract** except nasal mucosa .
- **Urinary bladder** except trigone and **urethra** except its terminal part .
- The **middle ear** cavity and the **Eustachian tube**.

2- **Parenchyma of** Palatine tonsils , thyroid , parathyroid glands ,thymus , Liver & pancreas .

c) DEVELOPMENT OF THE INTRAEMBRYONIC MESODERM :

1- Paraxial mesoderm:

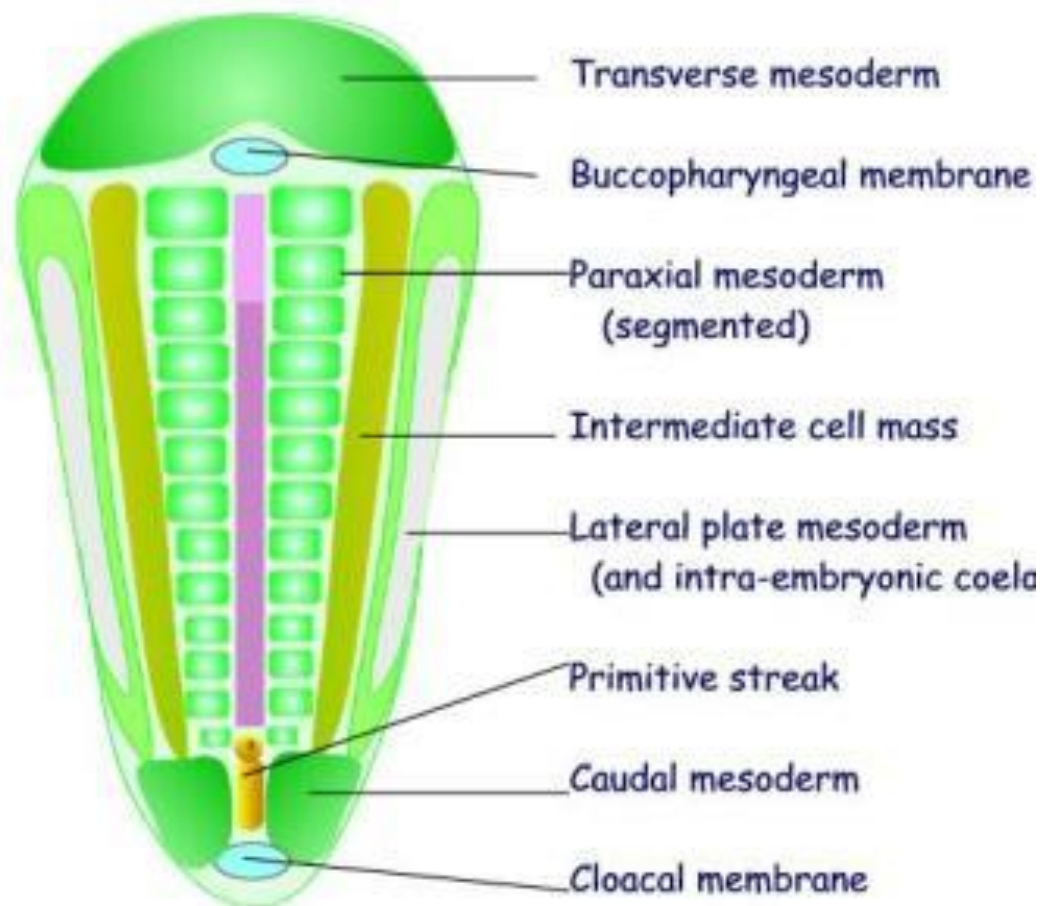
- It is segmented in the head region to form 7 **somitomeres** which gives skeletal muscles of face , jaws and throat .
- It is segmented from the occipital region caudally to form the **somites**.

Somites

- **Organization** of the somites:
 - The **first** pair appears in the **occipital** region at the **20th day**.
 - **Three somites** appear **every day** appear from the **20th** day till the **30th** day .
 - They **continue** to appear till the **35 or 40th** day but at a **slower** rate.
 - The period from the 20th to the 30th day is called the **somite period**.
- The **age of the embryo** could be calculated in the somite period as follows = (number of somites - 1)/3 + 20

Age in days	20	21	22	23	24	25	26	27	28	29	30
Number of somites	1	4	7	10	13	16	19	22	25	28	31

- **Total number** of somites formed are **42 – 44** classified as follows :
 - 4 occipital, 8 cervical, 12 thoracic, 5 lumbar, 5 sacral & 8 – 10 coccygeal.
 - The first occipital and last 7 coccygeal somites disappears .
- **Derivatives of somites** :Each somite **divides obliquely** into :
 - A ventro-medial part called the **sclerotome** which surround the neural tube & notochord to form the **vertebral column**.
 - A dorso-lateral part called the **dermo-myotome** which divides into **dermatome** which form the dermis of skin and **myotome** which form the striated muscles .



(d)

Surface (cutaneous) ectoderm

Neural crest

Dermamyotome

Neural canal

Neural tube

Sclerotome

2- Development of the intermediate mesoderm :

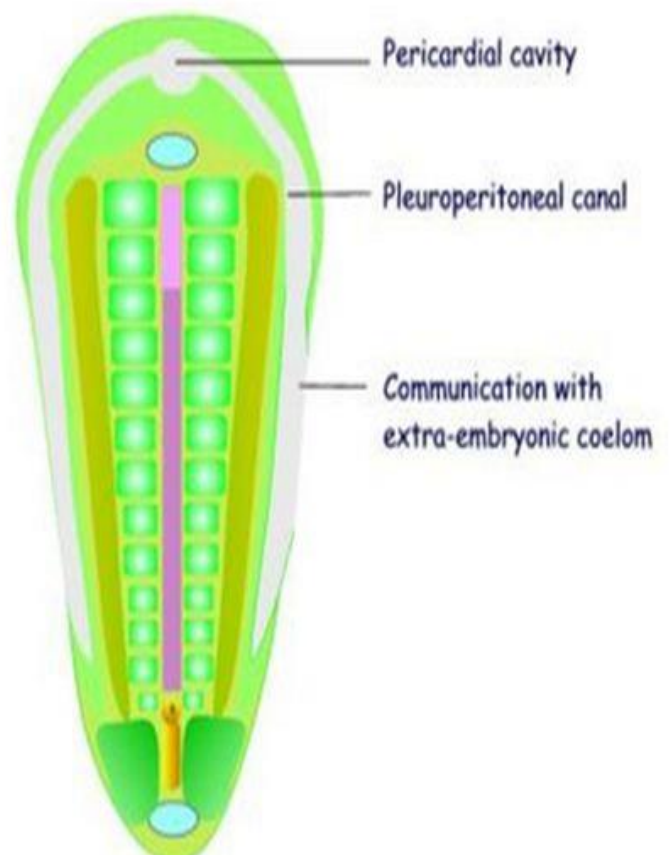
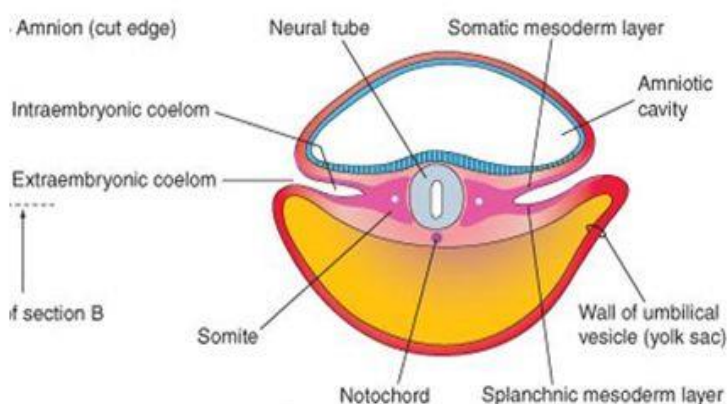
- It forms the cortex of suprarenal gland , nephrons of the kidneys, ureter and parts of genital system.

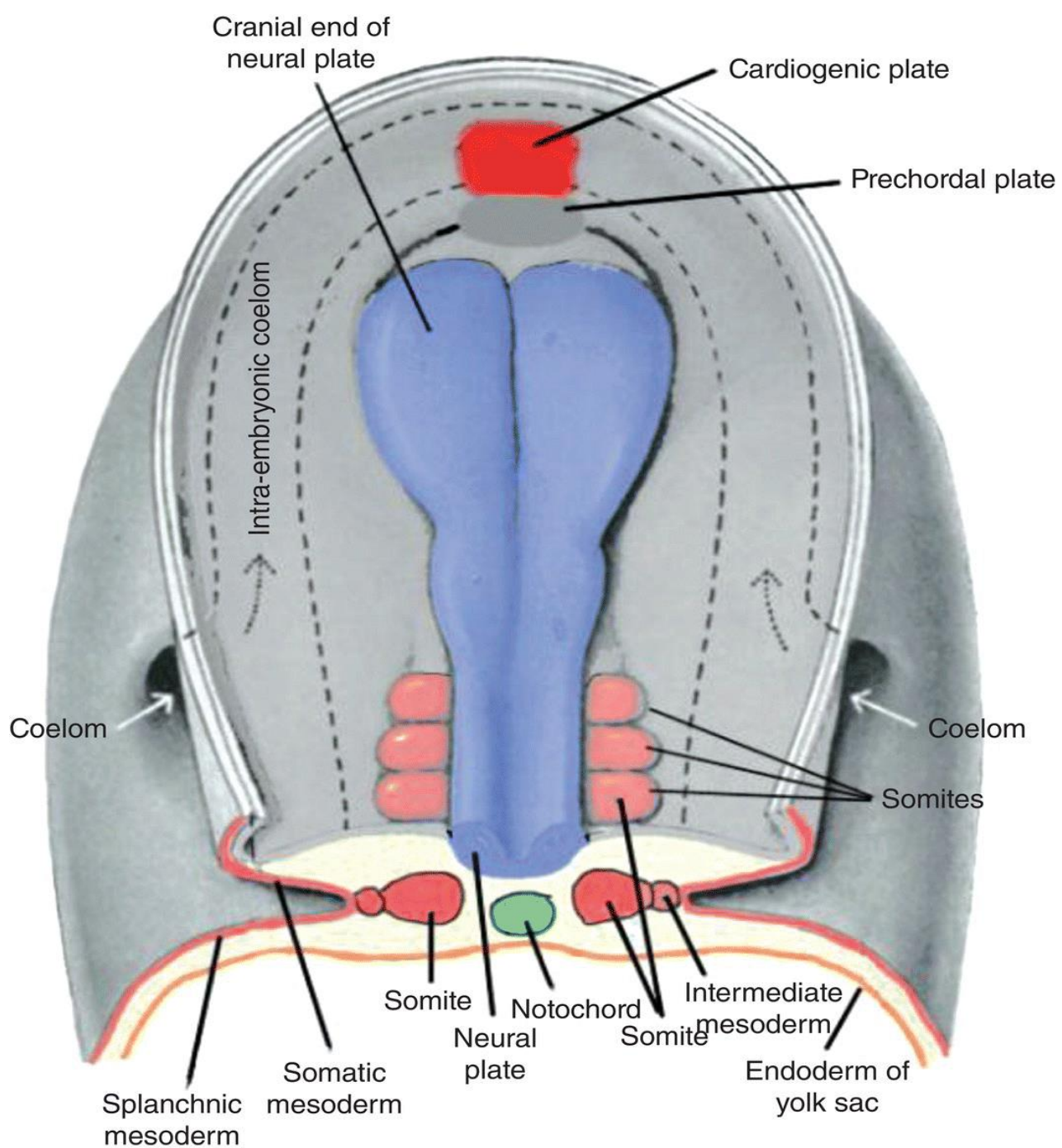
3- Development of the lateral plate mesoderm :

- Small spaces , appear in the lateral plate of mesoderm , which coalesce to form a cavity in this plate called the **intraembryonic coelomic** cavity which has the following characteristics:
 - It is in the form of an **inverted U** with a central part in cephalic to the buccopharyngeal membrane and 2 limbs on the sides of embryo.
 - The central part will form the **pericardial cavity**.
 - The cranial part of the 2 limbs will form the **2 pleural cavity**.
 - The caudal part of the 2 limbs will form the **peritoneal cavity** .
 - The mass of mesoderm cephalic to the pericardial cavity is called the **septum transversum** which will form the **diaphragm**.
 - The limbs of the intraembryonic coelomic cavity are open at the periphery of the embryonic disc and are **connected** to the extraembryonic coelom but this connection is closed at the 10

INTRA EMBRYONIC COELOM

- Intraembryonic coelom extends to caudal wall of the yolk sac.
- Distal part of each limb communicates with the **extraembryonic coelom** from 4th somite.
- Connection closes during the 10th week





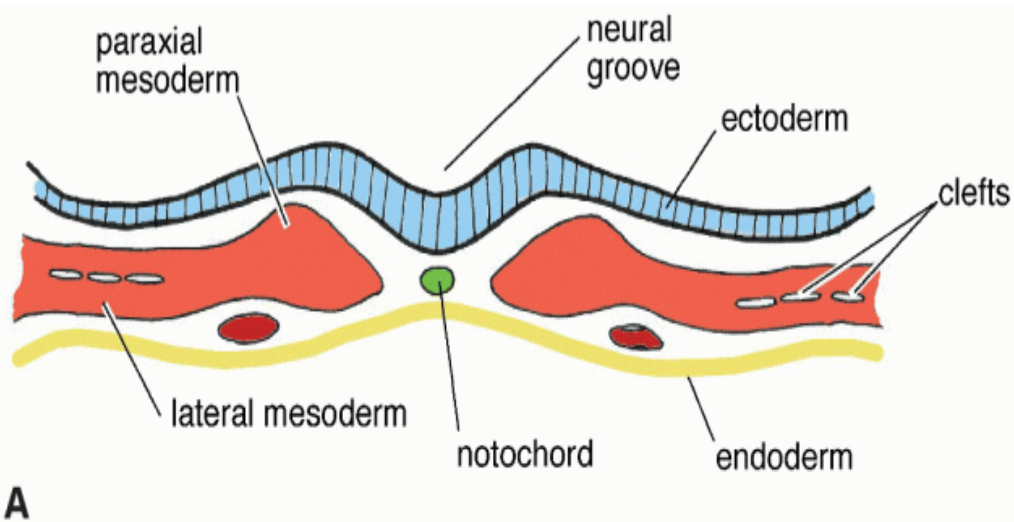
▪ **The intraembryonic coelomic cavity divides the lateral plate mesoderm into:**

➤ **The somatic mesoderm:**

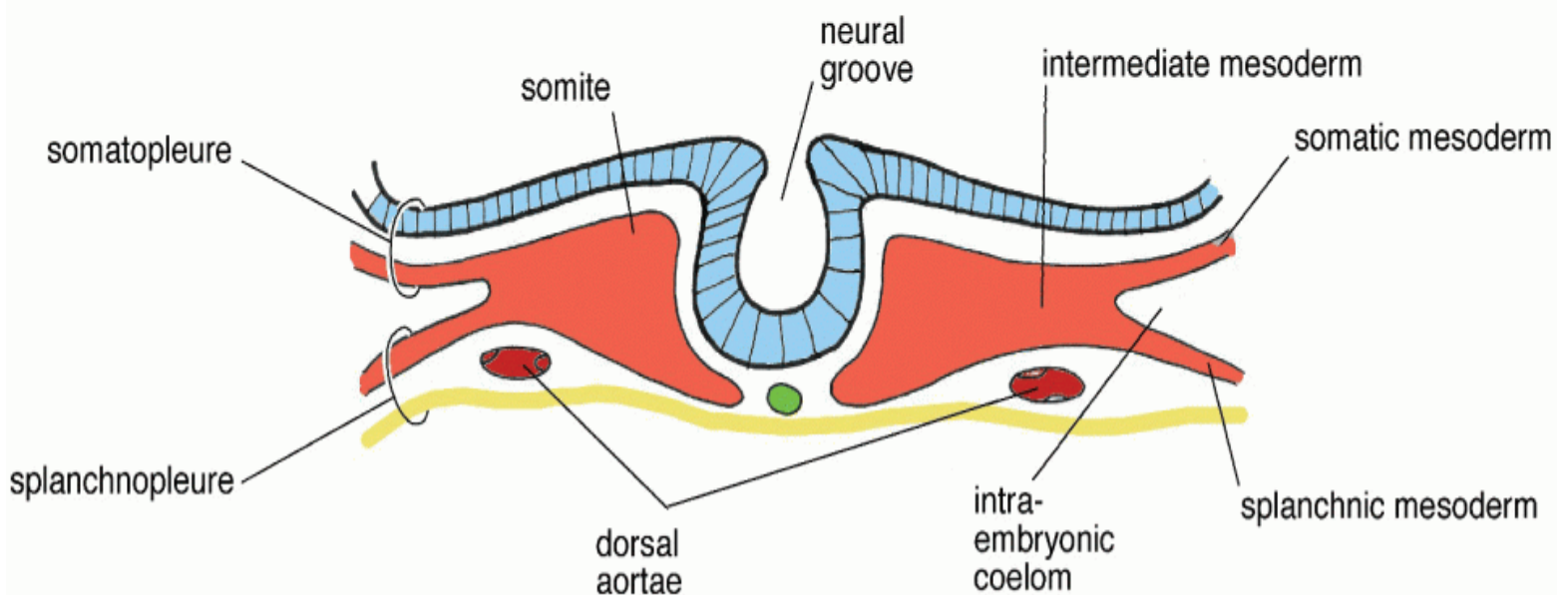
- It becomes adherent to ectoderm to form the striated muscles and connective tissue of the **lateral & ventral aspect of body wall**.
- Parietal layers of **serous membranes**.

➤ **The splanchnic mesoderm:**

- It becomes adherent to endoderm to form the smooth muscles and connective tissue of the **gut & respiratory system**.
- **Cardiac muscles**.
- visceral layer of **serous membranes**.



A



B

