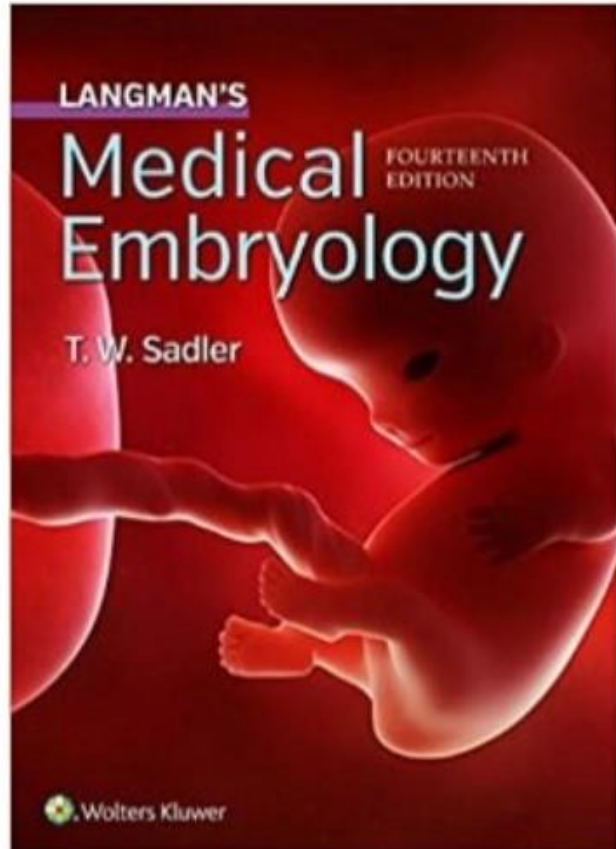




# Embryology Of Gastrointestinal Tract (Foregut & Midgut)



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- 1. Development derivatives of midgut and hindgut**
- 2. Development derivatives of primitive gut tube  
(pharynx. esophagus stomach, intestine) •**
- 3. Rotation of gut •**

# Embryology of G.I.T.:

## □ Endoderm :

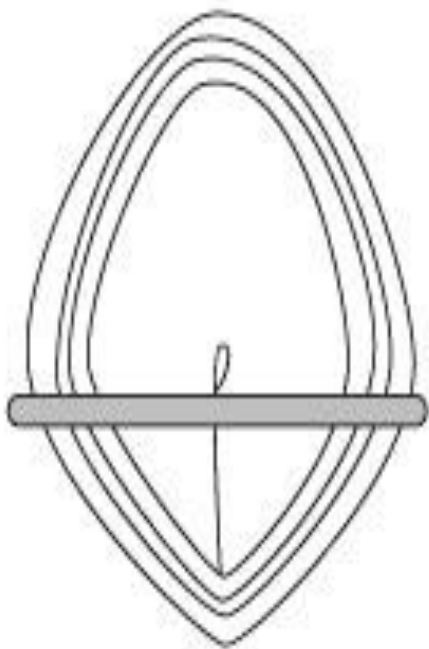
Epithelial lining & specific cells of glands (liver, pancreas).

## □ Visceral Mesoderm:

Lamina propria, muscularis mucosa, submucosa, muscularis externa , serosa , stroma of glands, mesentery & blood vessels.

## □ Ectoderm:

Enteric nervous system .




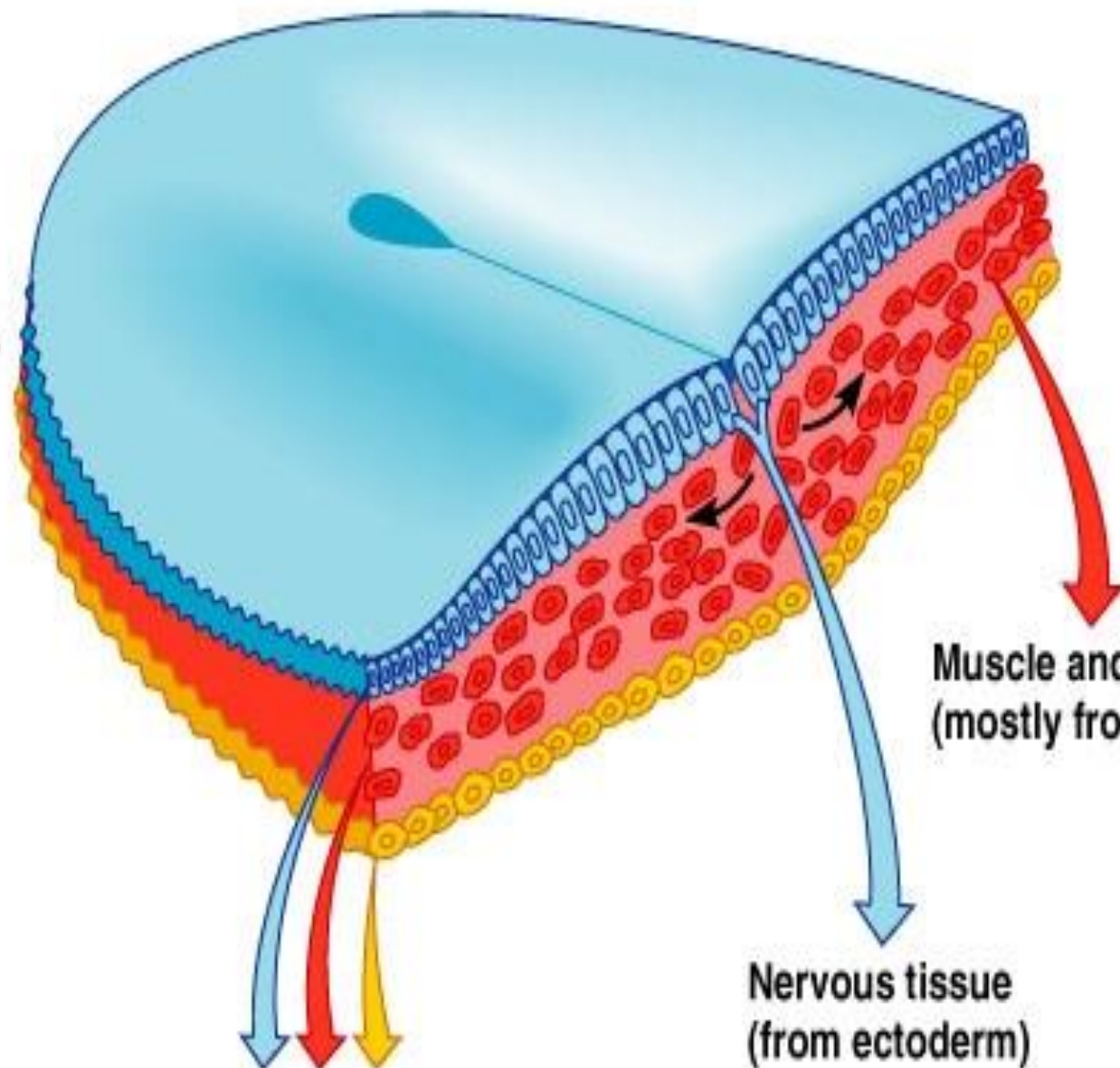
16-day-old embryo  
(dorsal surface view)

**Key:**

 = Ectoderm

 = Mesoderm

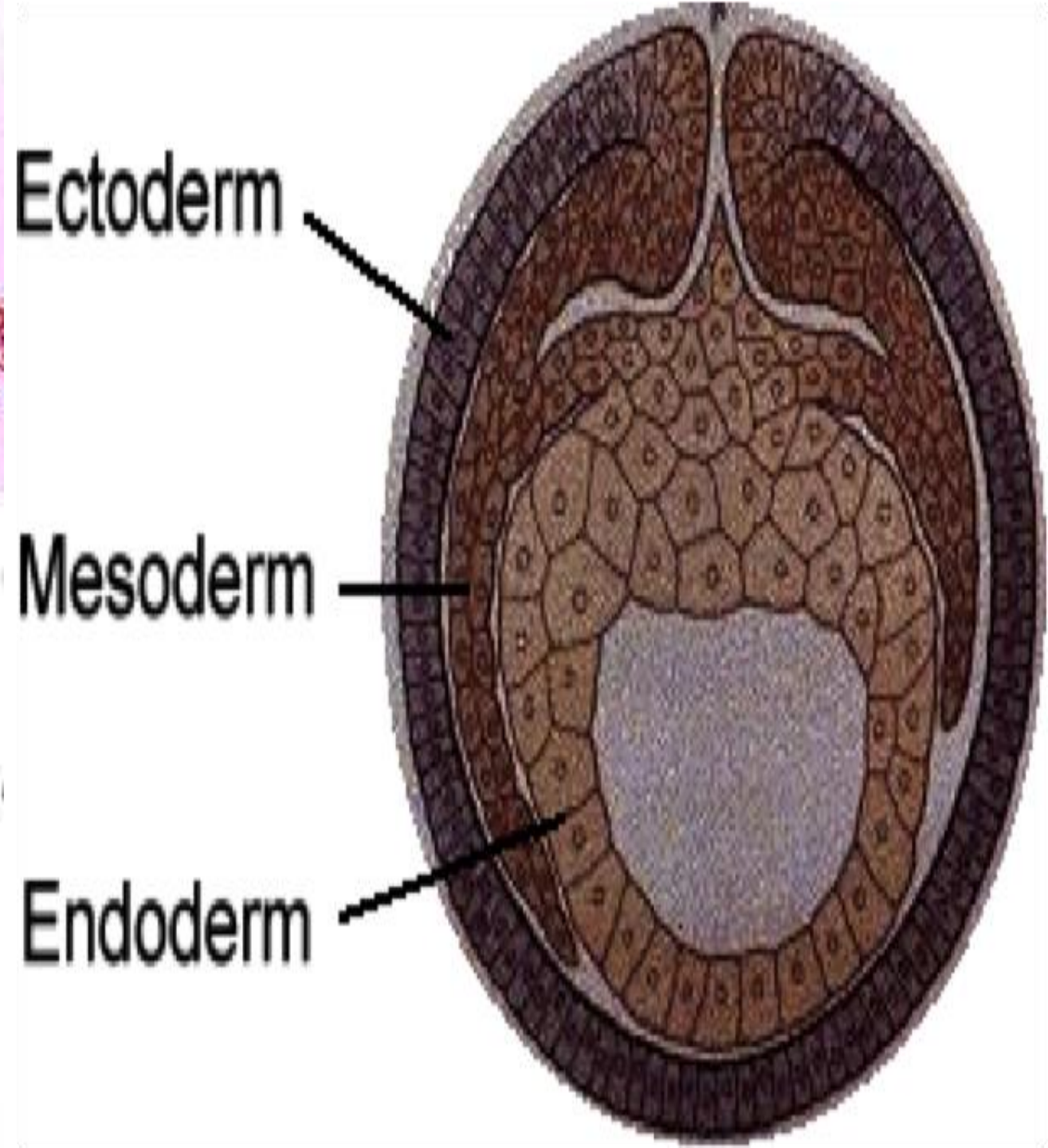
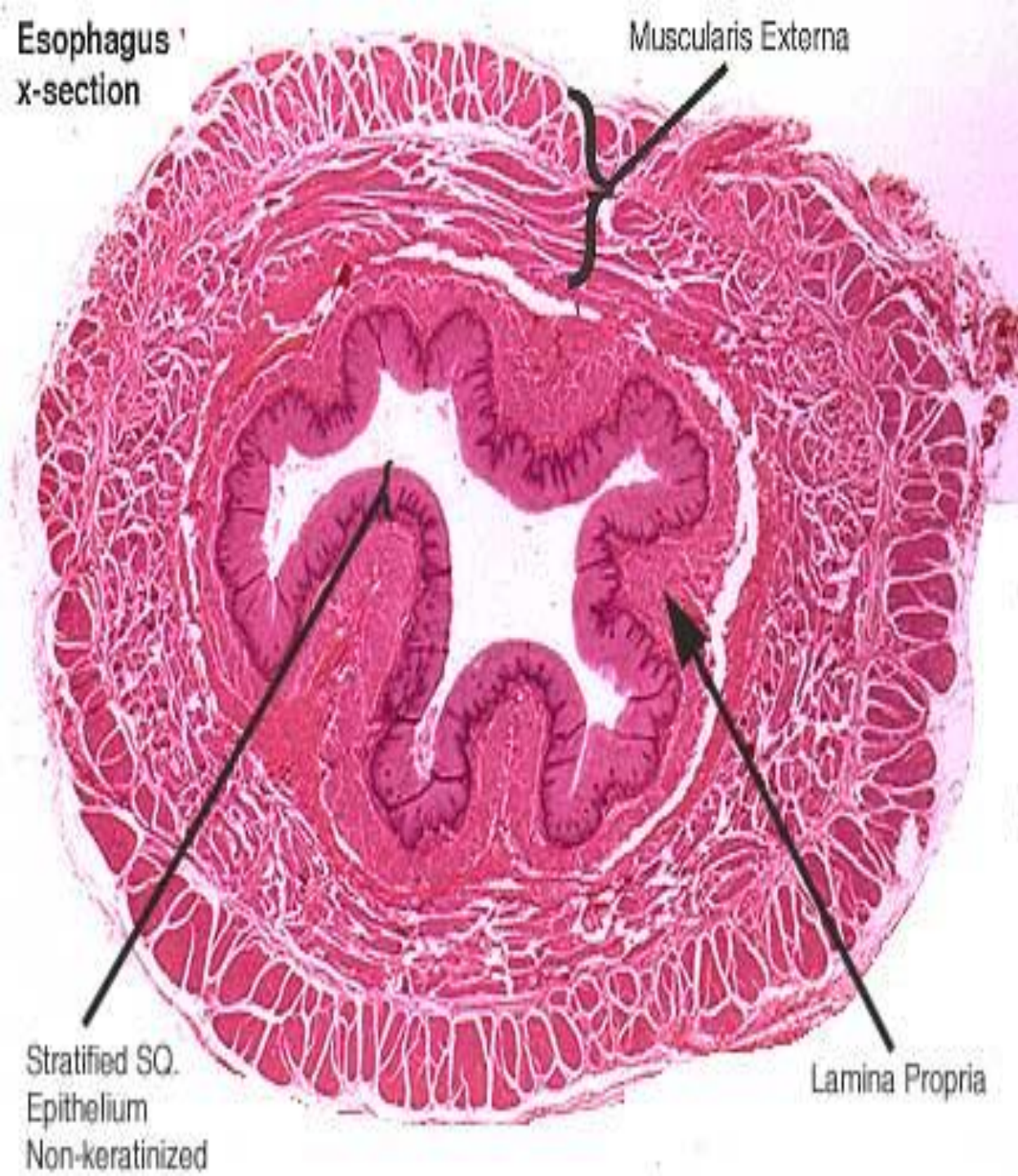
 = Endoderm



Epithelium

Nervous tissue  
(from ectoderm)

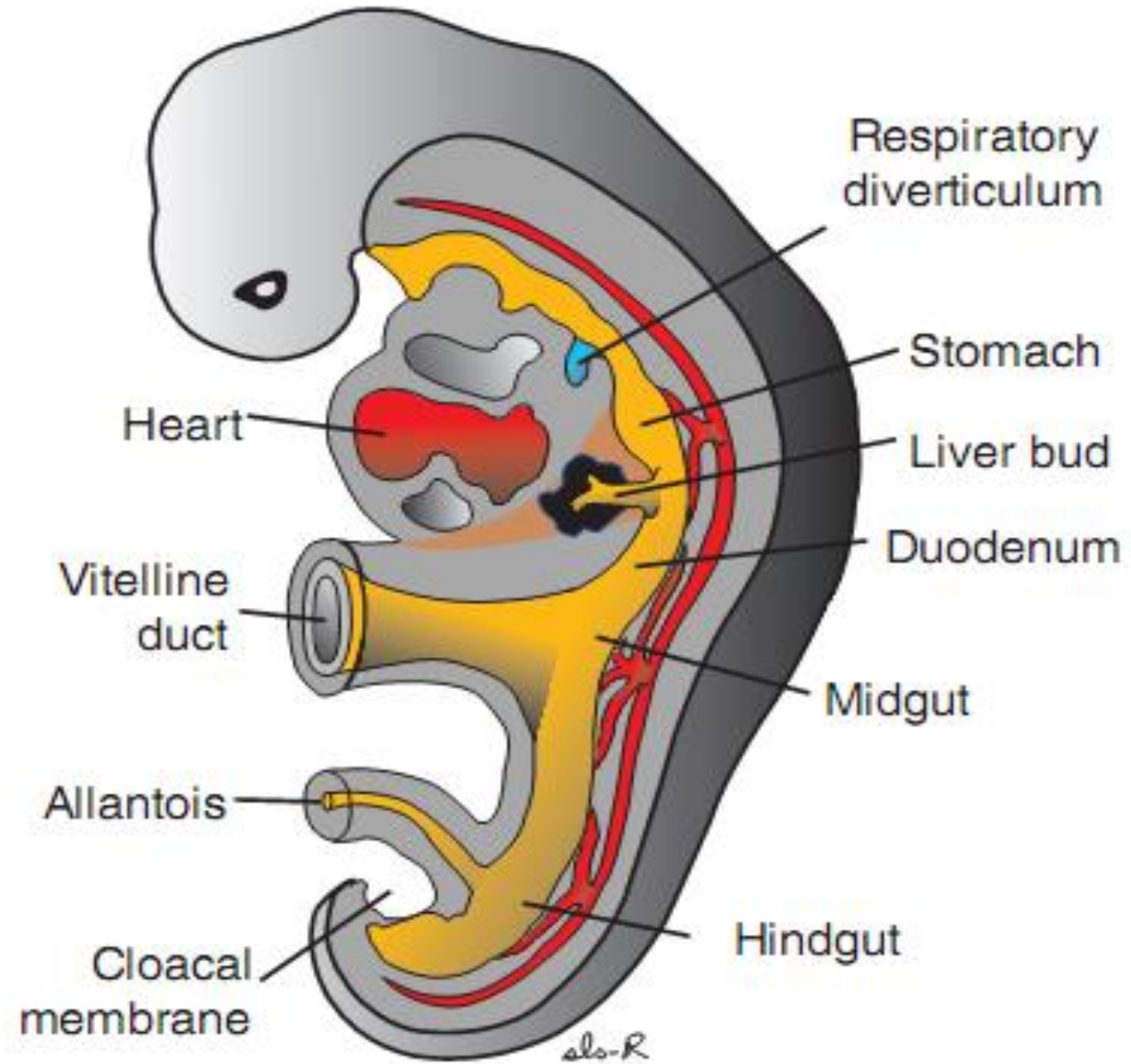
Muscle and connective tissue  
(mostly from mesoderm)



# Primitive Gut Tube :

➤ During cranio-caudal & lateral folding of the embryo.

- 1) Foregut.
- 2) Midgut.
- 3) Hindgut.



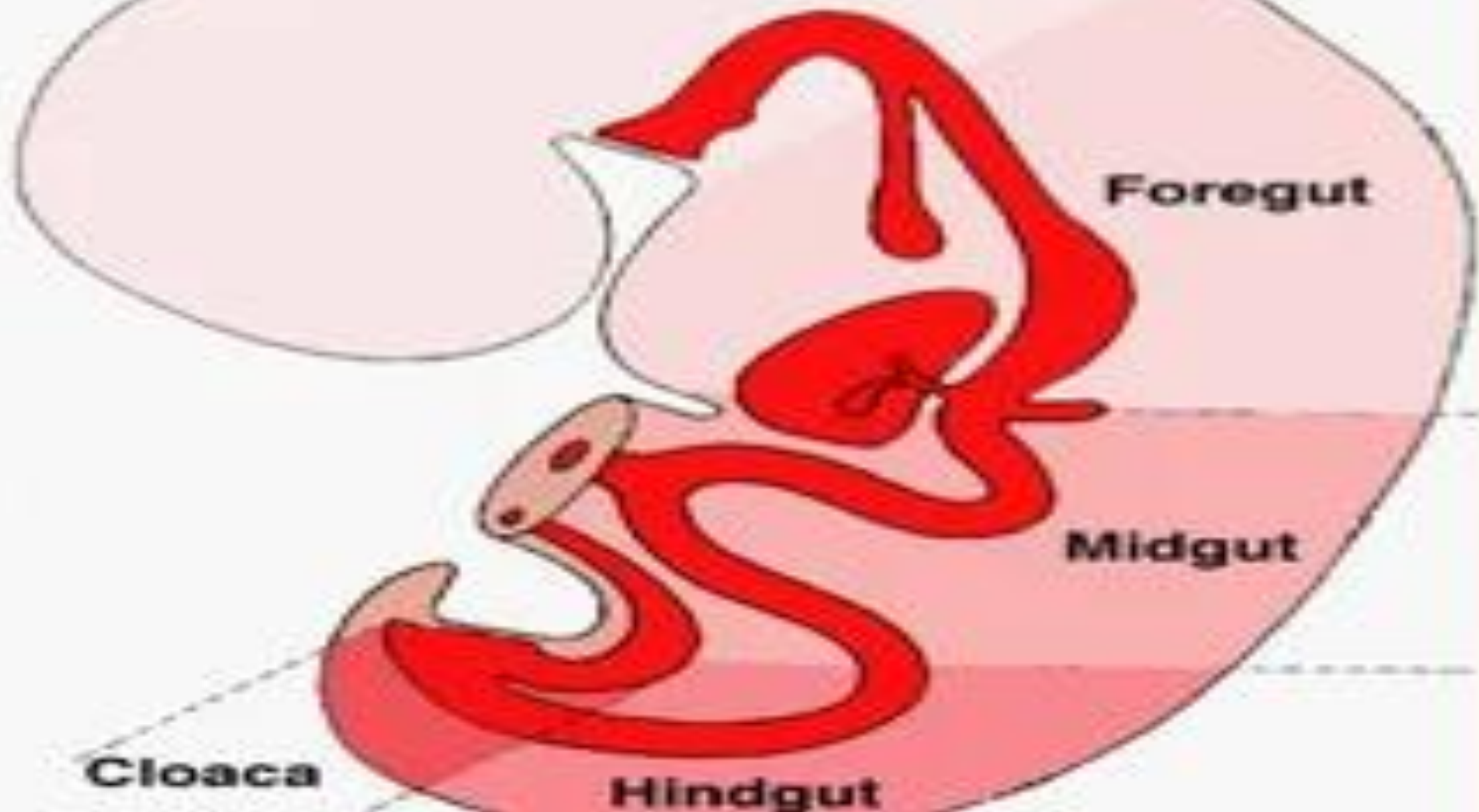
## **Foregut :**

- 1) Oral cavity, pharynx, esophagus
- 2) Stomach ,Upper Duodenum
- 3) Liver
- 4) Gallbladder & bile ducts
- 5) Pancreas

**Midgut :** rest of duodenum till distal 1/3 of transverse colon

**Hindgut :** from distal 1/3 of transverse colon till upper part of anal canal.

# Pharyngeal Gut



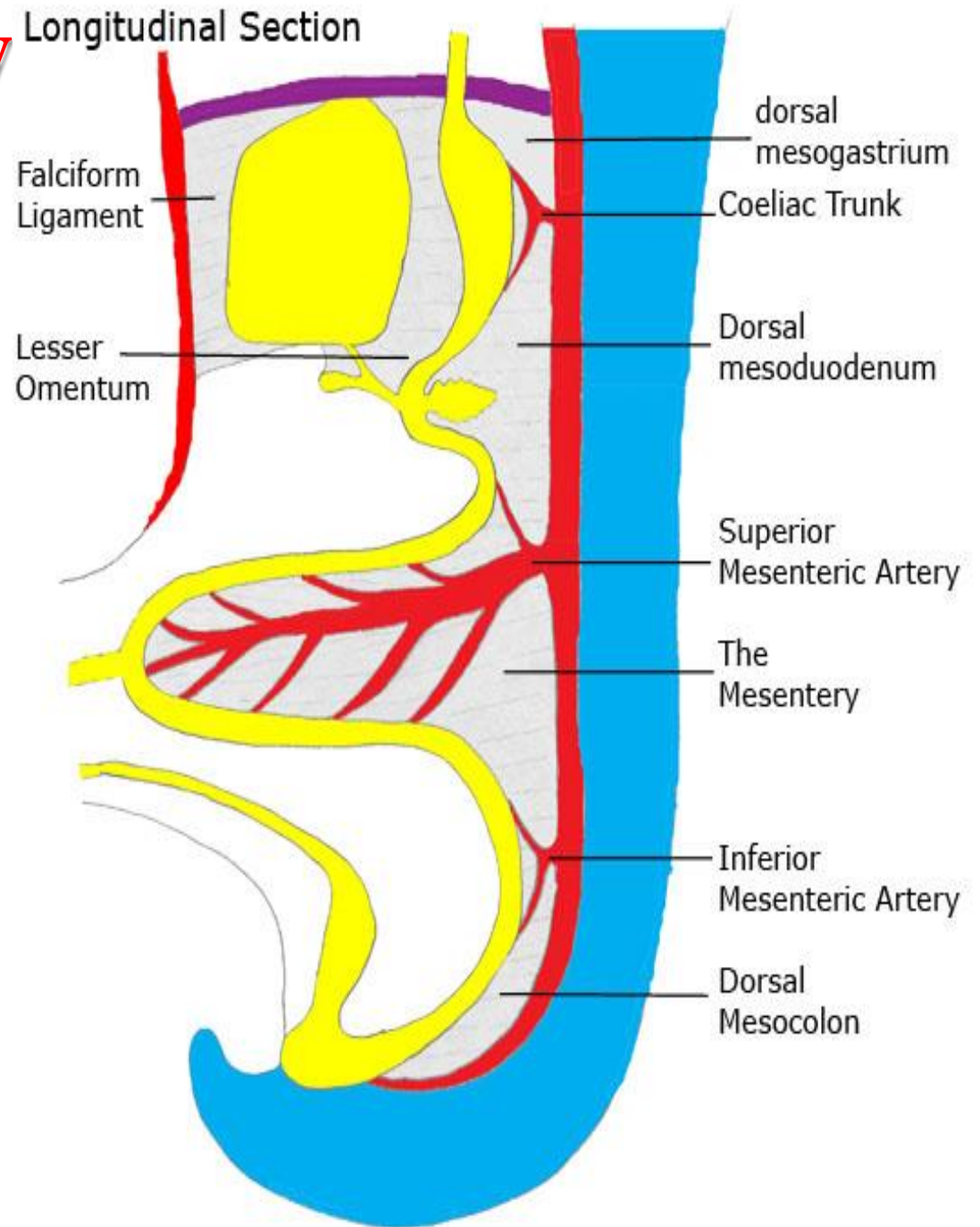


# Mesentery

## Primitive gut has :

1) **Dorsal mesentery:** initially it connects gut to posterior abdominal wall but at **5<sup>th</sup> wk**, it narrowed and presented in :

- **Stomach region** (dorsal mesogastrium or greater omentum)
- **Duodenum** (dorsal mesoduodenum)
- **Colon** (dorsal mesocolon)
- **jejunum & ileum** (mesentery proper)

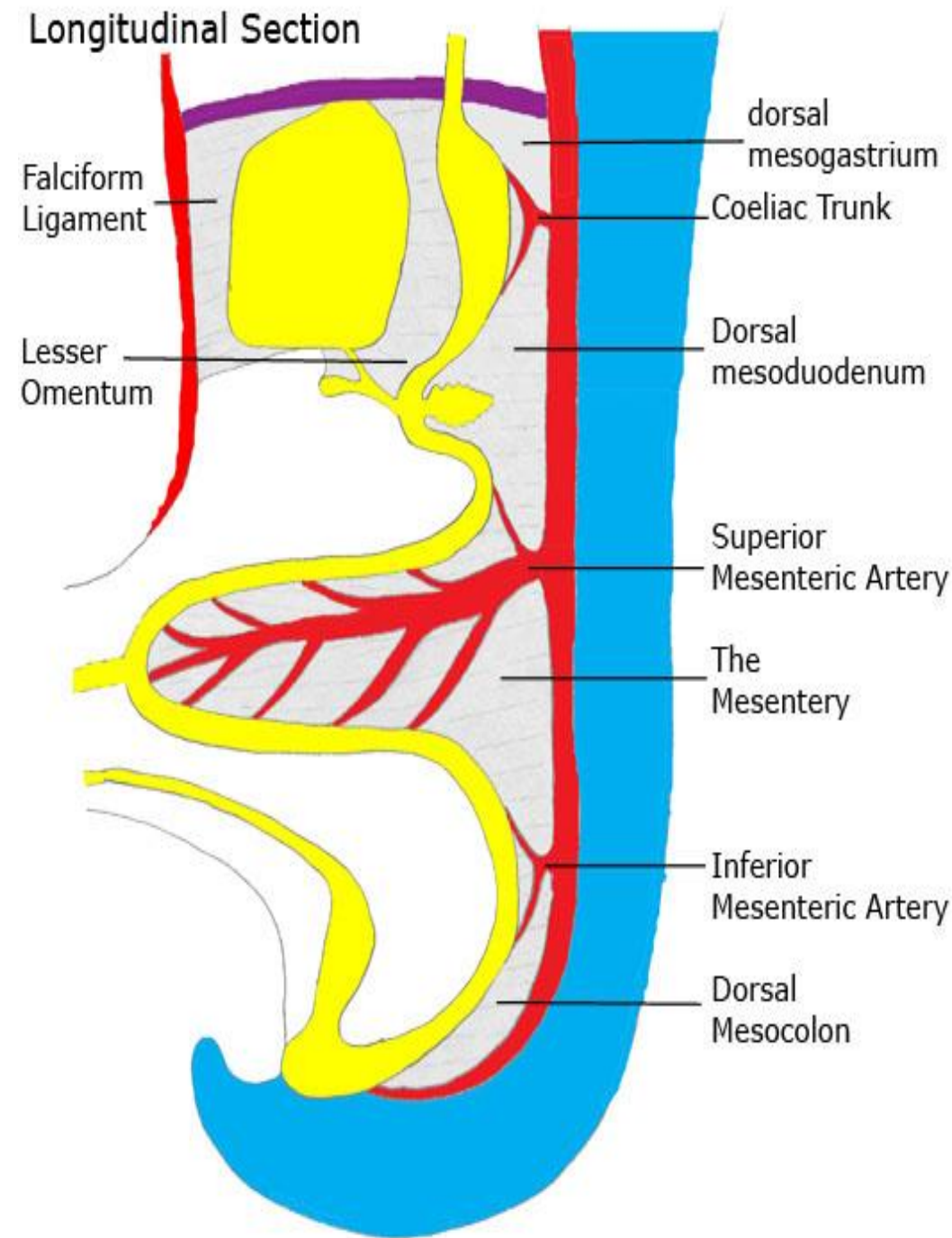


## ▪2) Ventral mesentery:

▪It presented in terminal part of esophagus , stomach & upper duodenum

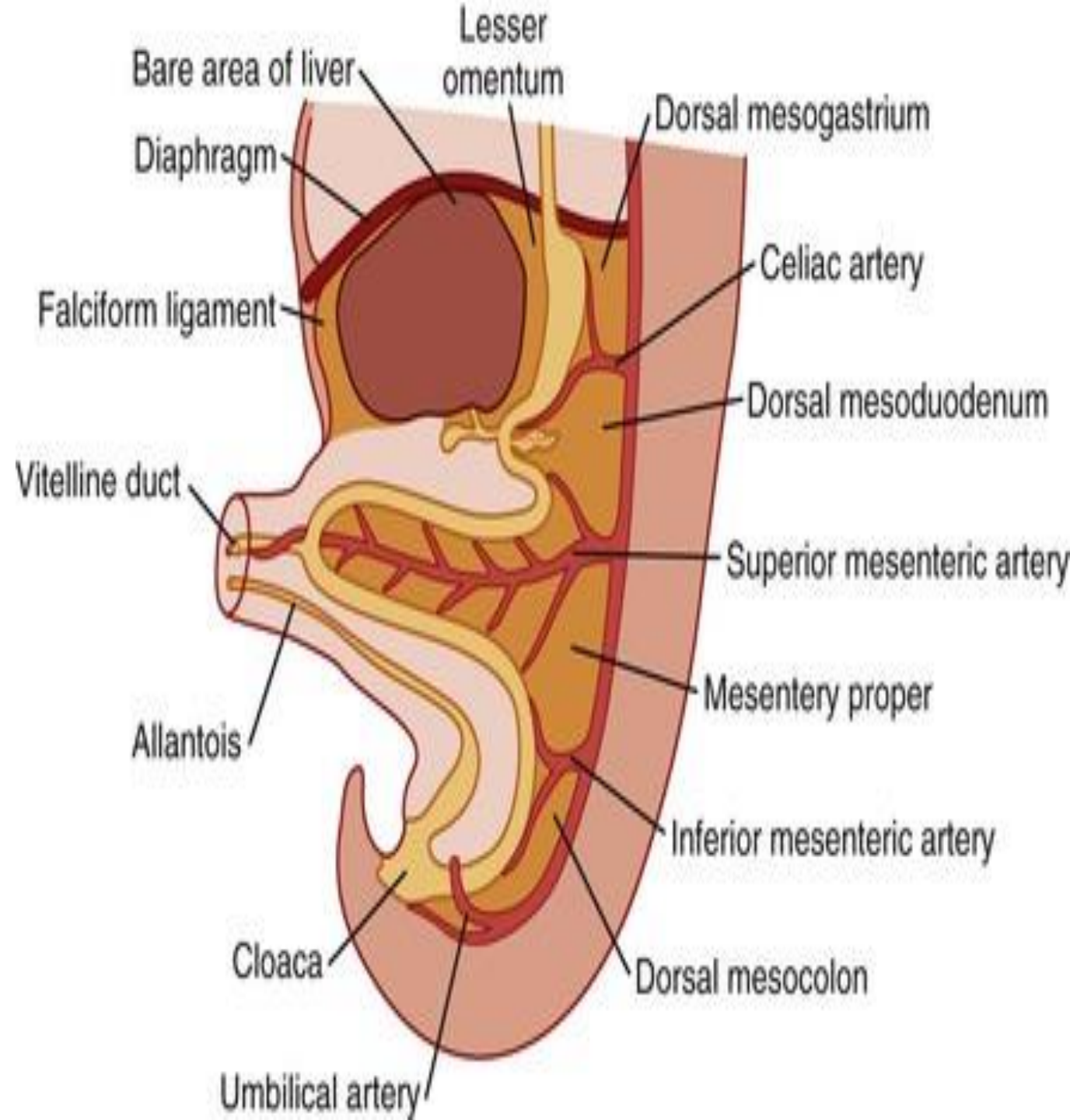
▪ once the liver invade & grow, it divided the ventral mesentery to :

➤ **ventral mesogastrium or lesser omentum** which connect t terminal part of esophagus , stomach & upper duodenum to liver .



➤ **Falciform ligament** which connect liver to ventral body wall.

➤ The Free margin of falciform ligament contain umbilical vein which obliterated after birth.

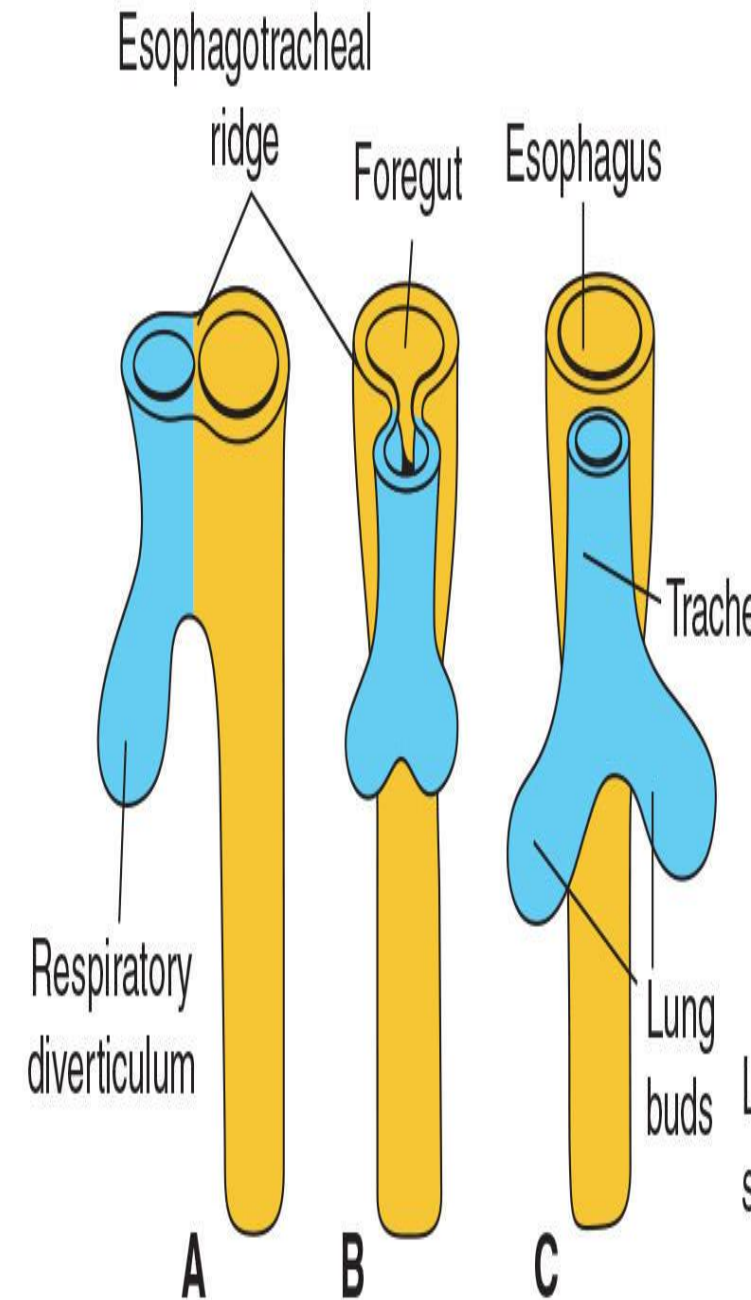


## Esophagus :

❑ It developed at **4th wk** .

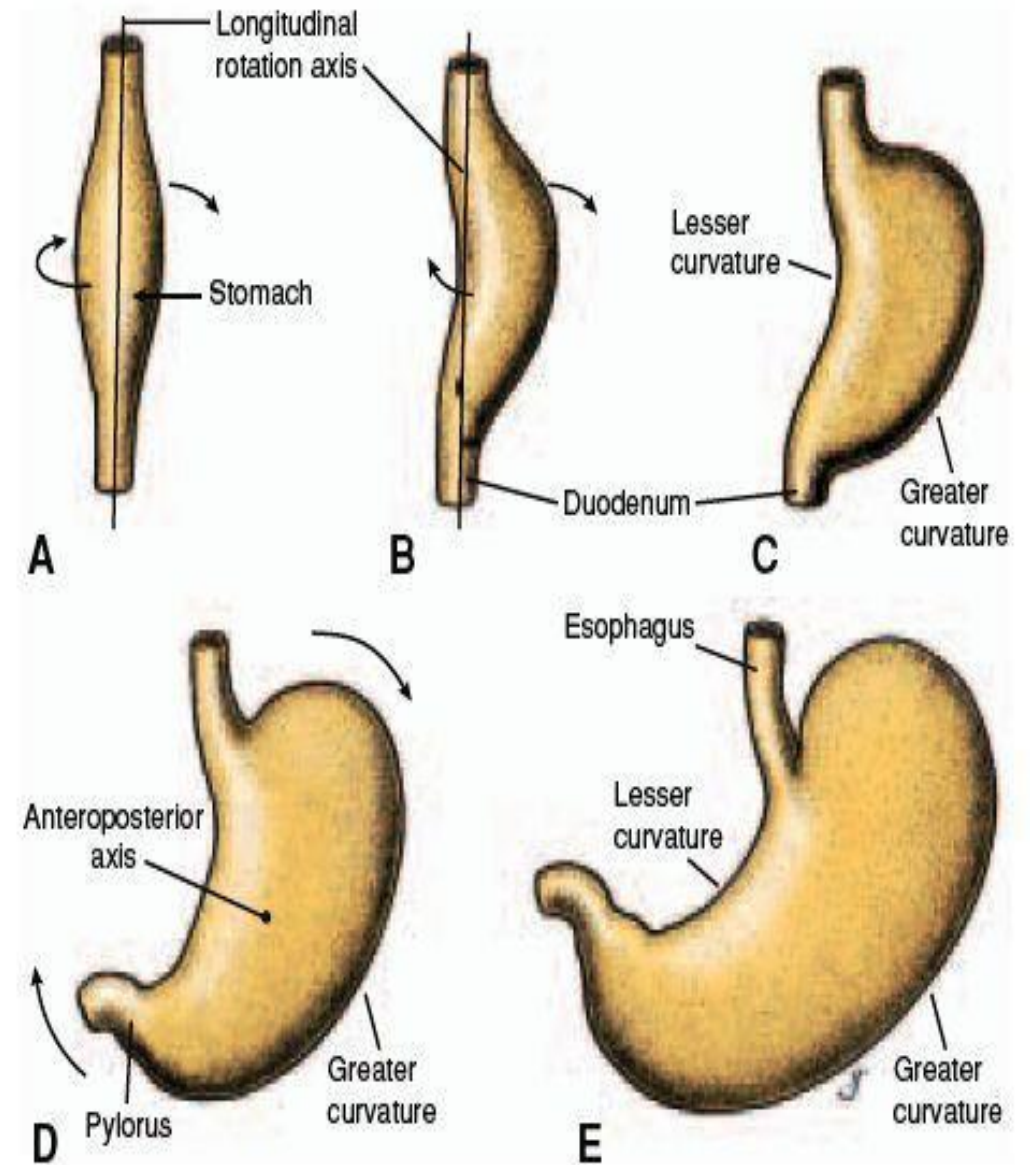
❑ Foregut caudal to pharyngeal gut started budding of **respiratory diverticulum (lung bud)** ventrally then tracheoesophageal septum form to separated lung bud from esophagus.

❑ at first time the esophagus is short but because descent of heart & lung it rapidly lengthen.



# Stomach:

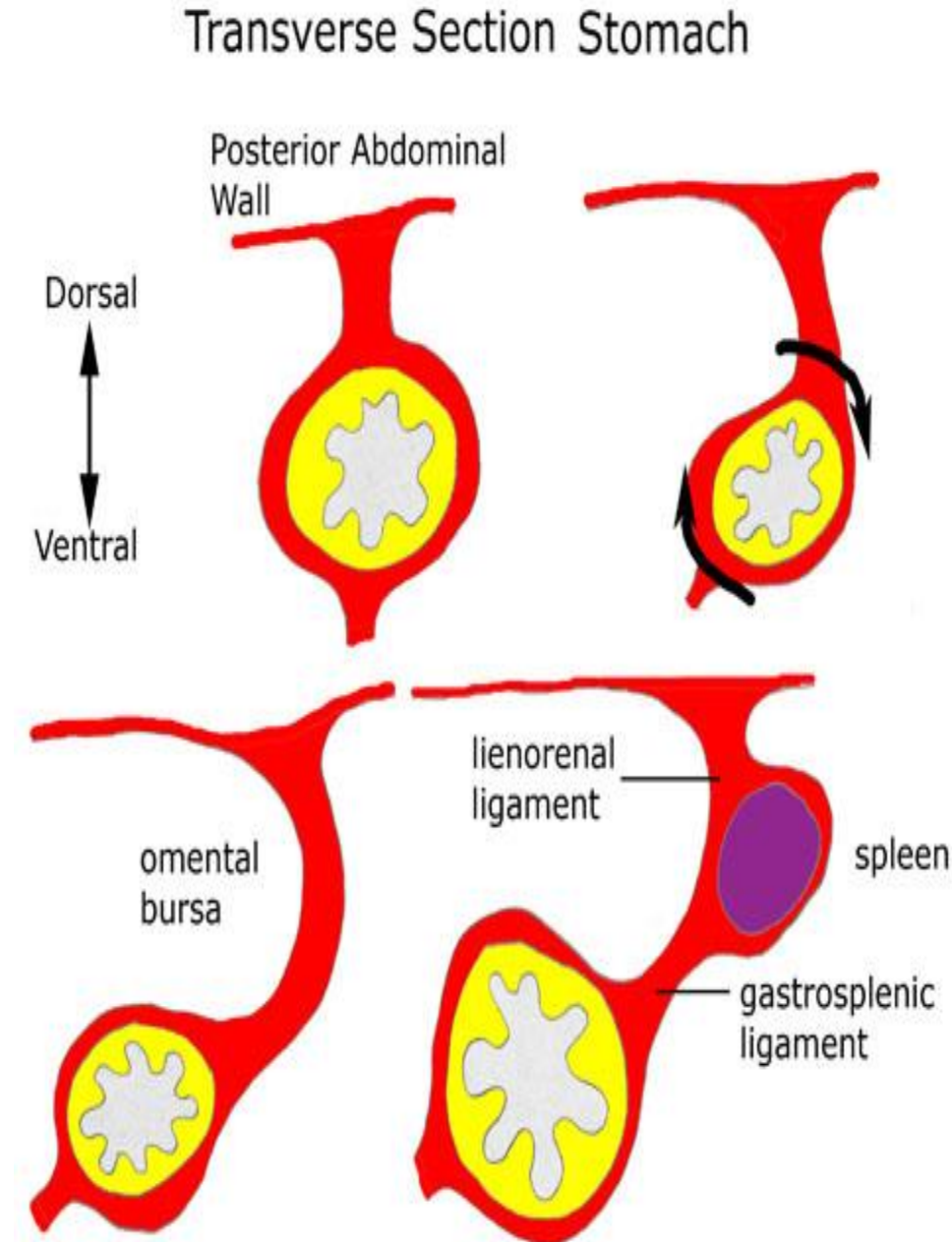
- It arised at **4th wk** of fetal life.
- Its appearance & position is greatly changed during development .**why?**
- The positional changes assumed when stomach rotates around the longitudinal & anteroposterior axis.

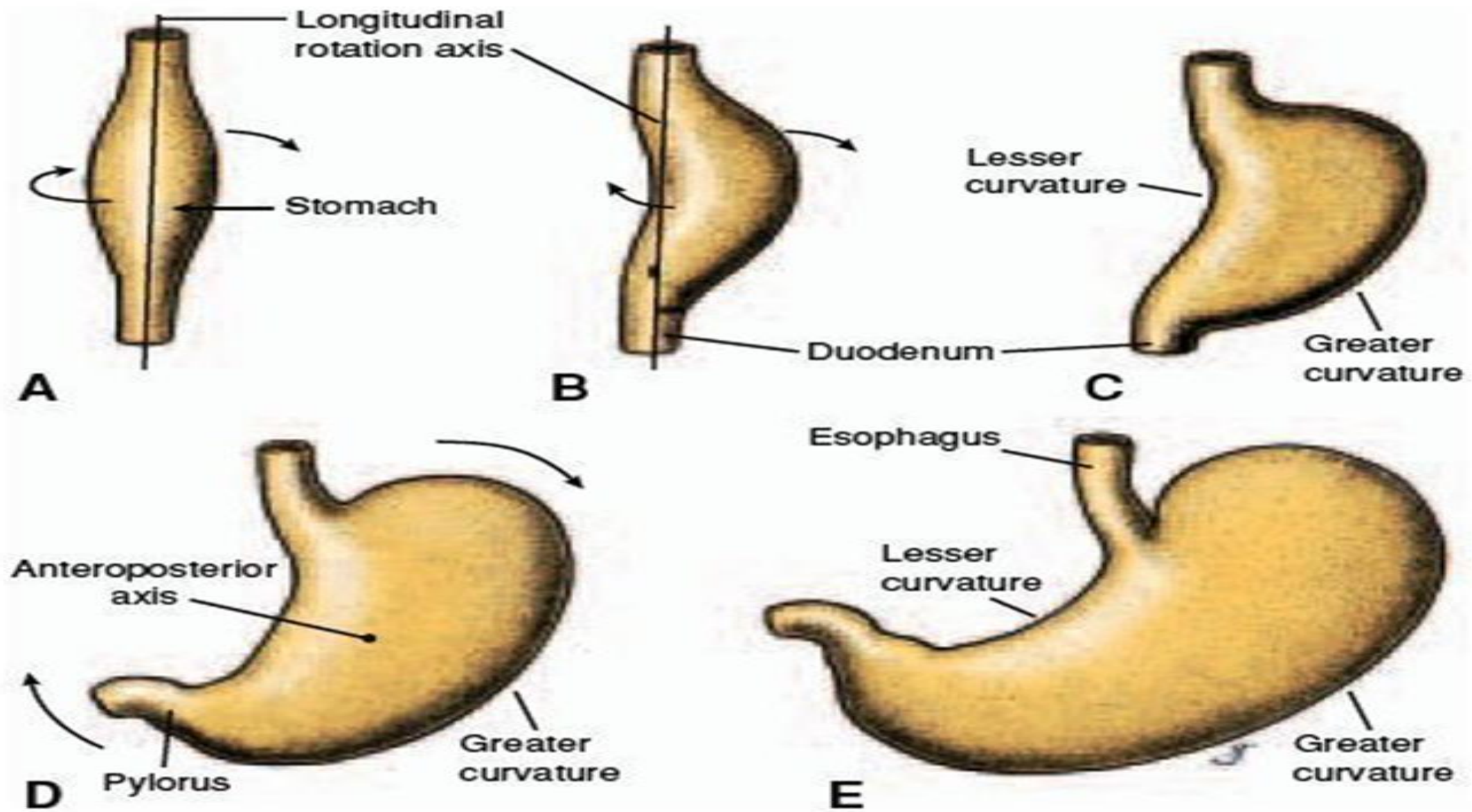


**Figure 13.8** A, B, and C. Rotation of the stomach along its longitudinal axis as seen anteriorly. D and E. Rotation of the stomach around the anteroposterior axis. Note the change in position of the pylorus and cardia.

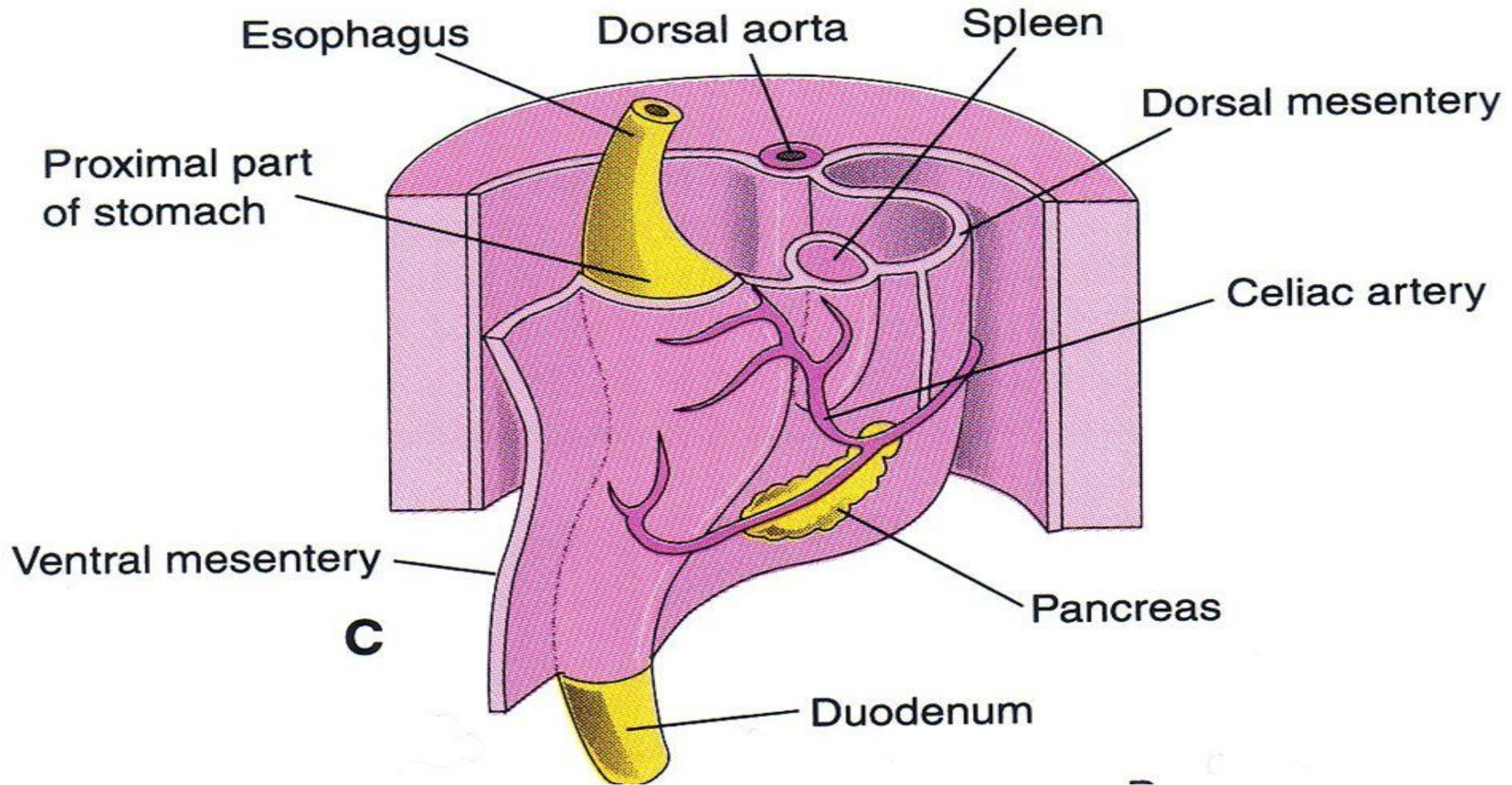
## When stomach rotates 90° around longitudinal axis :

- LT side of stomach be anteriorly ( LT vagus be anterior)
- RT side of stomach be posteriorly ( RT vagus be posterior)
- Original posterior wall grow faster than anterior so appears greater curvature & lesser curvature.
- Dorsal mesogastrium move to LT & leaving a space behind stomach **called lesser sac** but ventral mesogastrium move to RT .





**Figure 13.8** A, B, and C. Rotation of the stomach along its longitudinal axis as seen anteriorly. D and E. Rotation of the stomach around the anteroposterior axis. Note the change in position of the pylorus and cardia.

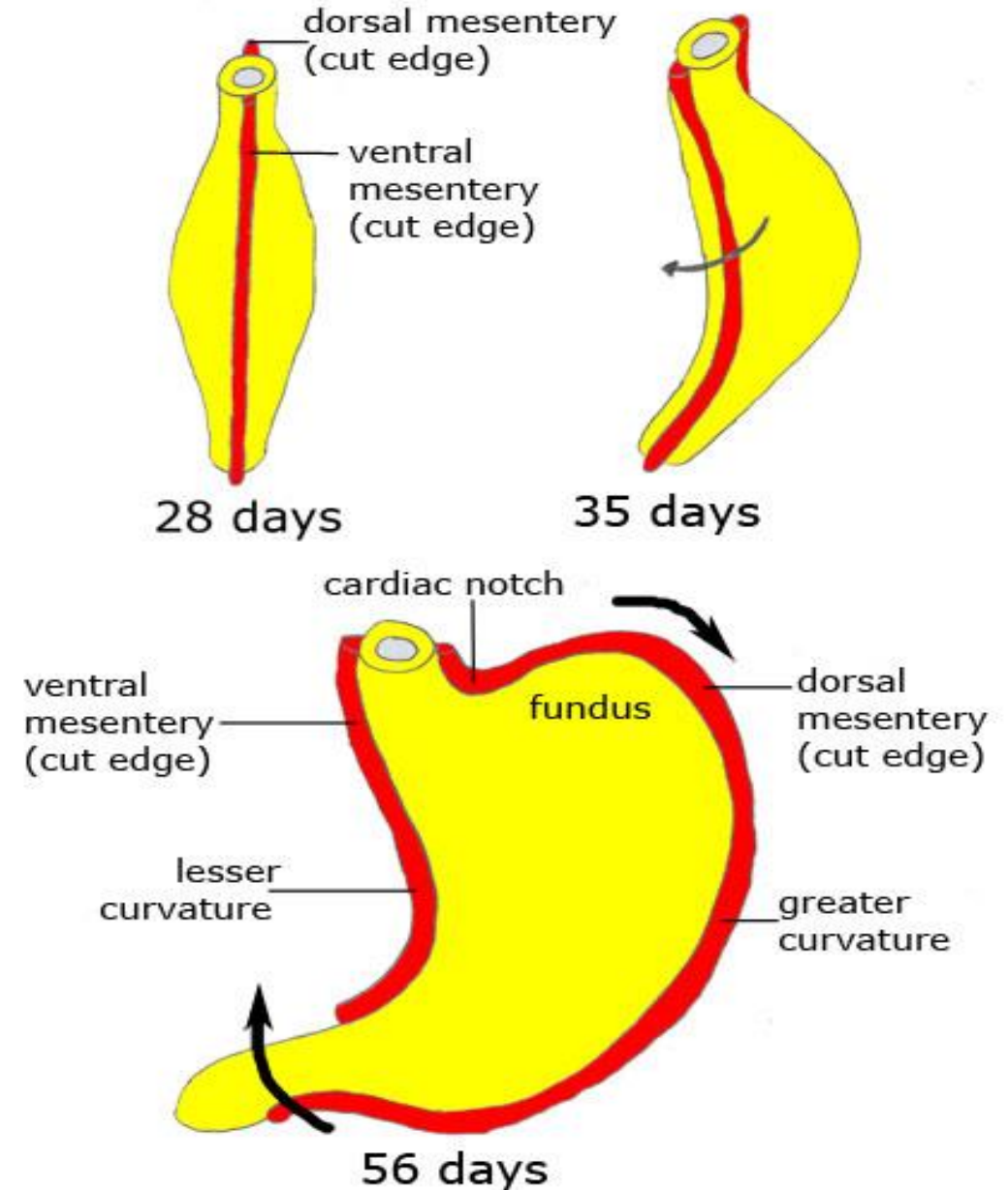




## When stomach rotates around anteroposterior axis :

○At 1<sup>st</sup> both cardiac end & pyloric end of stomach lie in mid line but after this rotation cardiac end move down & LT but pyloric end moved up & RT.

○After this 2 rotations the stomach assumed final position.

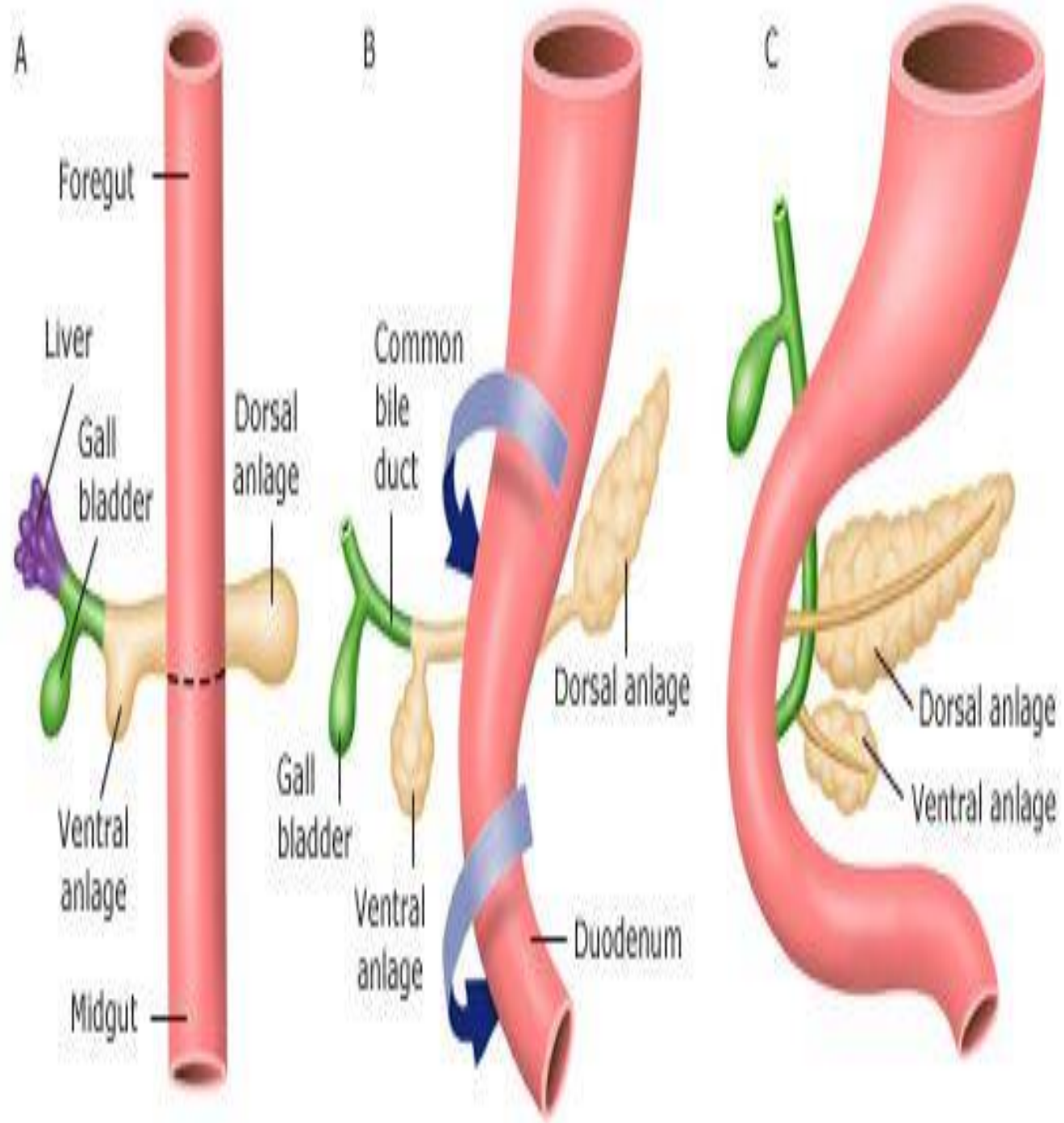


# Duodenum:

Its junction of both:

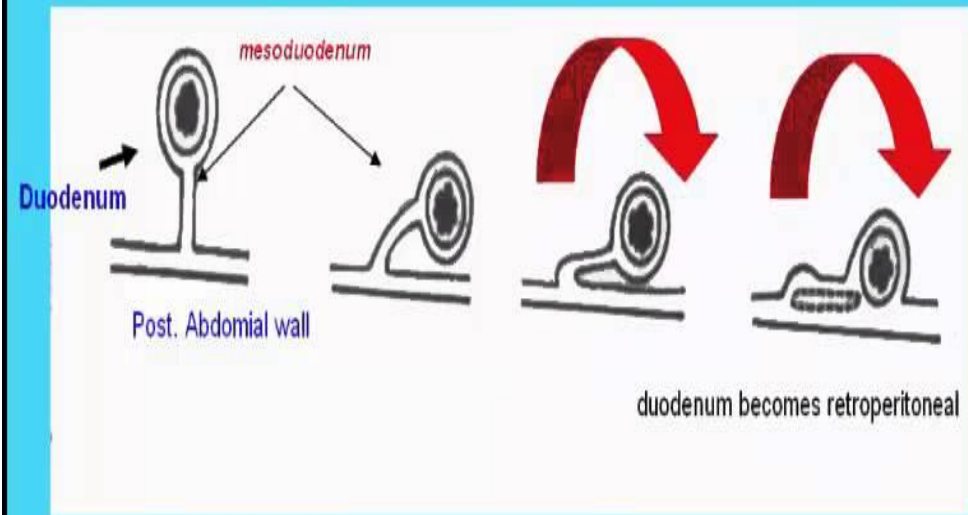
❑ Terminal part of foregut & cephalic part of mid gut.

❑ When stomach rotate the duodenum also rotate to RT **as C shape**. This rotation cause swing of duodenum from initial midline to RT side abdominal cavity .

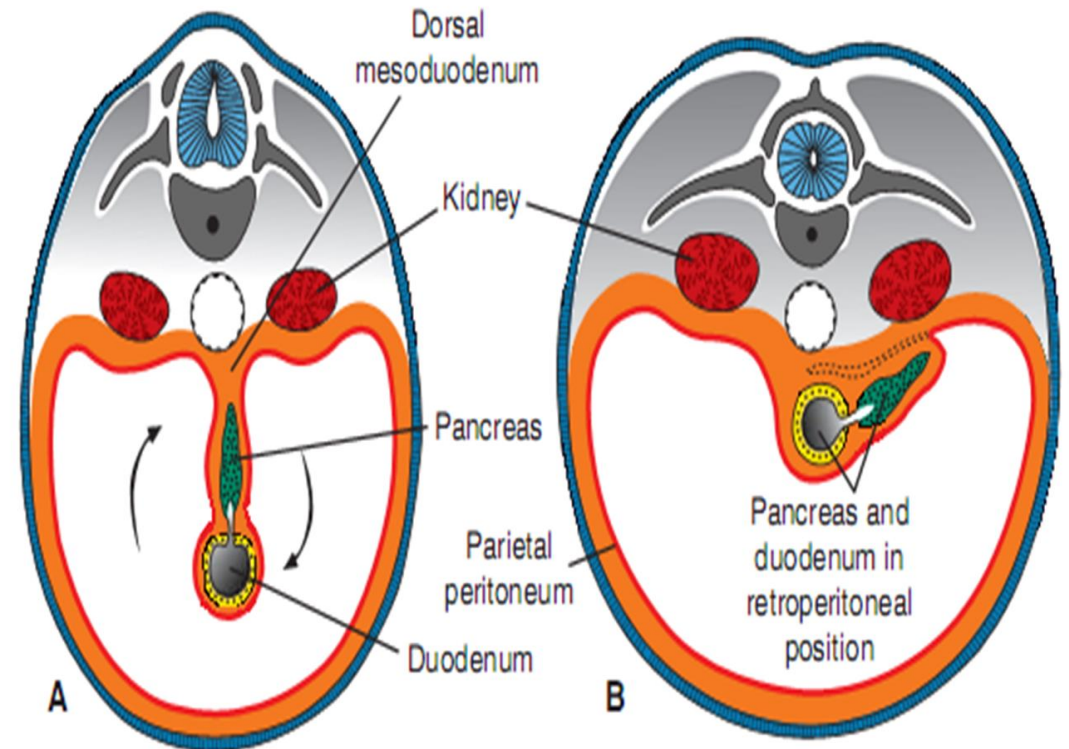


□ Duodenum & head of pancreas press against dorsal body wall so dorsal mesoduodenum fused & disappears except in 1<sup>st</sup> part of duodenum .

□ At end, rest of duodenum & head, neck & body of pancreas is fixed secondary retroperitoneally.



The mesoduodenum is absorbed and the duodenum becomes retroperitoneal



## Development of Mid gut :

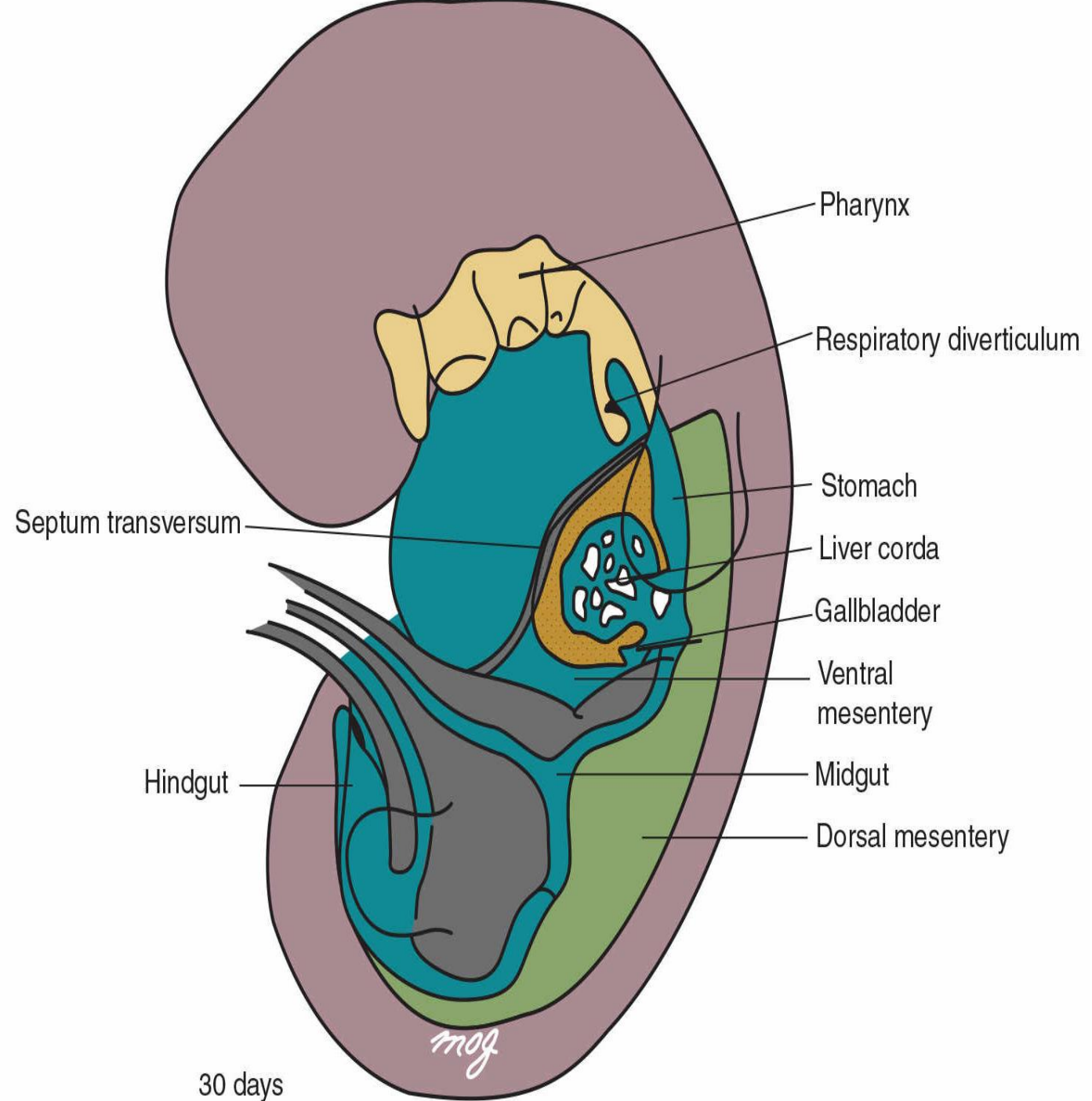
➤ Started at 5<sup>th</sup>wk .

➤ **Connection :**

○ with dorsal abdominal wall by a mesentery.

○ With yolk sac by yolk stalk (vitelline duct).

➤ **Mid gut** : rest of duodenum till proximal 2/3 transverse colon is involved

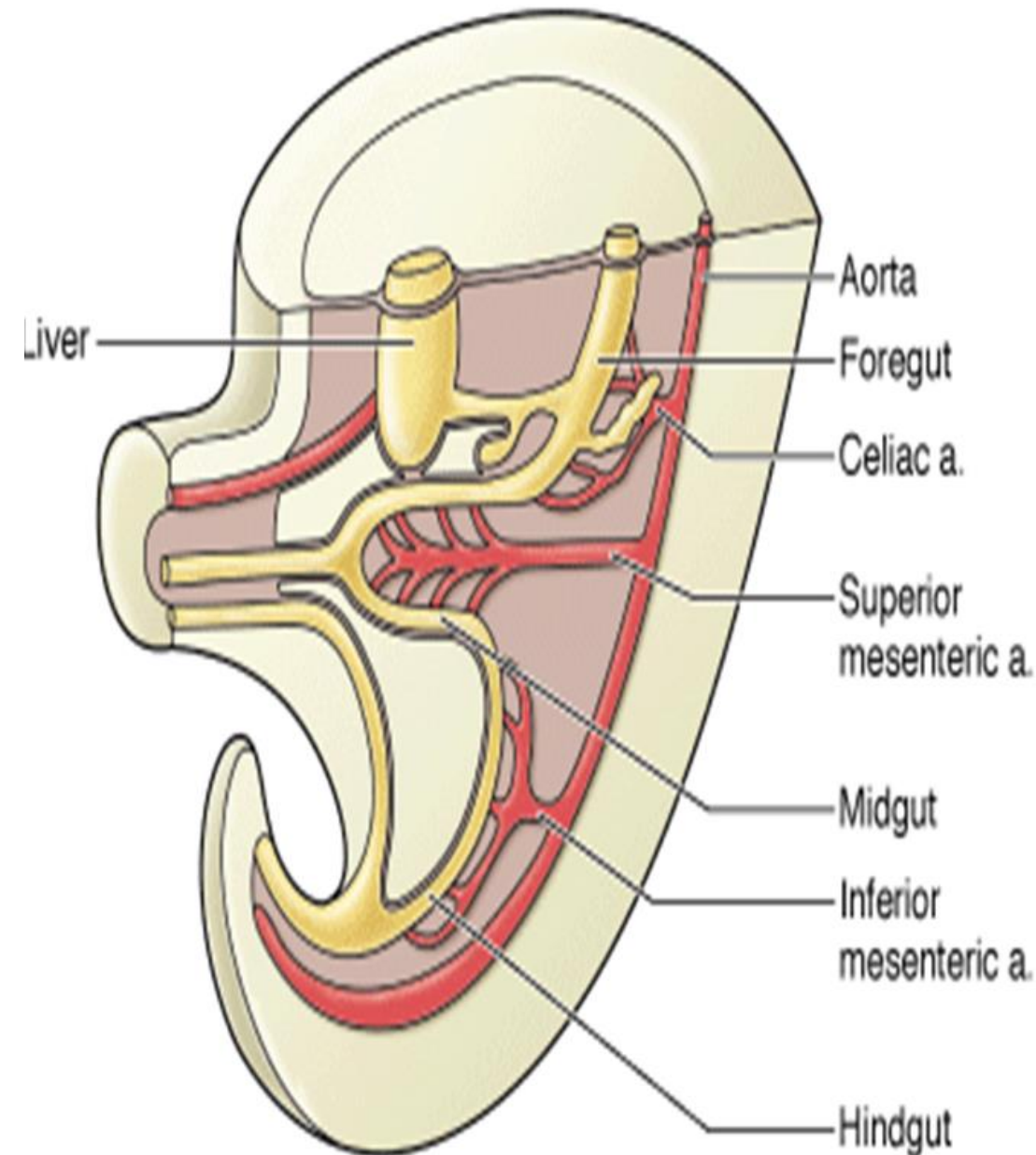


❖ Rapid elongation of gut & its mesentery will form primary intestinal loop :

1) Its apex is in connection with yolk sac by vitelline duct .

2) Cephalic limb of loop developed (rest of duodenum, jejunum and part of ileum).

3) Caudal part of loop developed (the rest of ileum till proximal 2/3 transverse colon).



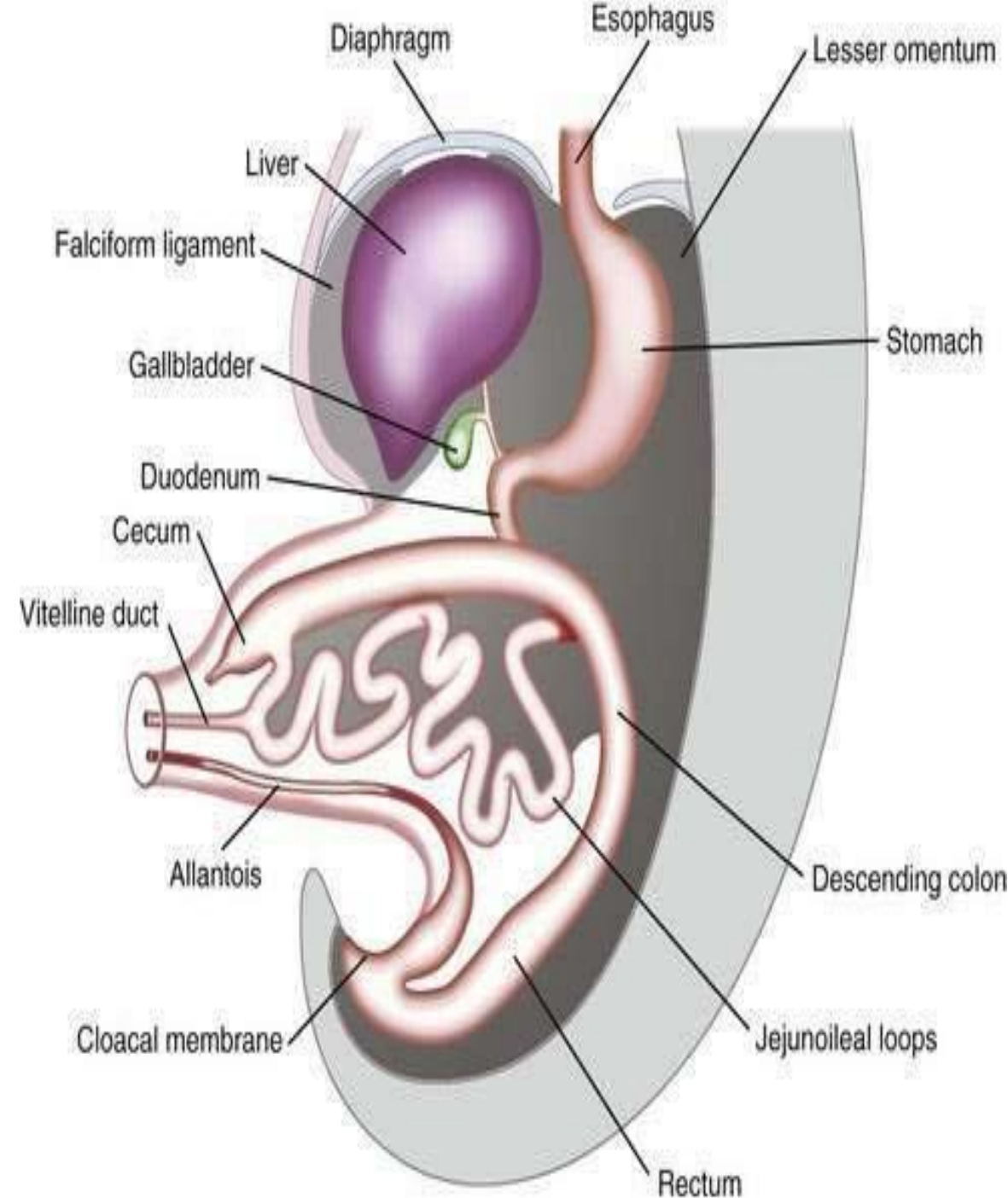
# Stages of development:

1) **Physiological Herniation:** It occur during 6<sup>th</sup> wk of development, why?

1) Primary intestinal loop is characterized by rapid elongation

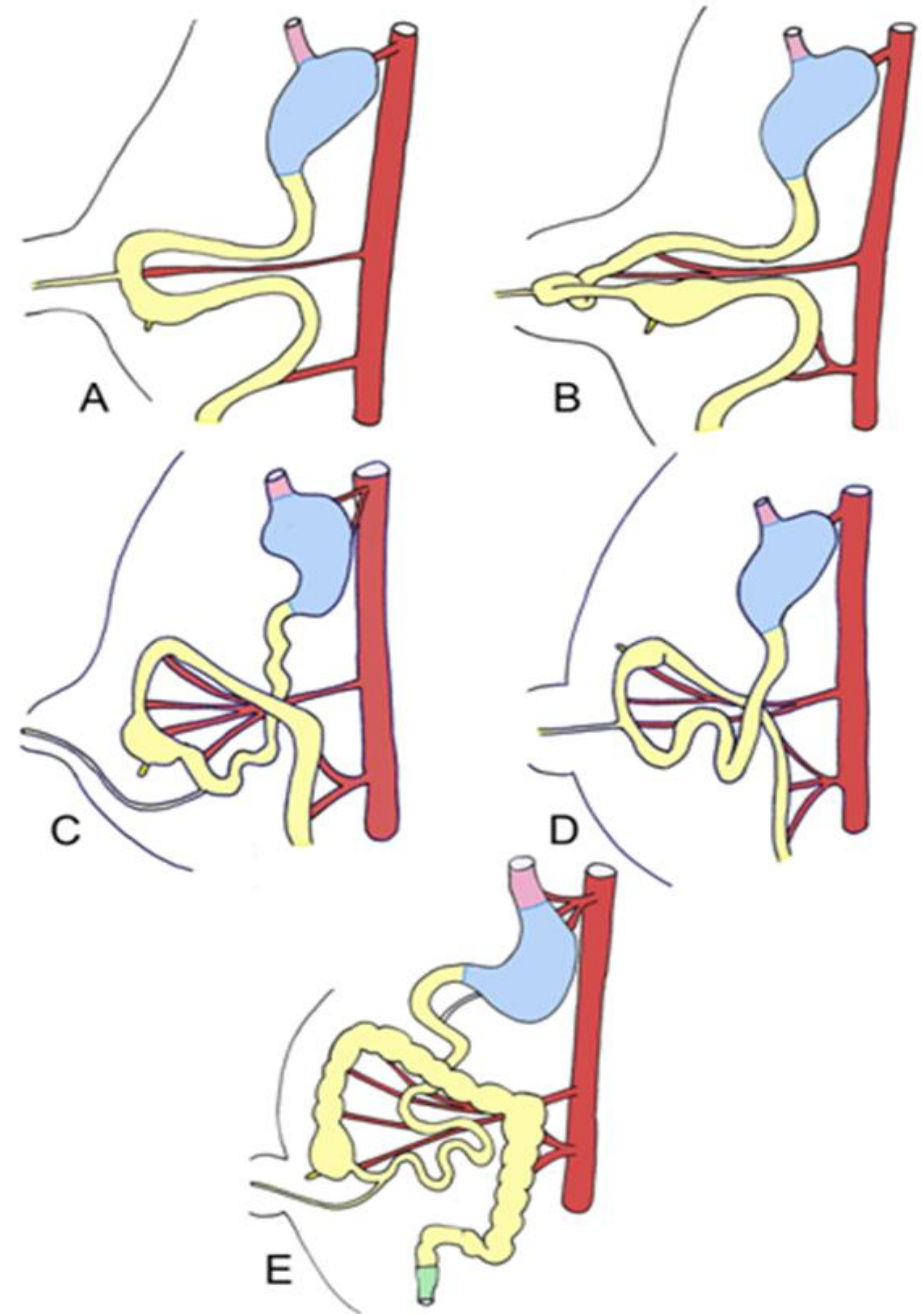
2) Rapid growth & expansion of liver .

3) Abdominal cavity temporarily is too small.



## 2) Rotation of the Mid gut:

- It rotates around an axis formed by **superior mesenteric artery** anticlockwise
- Rotation occurs during herniation about  $90^\circ$ .
- As well as during return of intestinal loops into abdominal cavity rotates  $180^\circ$ .



### 3) Retraction of Herniated Loops:

\*Started at 10th week.

➤Herniated intestinal loops return to abdominal cavity, why?

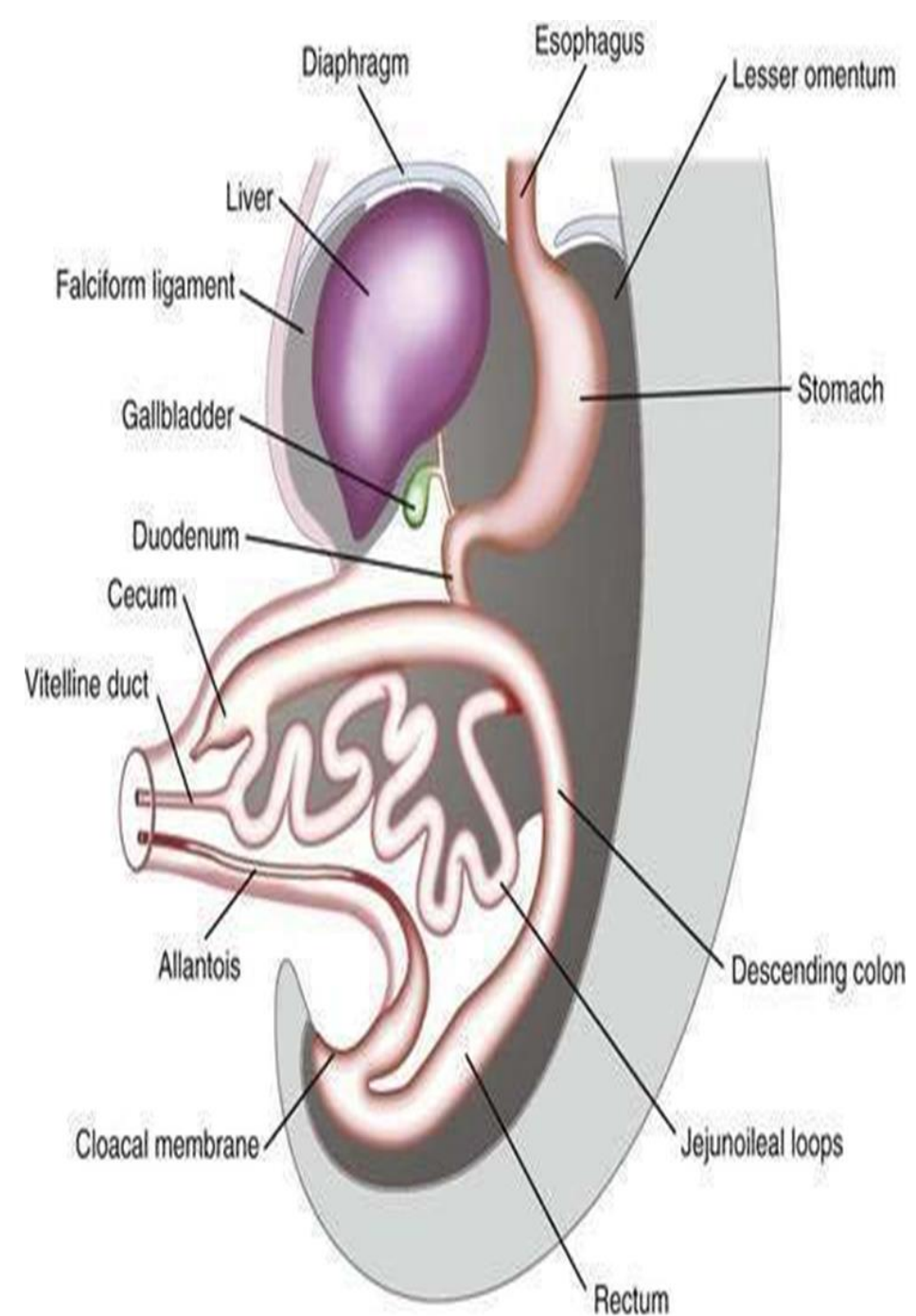
➤Regression of mesonephric kidney.

➤Reduced growth of the liver.

➤ Expansion of abdominal cavity.

\*The 1st part to reenter abdominal cavity is jejunum comes to lie on LT side.

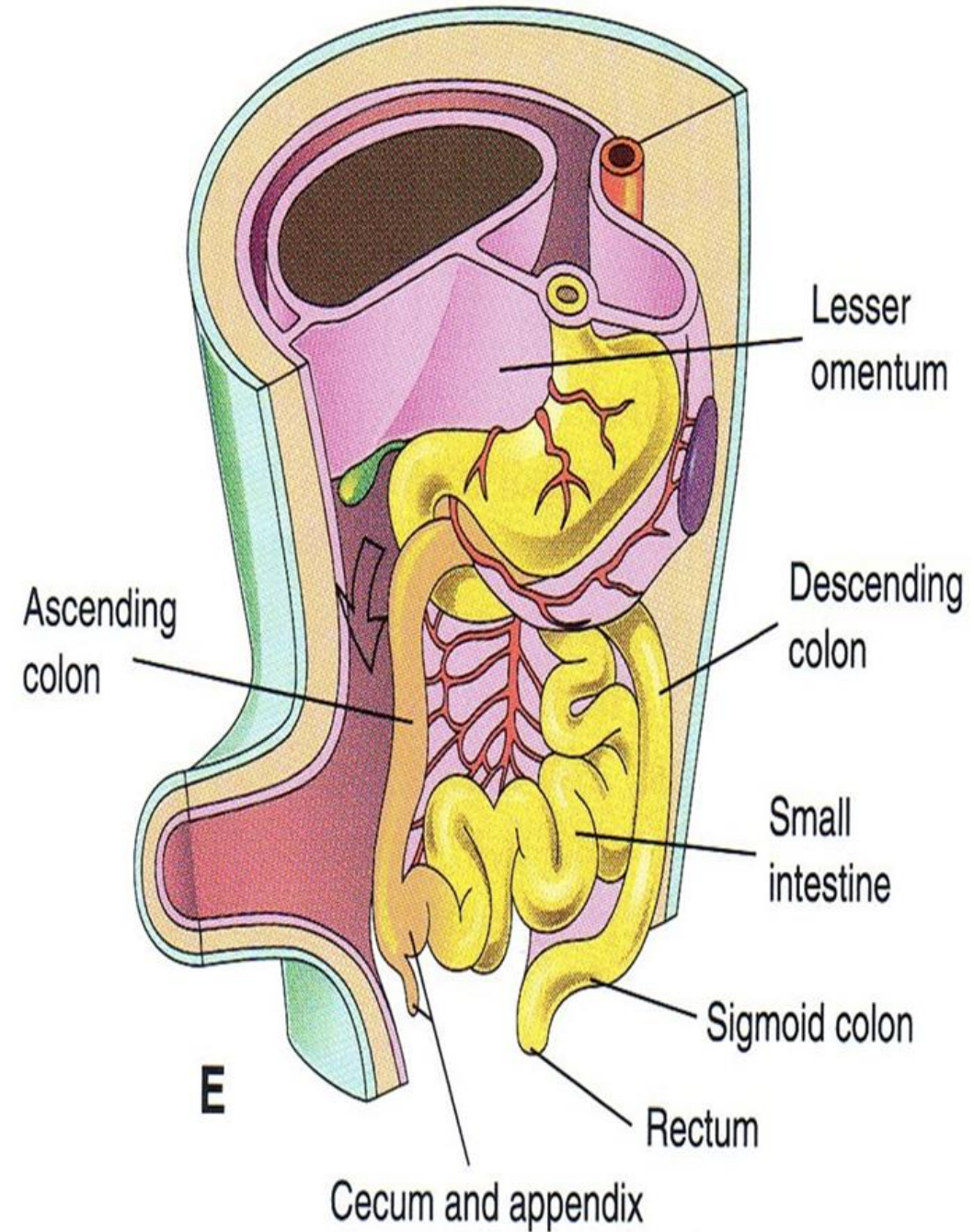
\*The later returning loops gradually settle more & more to RT .





**Cecum : cecal bud** which appears at about **6th week** as a small conical dilation of the primary intestinal loop, is the last part of the gut to reenter abdominal cavity.

➤ During this process the cecal bud forms a narrow diverticulum called **appendix**



Thank You



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