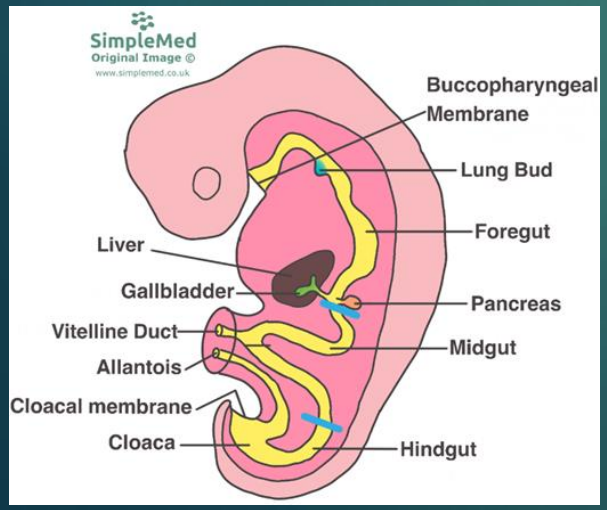
Kazan Federal (Volga Region) University
Institute of Fundamental Medicine and Biology
Department of Morphology and General Pathology

LECTURE 1

DIGESTIVE SYSTEM

(SYSTEMA DIGESTORIUM/ ALIMENTARIUM).

DEVELOPMENT



Zaikina Elvira Ildarovna,
MD, PhD, Senior lecturer

Splanchnology is the science of viscera

cells

↓

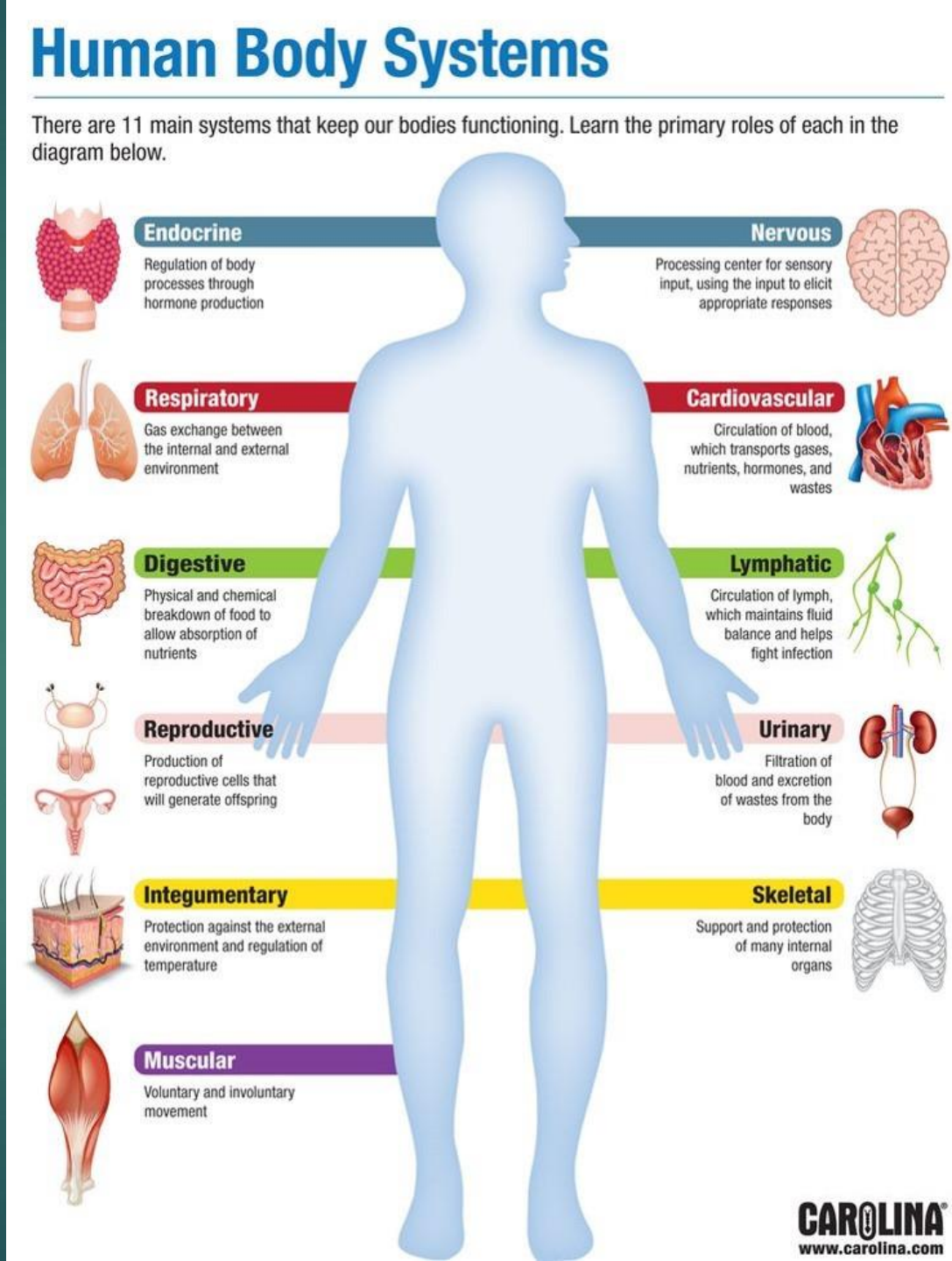
tissues

↓

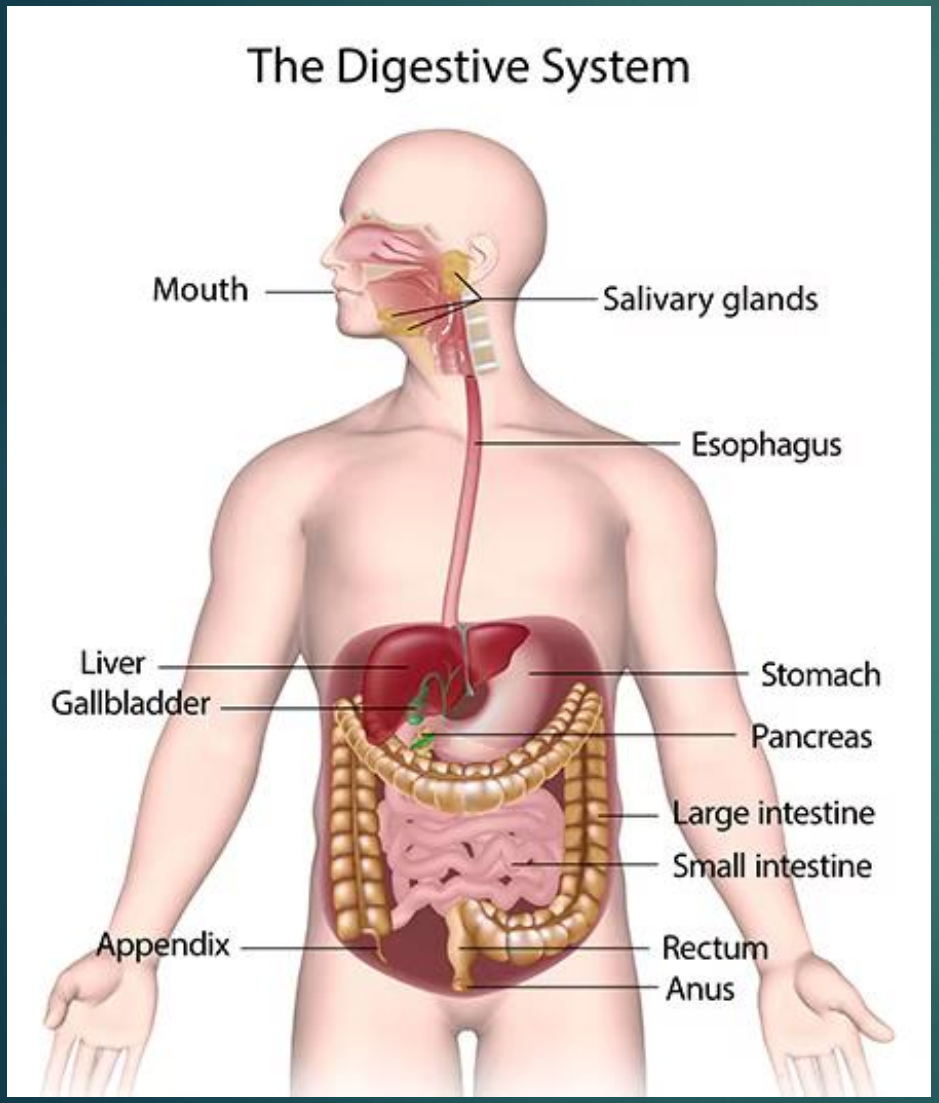
organs

↓

organ systems

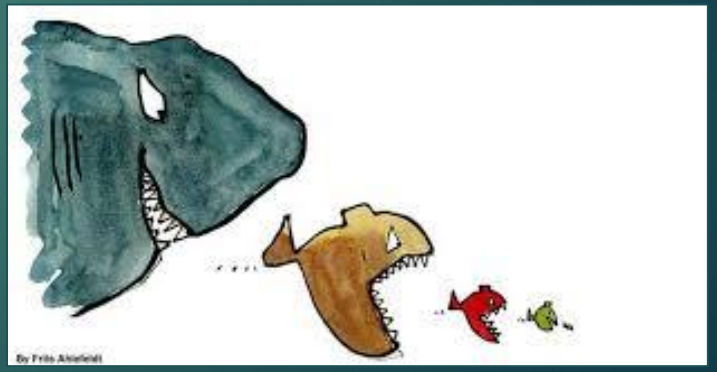


Alimentary (Digestive) system

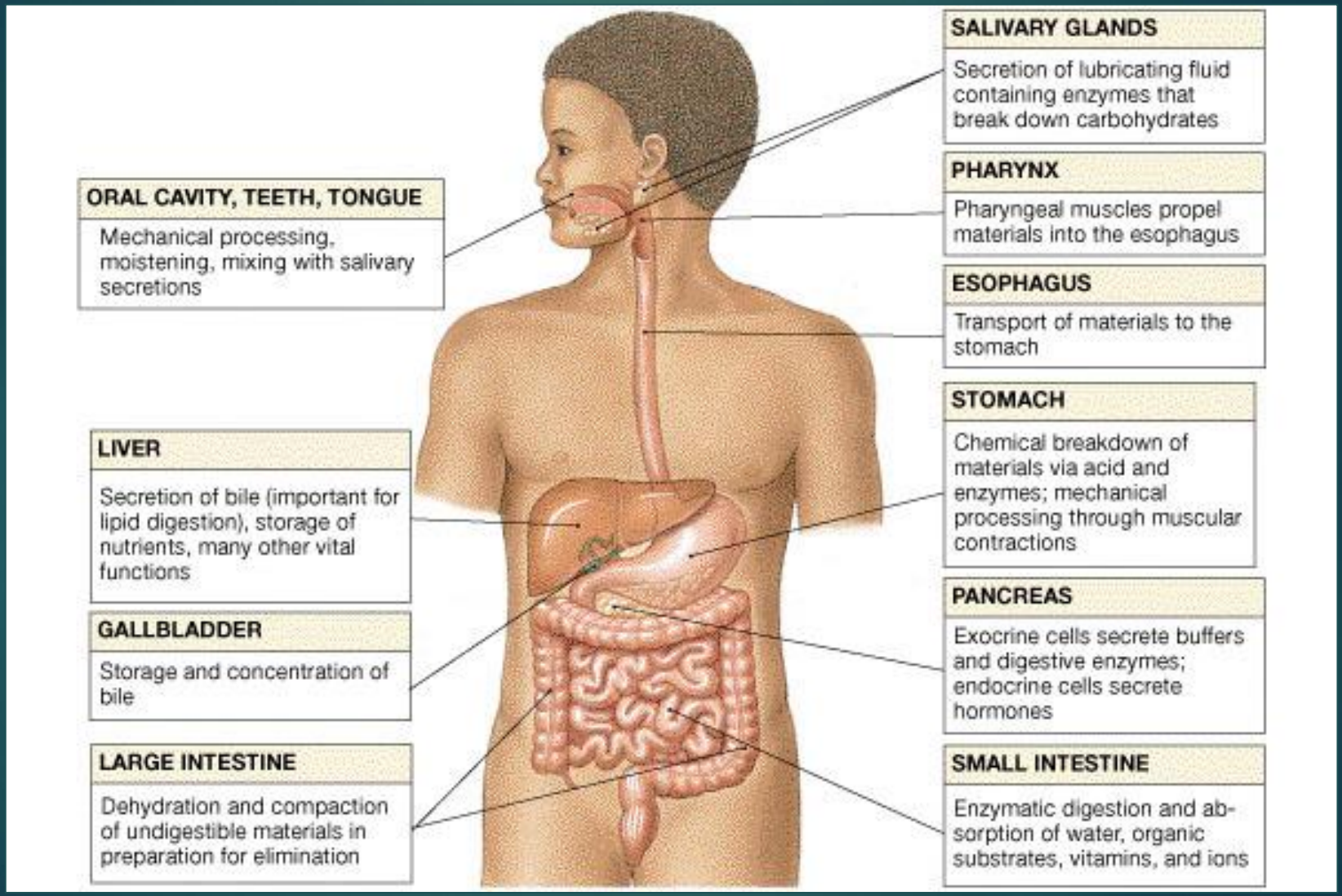


<u>is a complex of organs with the function of</u>

- mechanical and chemical treatment of food,
- absorption of the treated nutrients,
- and excretion of undigested remnants.

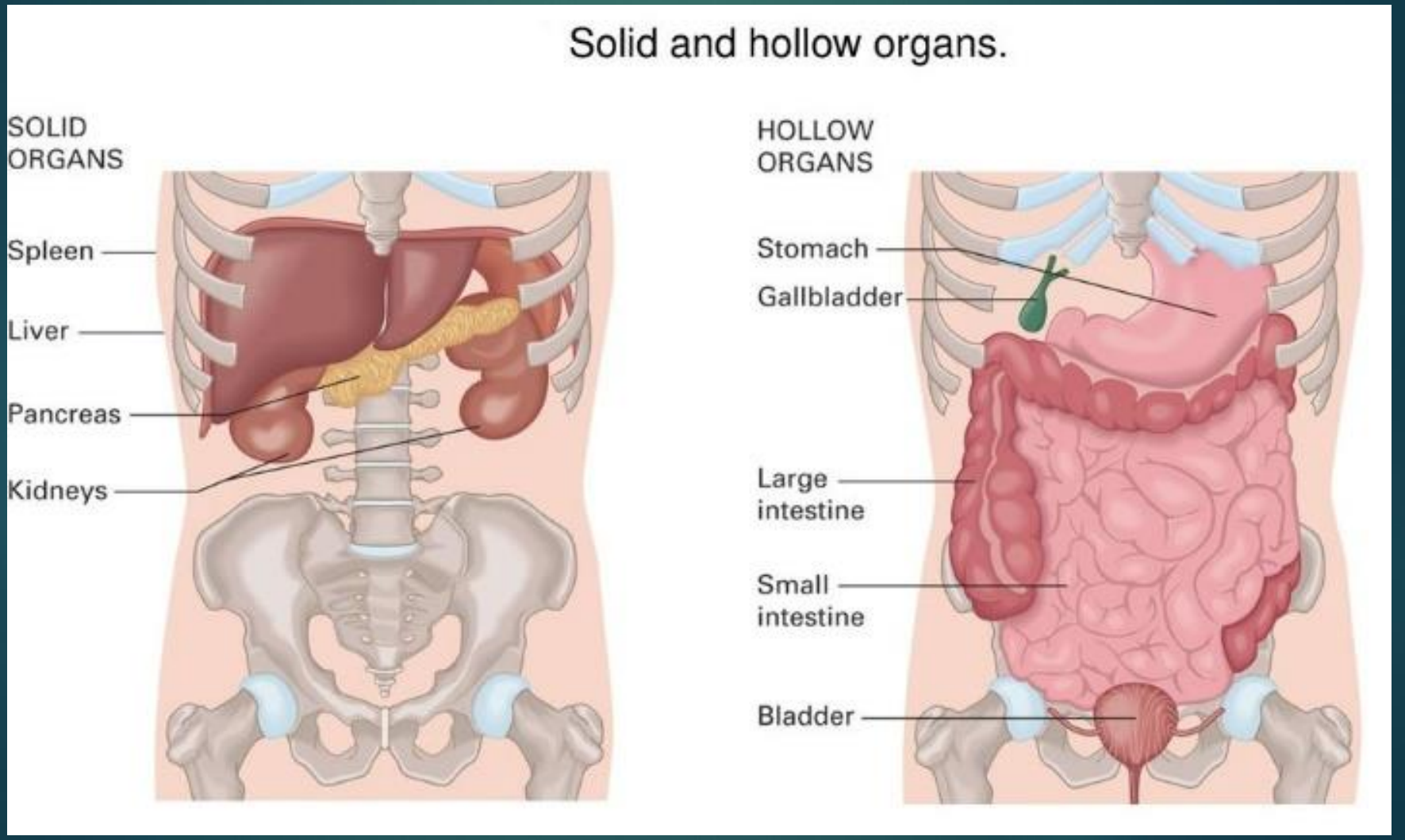


Overview of Digestive Anatomy



Internal organs:

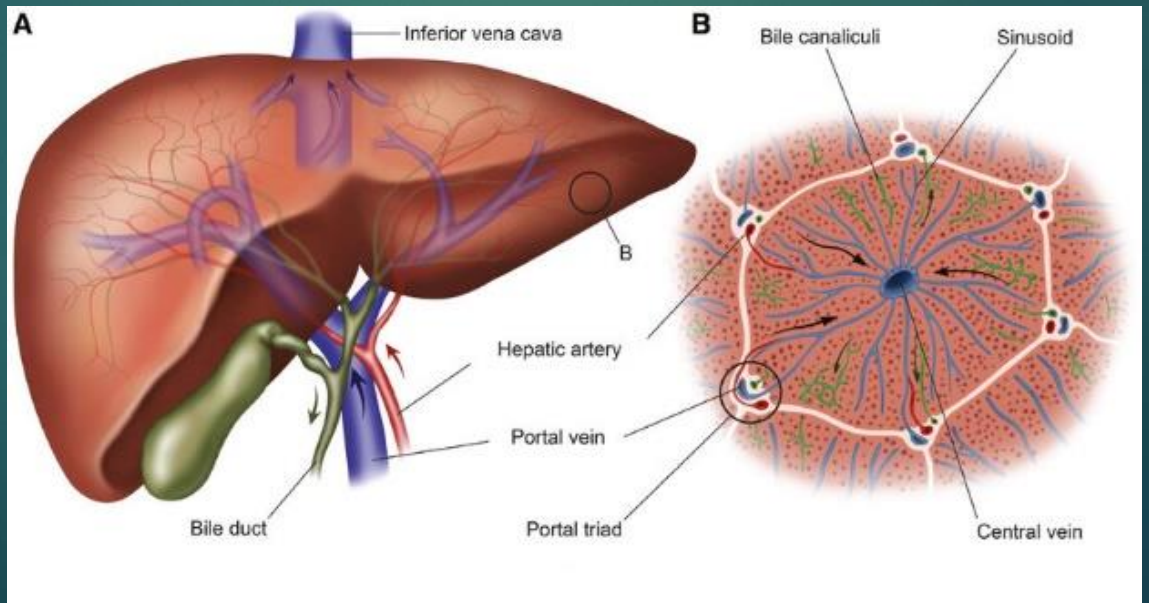
- Parenchymal (solid) organs
- Hollow (tubular) organs



Parenchymal (solid) organs

- *Parenchyma* – specialized tissue that carries out the specific functions of the organ
- Parenchymal organs have stromal *capsule*, that gives off *trabecules* into the parenchyma

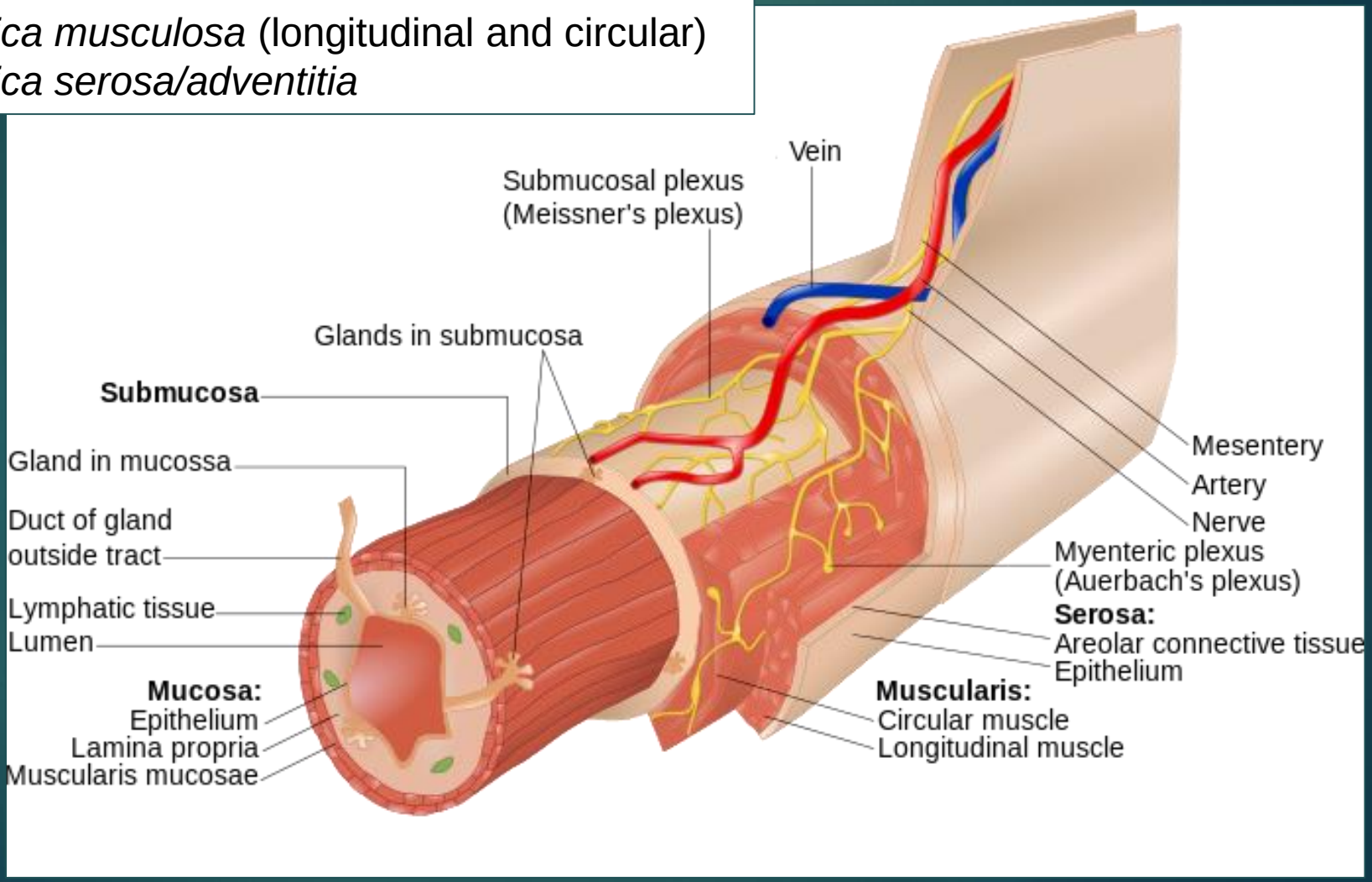
- **The segment is** a macroscopically visible part of the organ, having the relatively autonomic innervation, blood and lymph circulation and bounded by the connective-tissue septa.



Tubular (hollow) organs

Layers of the wall:

1) *Tunica mucosa*
2) *Tunica submucosa*
3) *Tunica musculosa* (longitudinal and circular)
4) *Tunica serosa/adventitia*



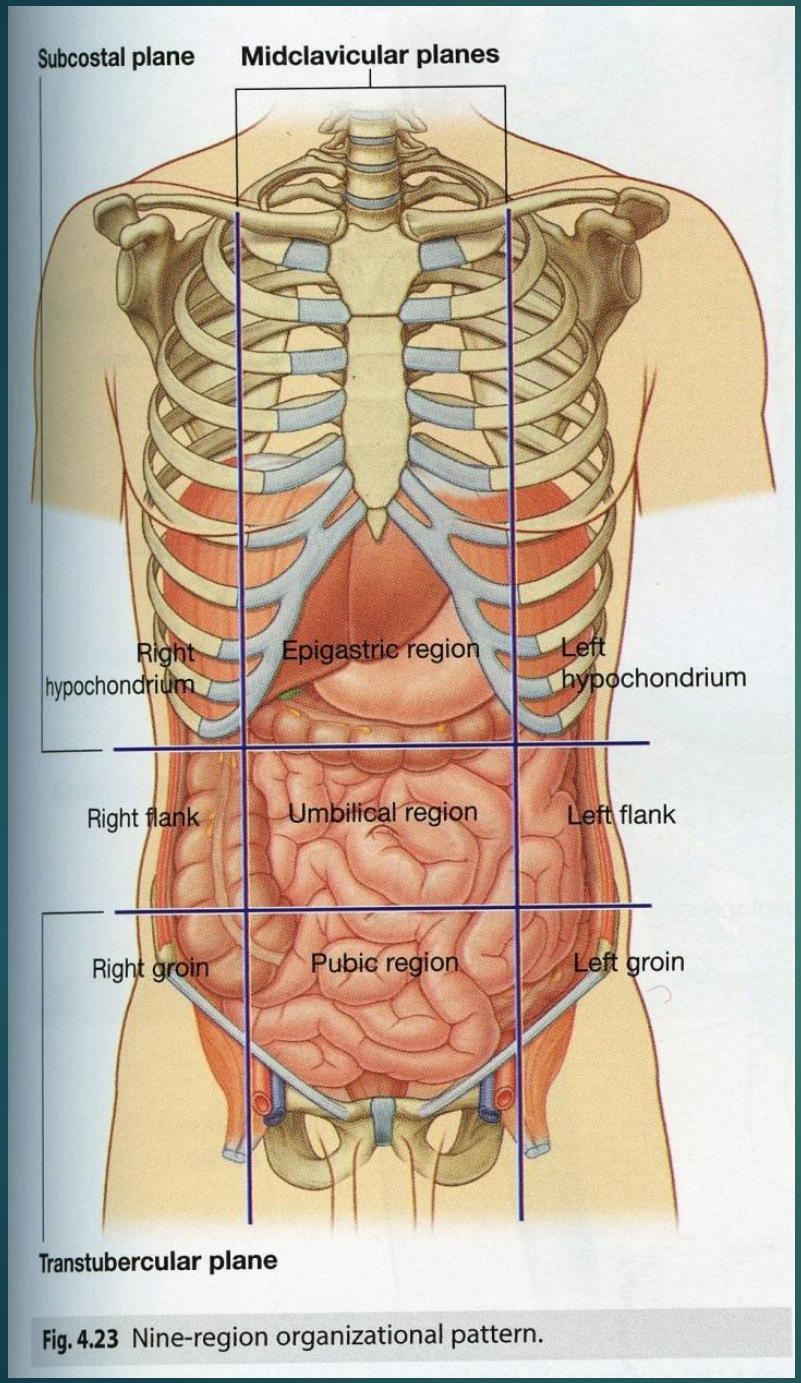


Fig. 4.23 Nine-region organizational pattern.

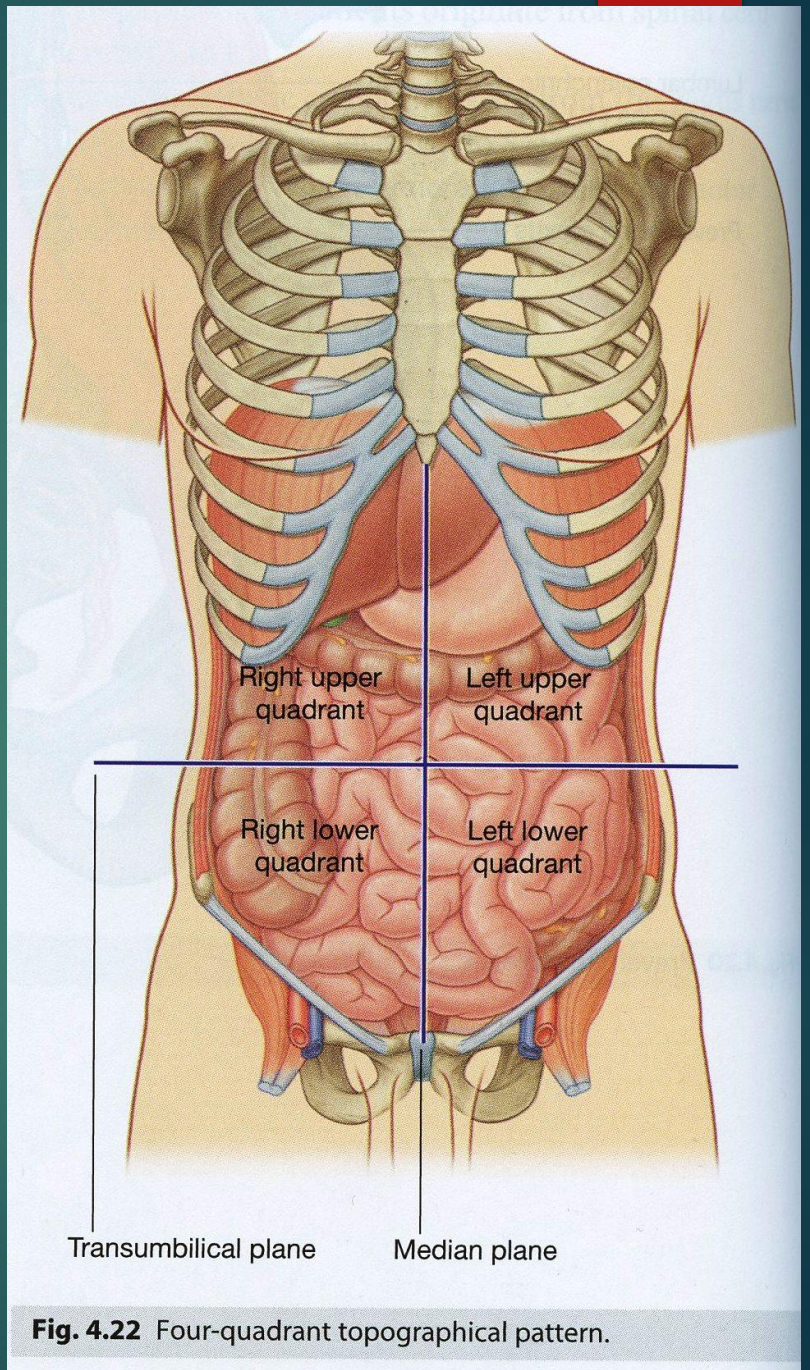
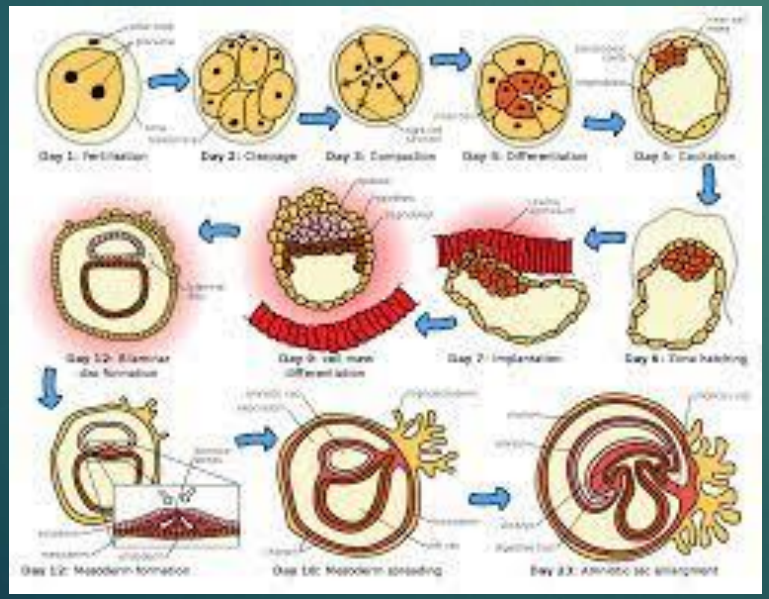
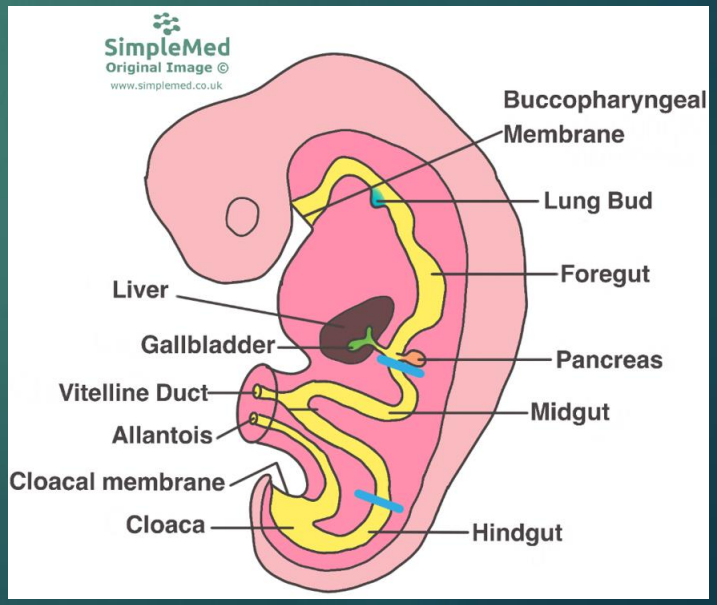


Fig. 4.22 Four-quadrant topographical pattern.

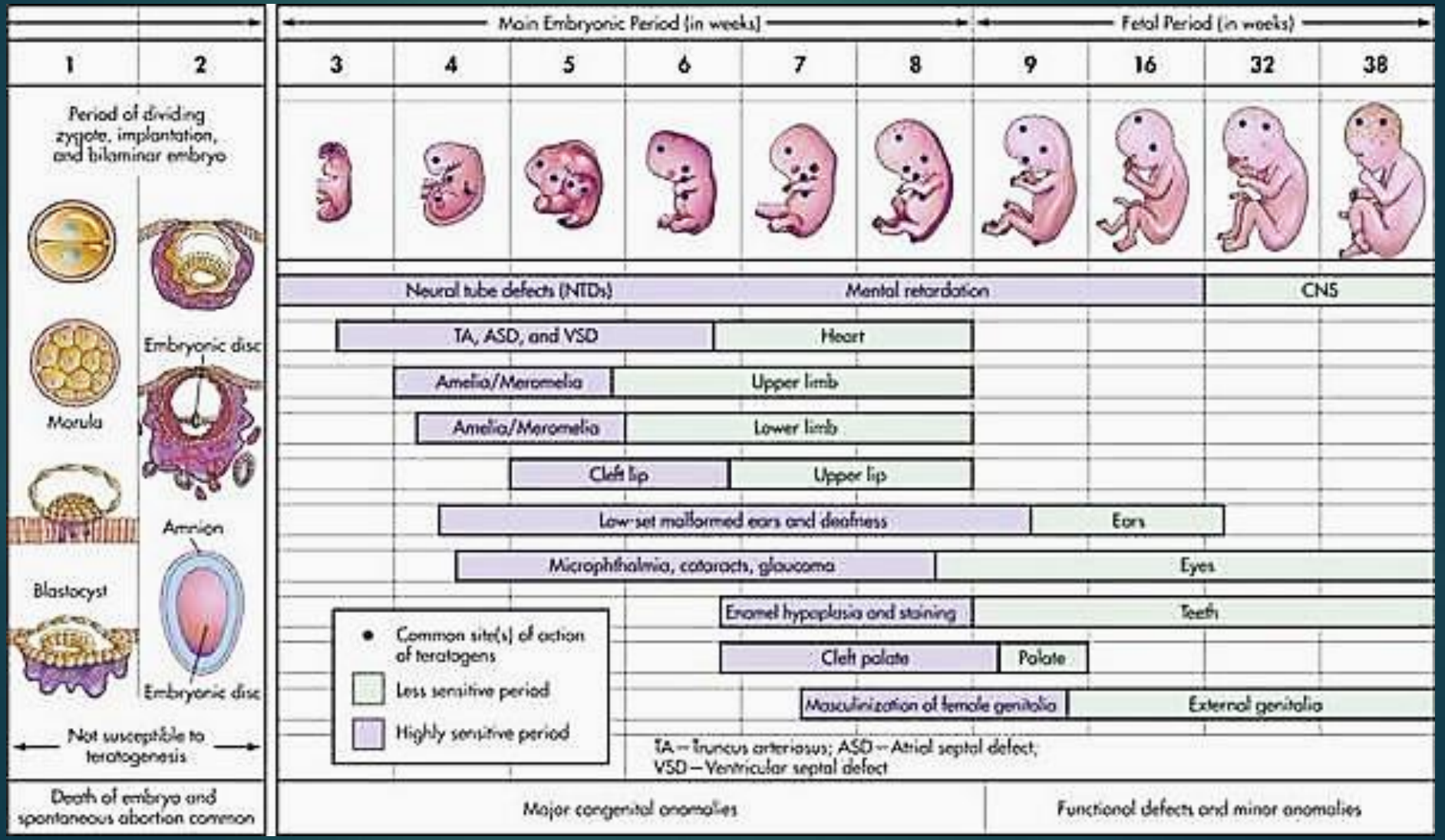
Development of digestive system





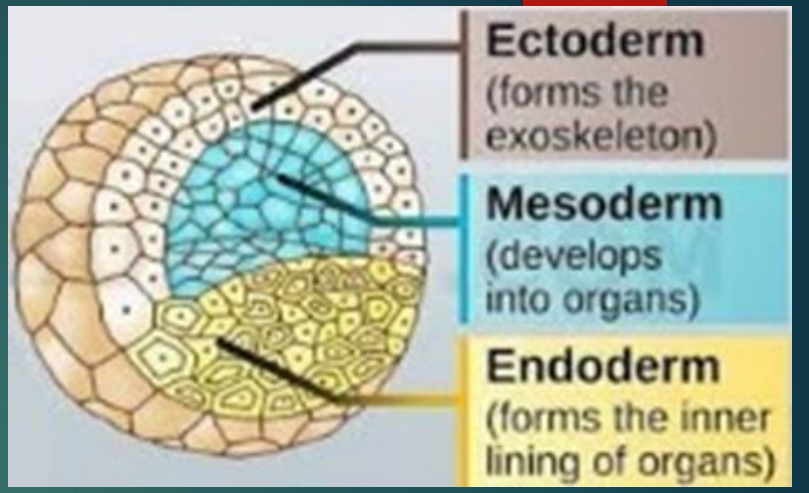
3-8 weeks are crucial

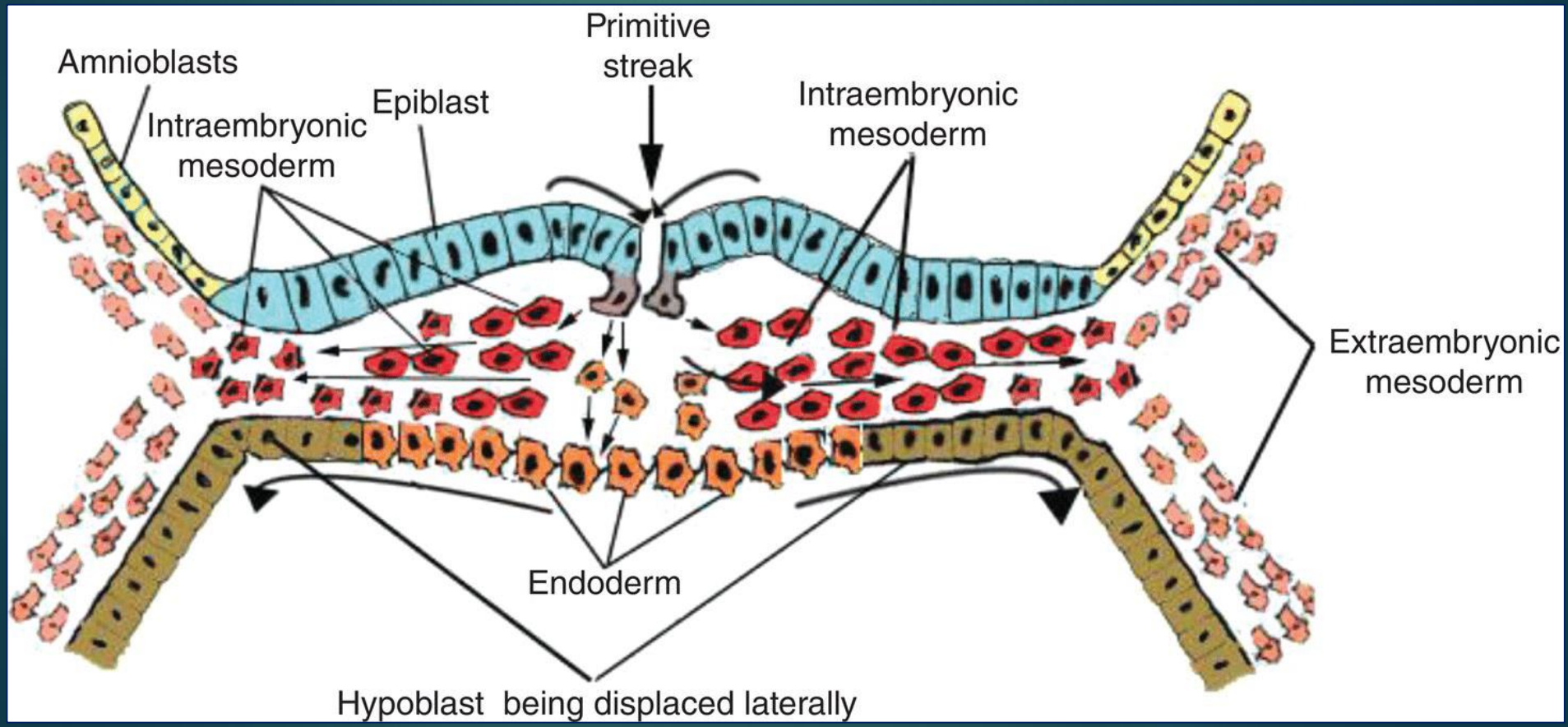
- initiation of organs and systems development
- influence of exogenous or endogenous factors – major congenital anomalies – high risk of death



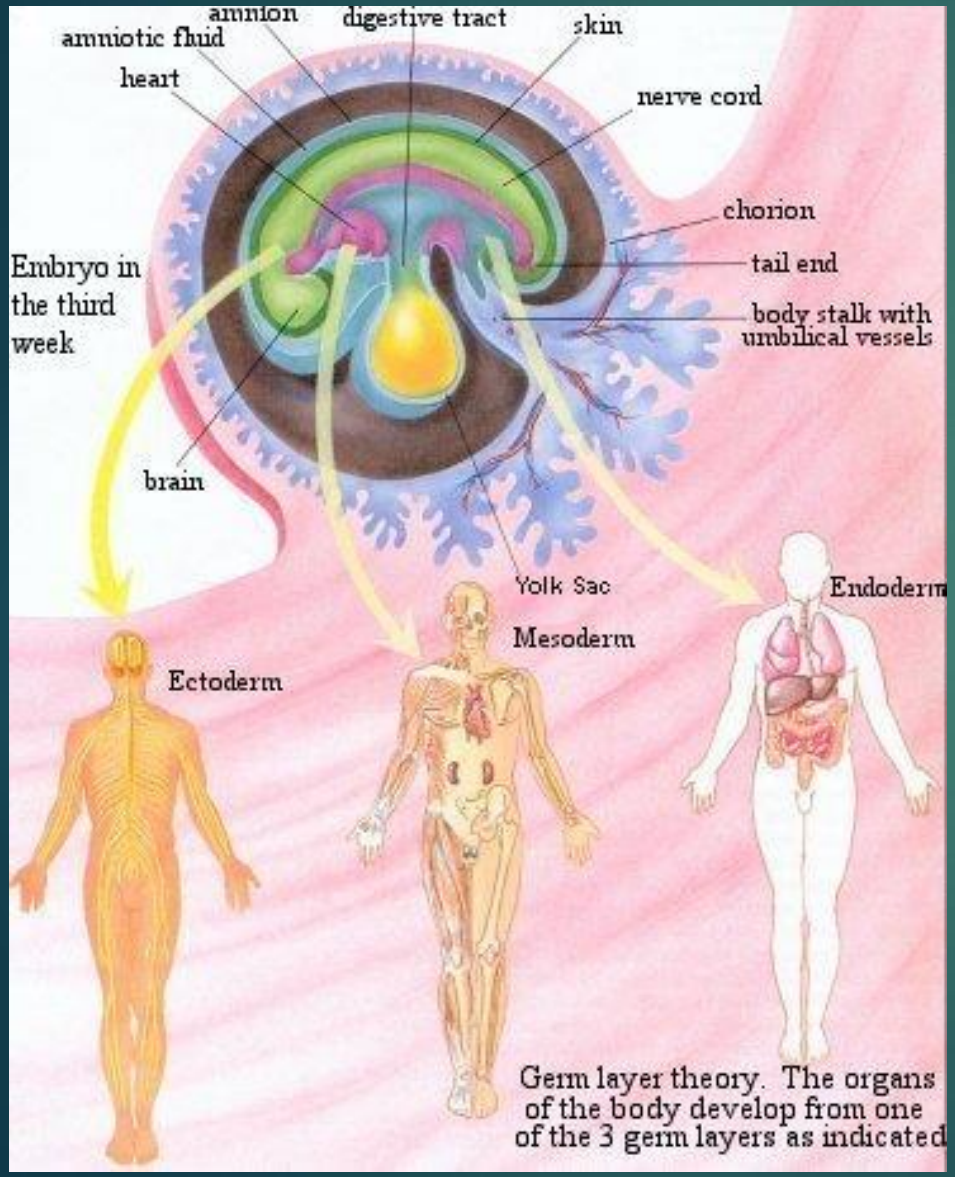
Gastrulation – formation of germ layers (4th week):

- Ectoderm
- Mesoderm
- Endoderm





In humans, the germ tissues are the basis of all tissues and organs

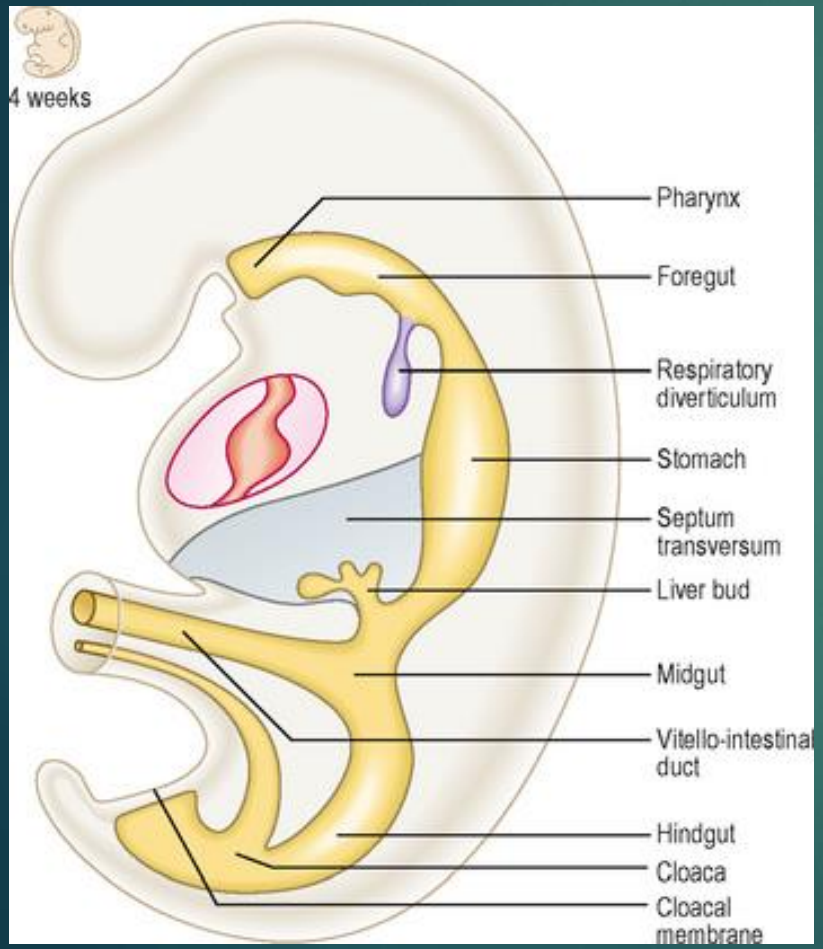


- **Endoderm**:
organs of the gastrointestinal and respiratory systems, as well as the thymus, parathyroid, bladder, and urethra.

- **Ectoderm**:
skin and skin appendages, the nervous system, and portions of sensory organs.

- **Mesoderm**:
circulatory system and blood, lymphatic system, bone, cartilage, muscles, and many internal organs. For example, the kidney, spleen, ureters, and adrenal cortex are all derived from mesoderm

The most digestive organs have a single origin – from primitive gut



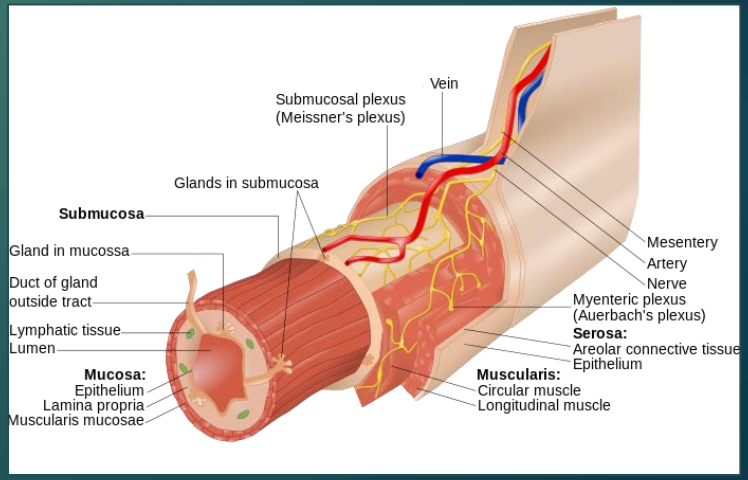
- **Endoderm**:
  - epithelial lining,
  - glands;
- **Mesoderm**:
  - lamina propria,
  - muscularis mucosae,
  - submucosa,
  - muscularis externa
  - serosa;
- **Ectoderm**:
  - enteric nervous system,
  - posterior luminal digestive structures

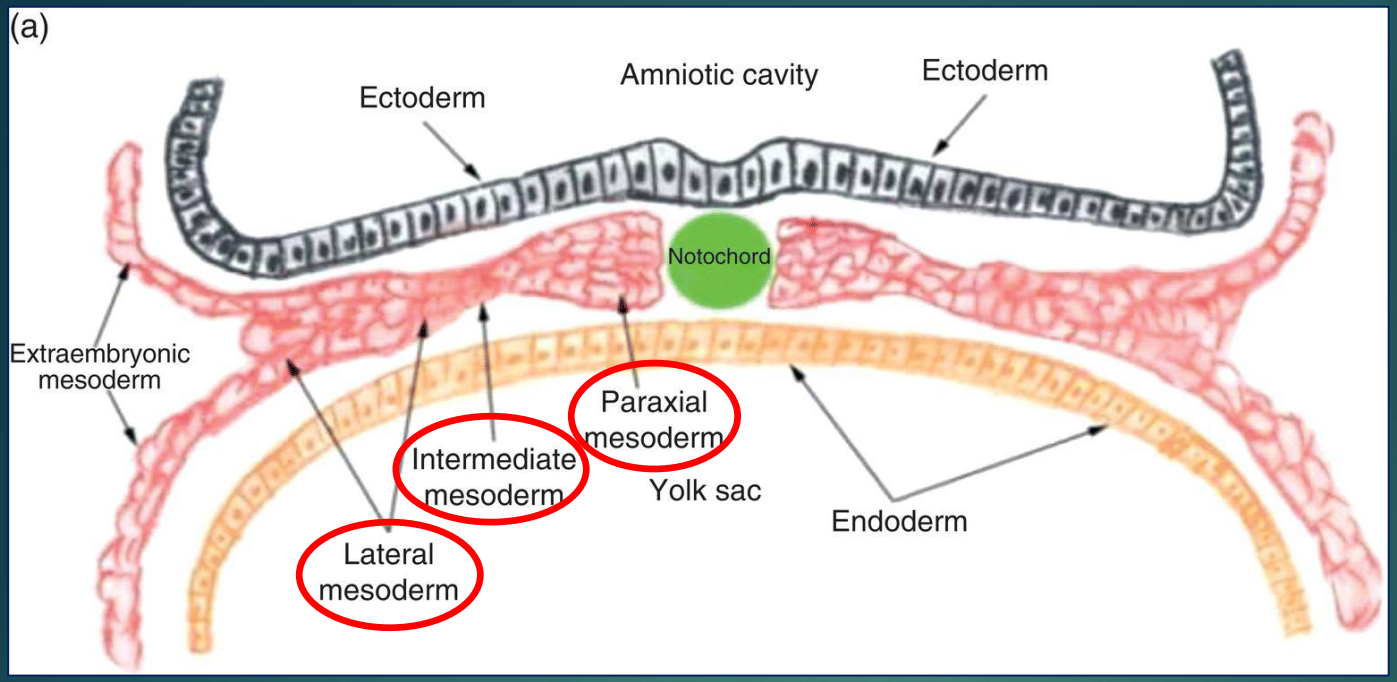
Tubular organ layers'development

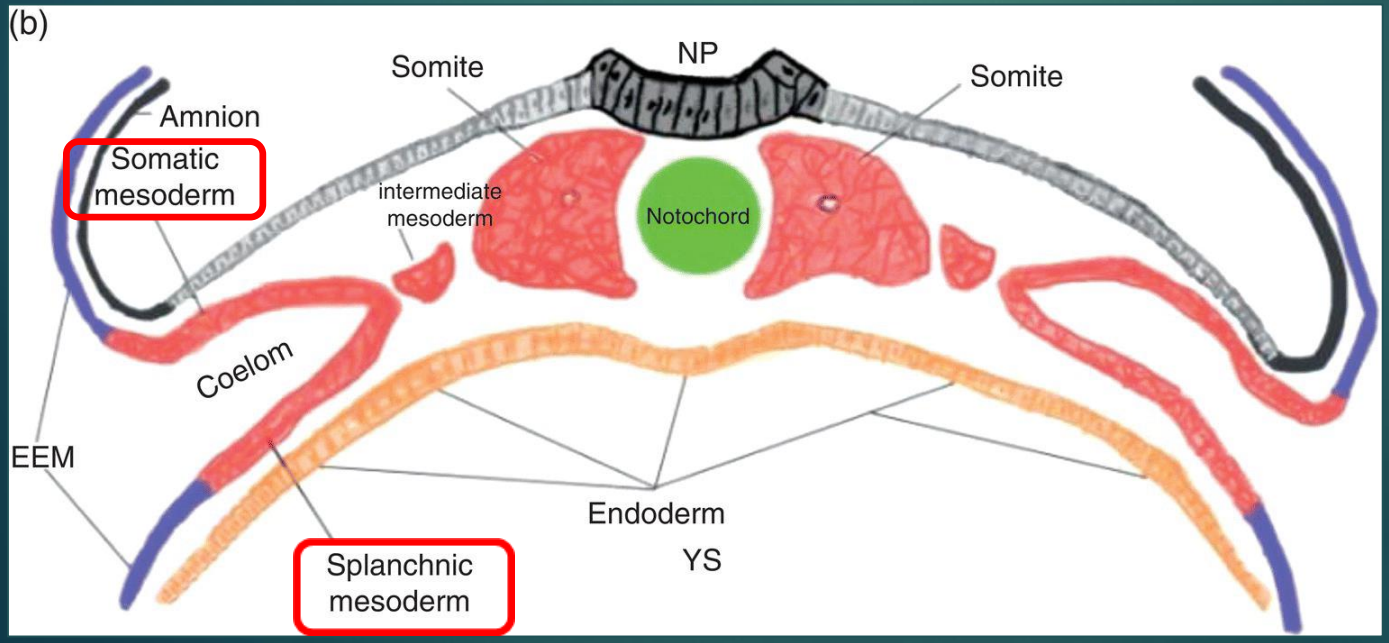
- Mucosa
  - Epithelial lining and glands
  - Lamina propria
  - Muscularis mucosae
- Submucosa
- Muscularis externa
- Adventitia/Serosa

- Derived from endoderm

Derived from visceral mesoderm



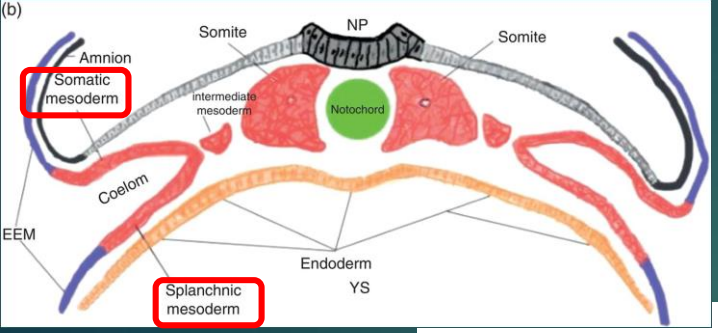




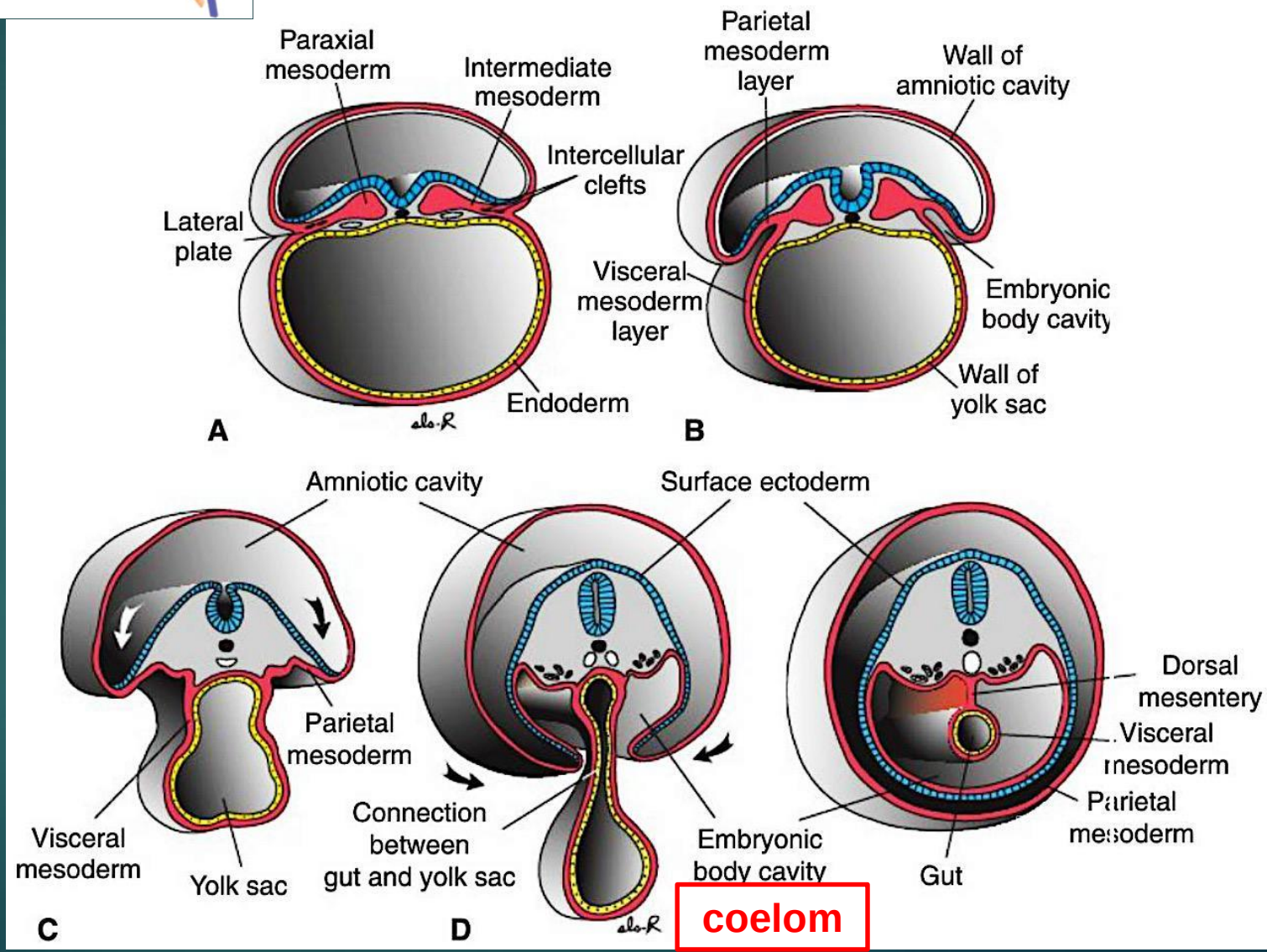
Intraembryonic mesoderm plates:

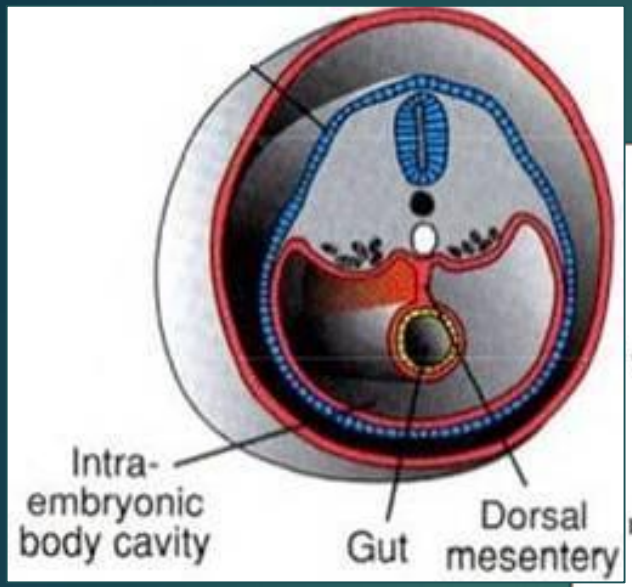
- ***Paraxial (dorsal) mesoderm***
- ***Intermediate mesoderm***
- ***Lateral mesoderm (somatic and splanchnic)***

EEM, extraembryonic mesoderm; YS, Yolk sac; NP, neural plate.

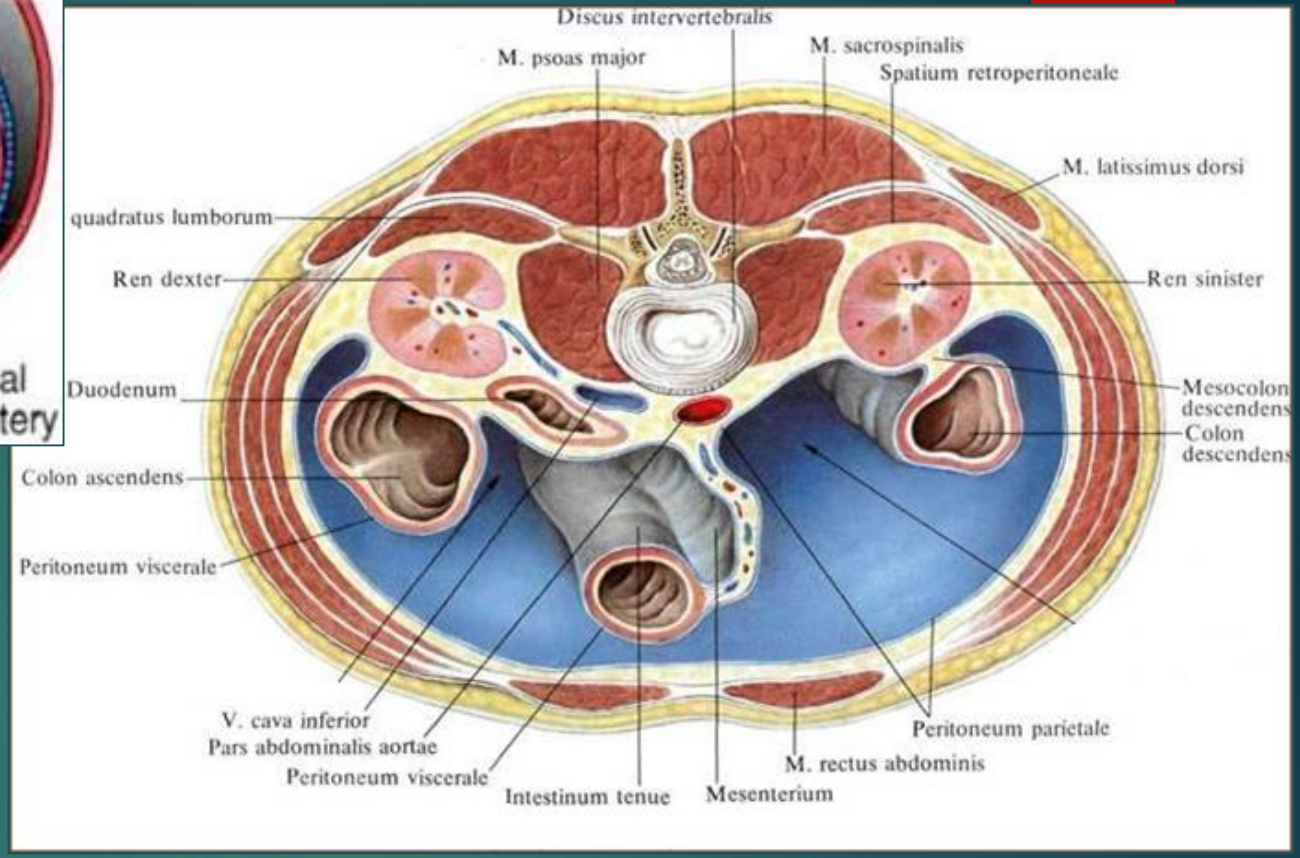


- Lateral folding of the embryo completes the gut tube.
- Mesodermal layer of the gut tube is called splanchnic (visceral) mesoderm.
- Somatic mesoderm lines body cavity.





coelom



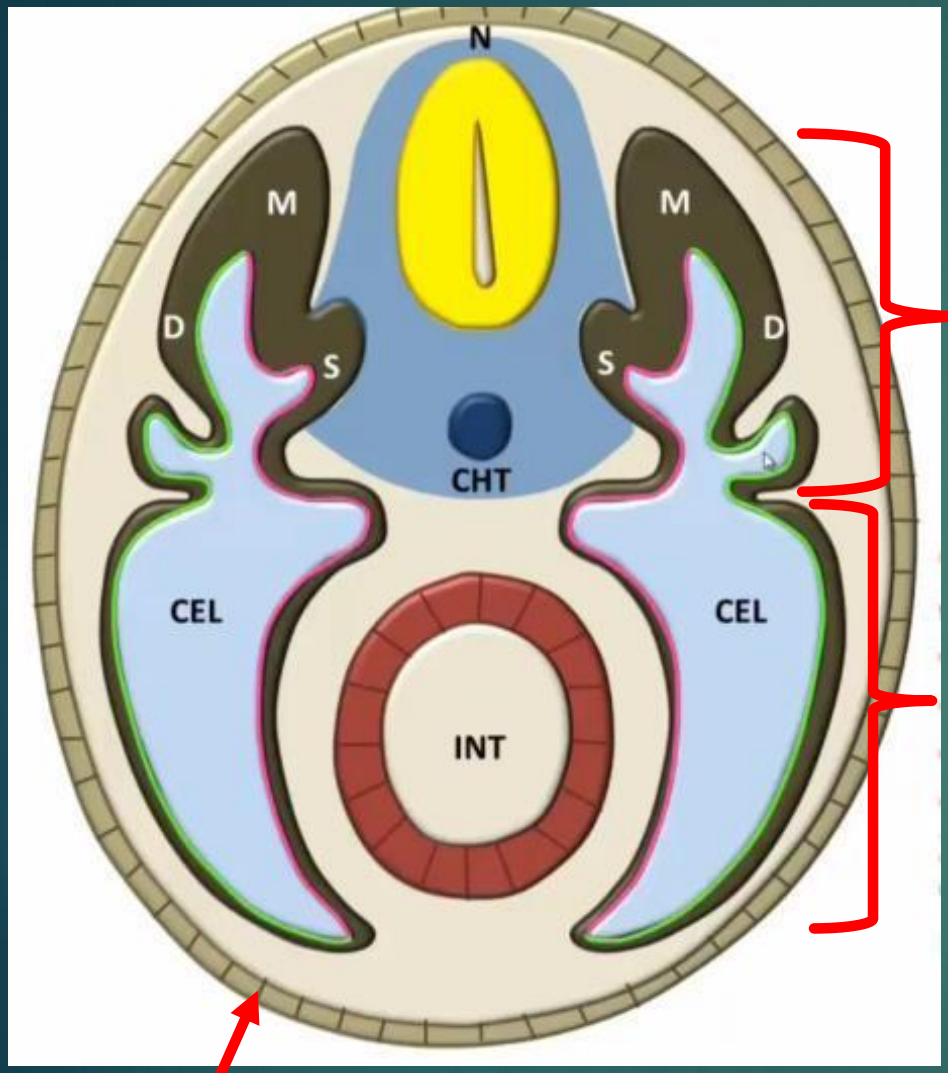
Intraembryonic body cavity(coelom) ⟹ Peritoneal cavity

Primitive gut tube ⟹ Tubular organs (gut)

Dorsal mesentery ⟹ Mesentery

Mesoderm structure

Transverse section of human embryo – axial organs stage (21-25 days)



Segmented part:

S – sclerotome

M – myotome

D – dermatome

Unsegmented part (lateral) – **splanchnotom**:

CEL – coelom

ectoderm

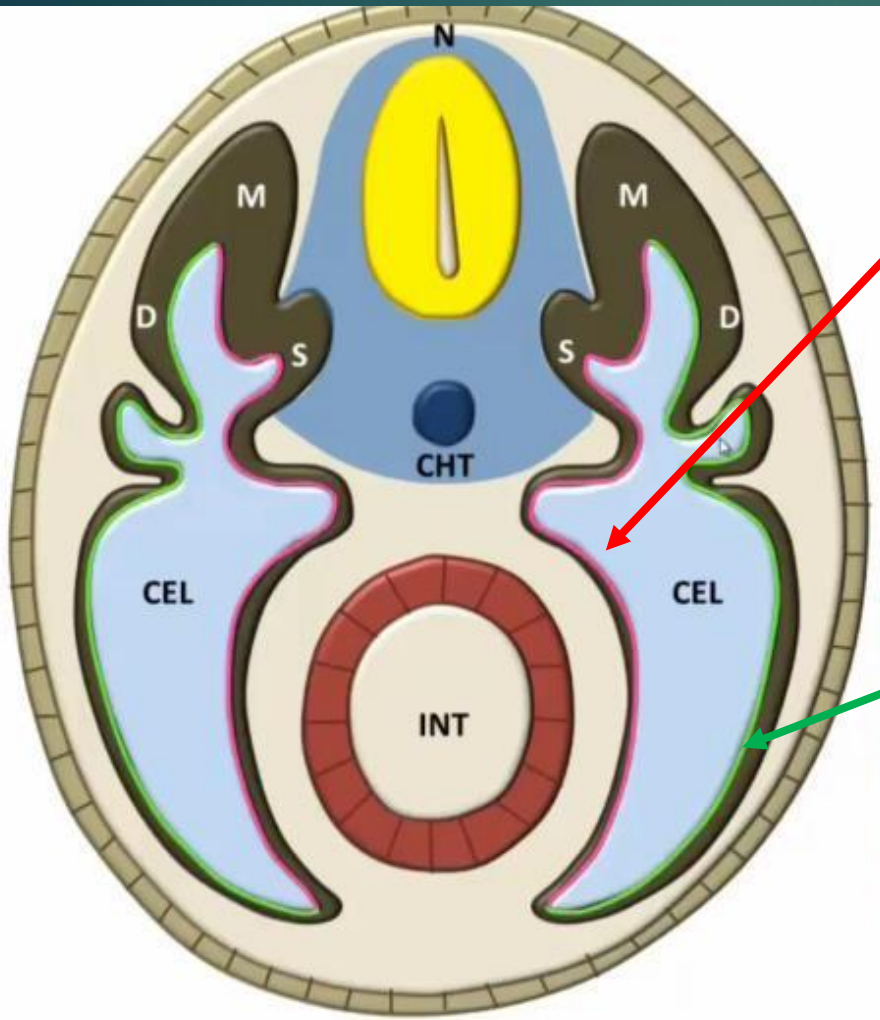
INT – entoderm

N- neuronal tube

CHT - chorda

Mesoderm structure

Transverse section of human embryo – axial organs stage (21-25 days)



Splanchnotom has 2 plates:

Splanchnopleura – visceral layer – gives rise to mucous, submucos, muscular layers and serosa (except of epithelium and glands)

Somatopleura – parietal layer – lines the abdominal cavity

Stomodeum – cranial entrance of the gut tube

Foregut

Pharyngeal membrane

Stomach

Heart

Liver bud

Vitelline duct

Midgut

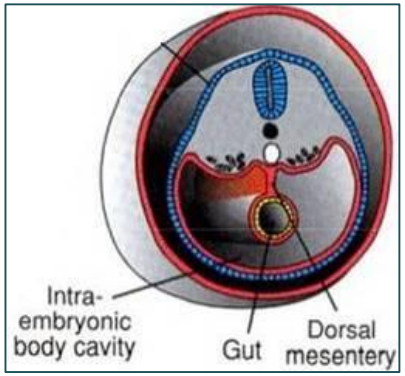
Omphalomesenteric duct=vitelline duct
(joins yolk sac and midgut lumen)

Allantois

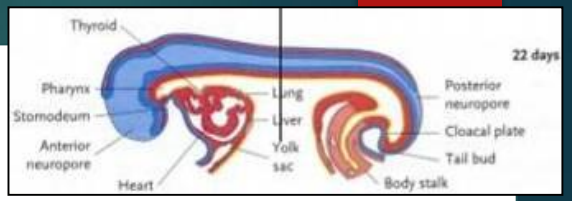
Hindgut

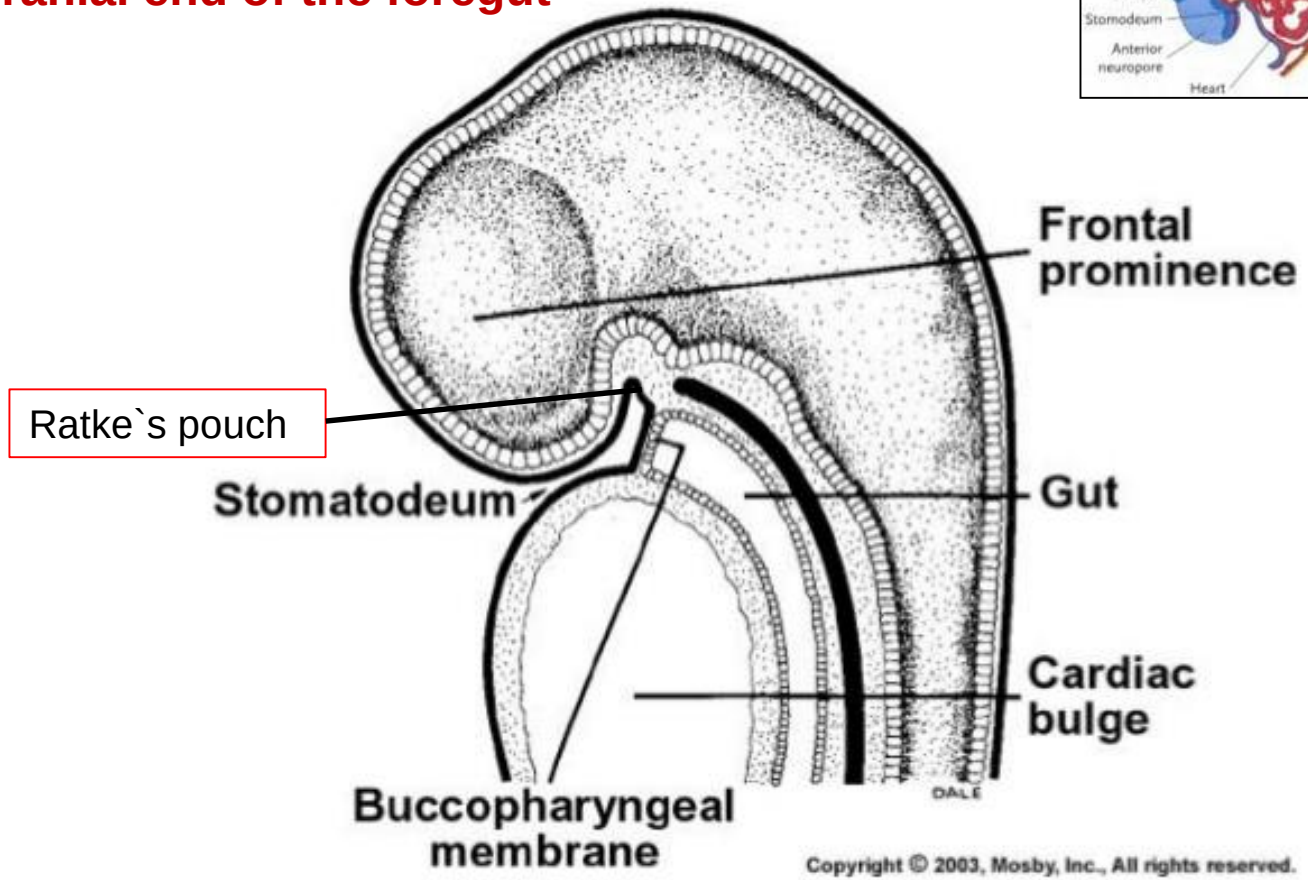
Cloacal membrane

Proctodeum – caudal exit of the gut tube



Cranial end of the foregut



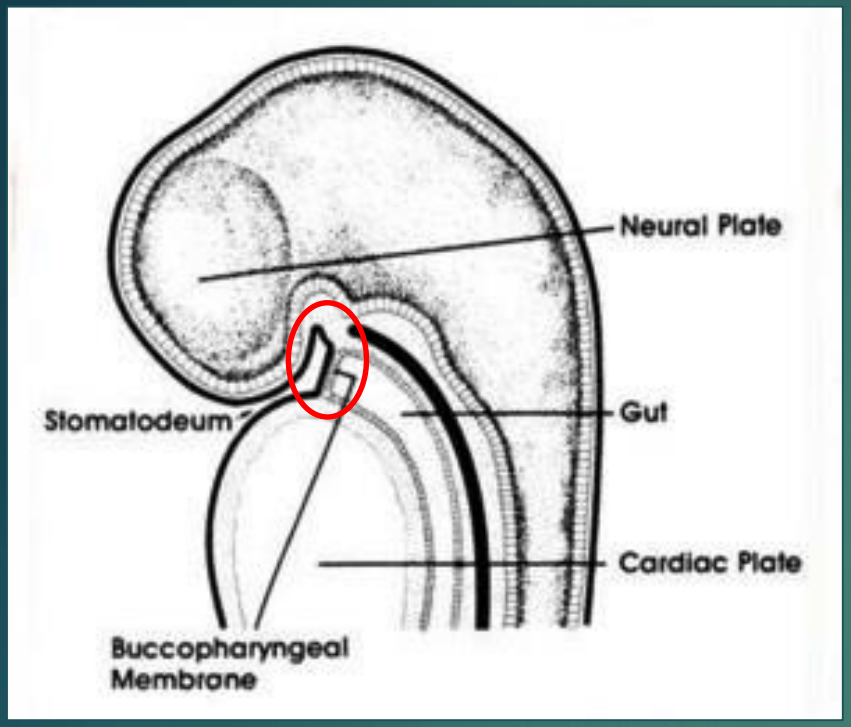


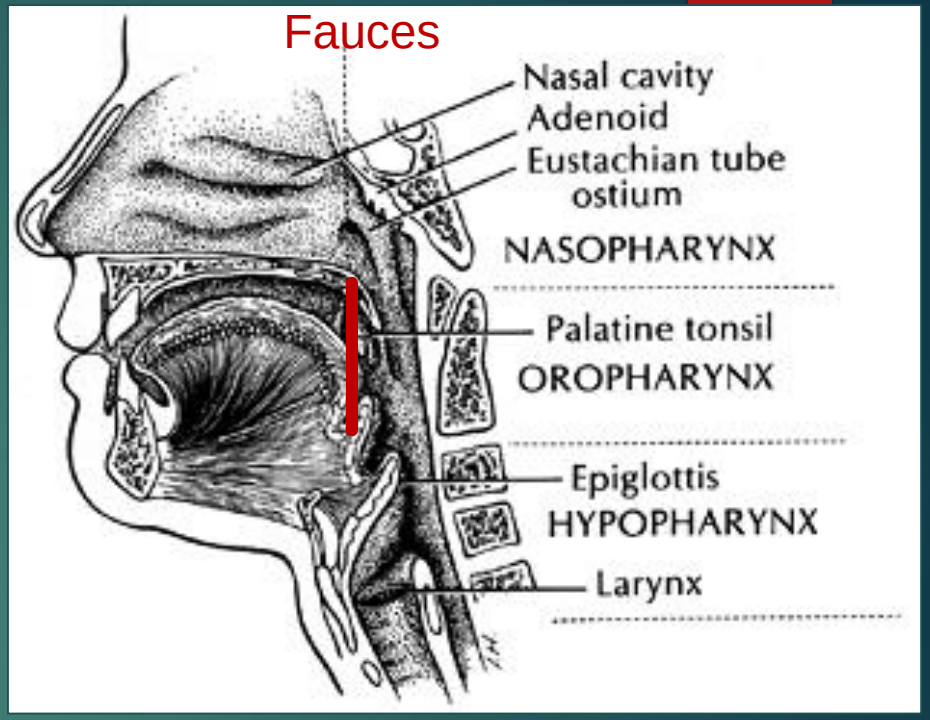
Buccopharyngeal membrane ruptures at 24 to 26 days

Sagittal section through a 25-day embryo

Figure from Ten Cate's Oral Histology, Ed., Antonio Nanci, 6th edition

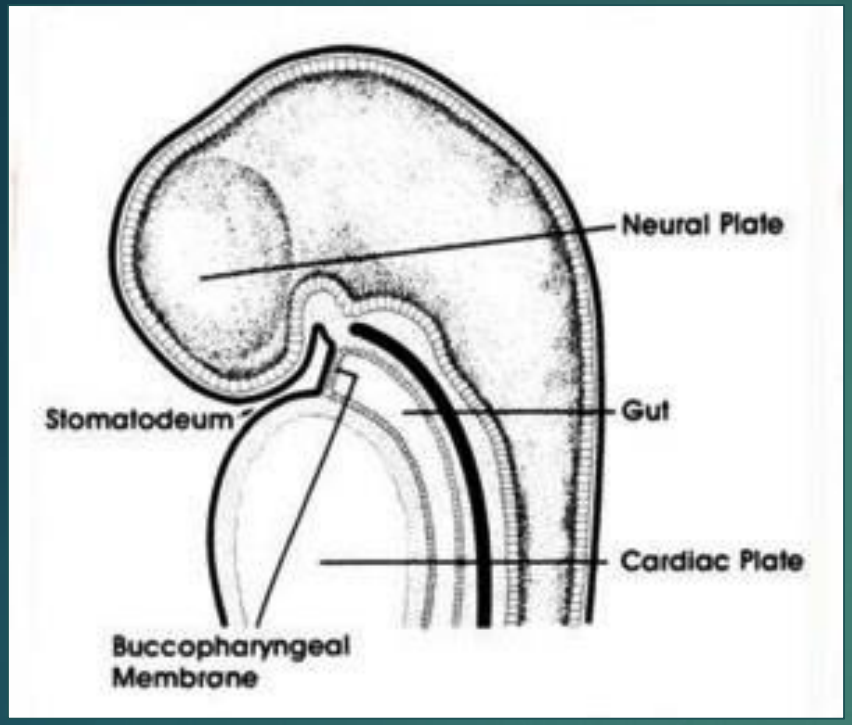
Rupture of buccopharyngeal membrane

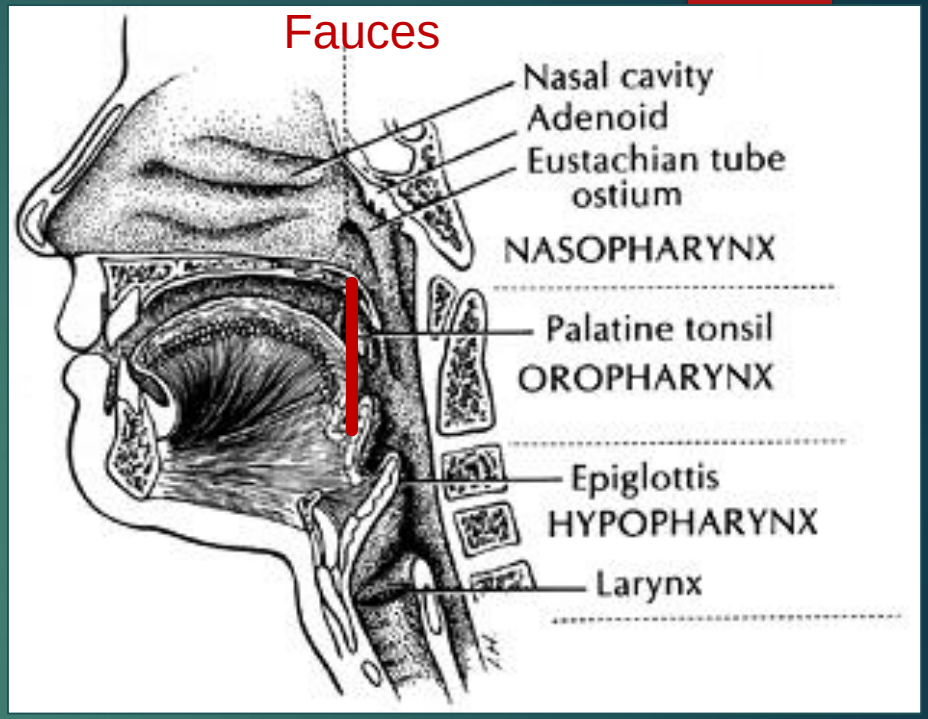




- ✓ Pharyngeal membrane disappears during the fifth week
- ✓ Communication is established between the stomatodeum and the pharyngeal gut

Rupture of buccopharyngeal membrane





Stomodeum → Oral cavity

Buccopharyngeal/oropharyngeal membrane → Fauces

Ectoderm → Epithelial lining of oral cavity, teeth

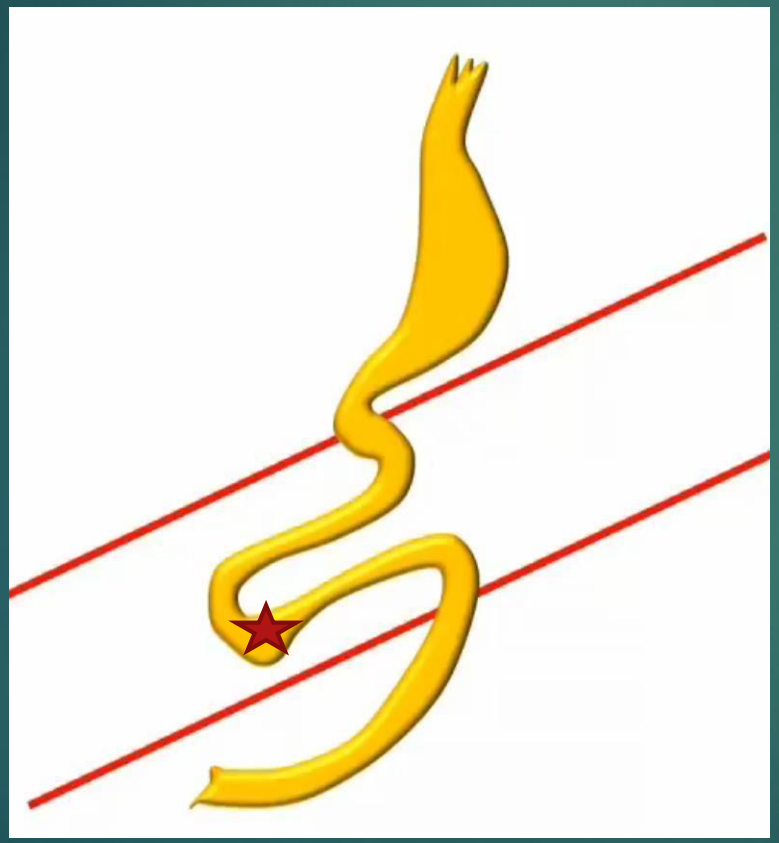
Ectoderm → Parotid and submandibular salivary glands

Endoderm (foregut) → Epithelial lining of pharynx

Endoderm (foregut) → Sublingual salivary gland

Ratke`s pouch → Adenohypophysis

The primitive gut is divided into 3 distinct sections

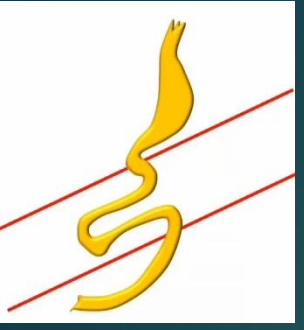


foregut

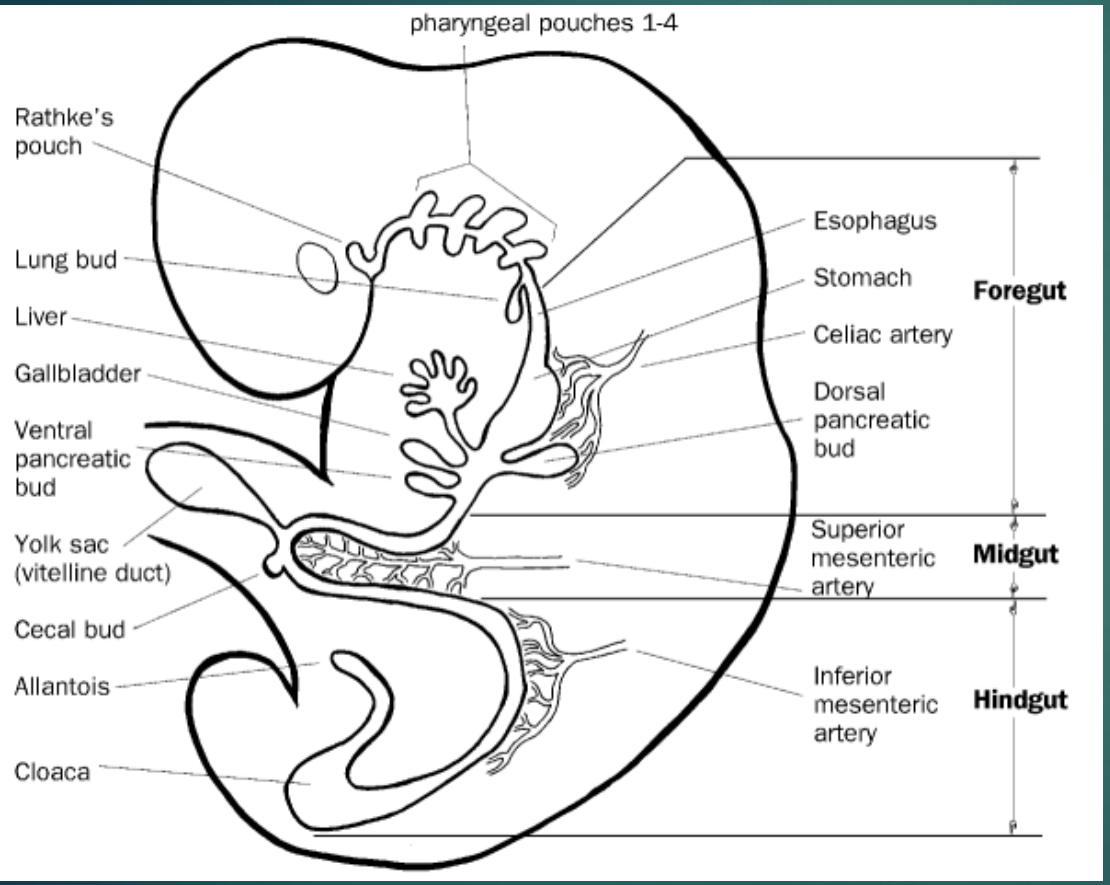
midgut

hindgut

future caecum



cephalic (pharyngeal) part (gut): deep parts of oral cavity; pharynx



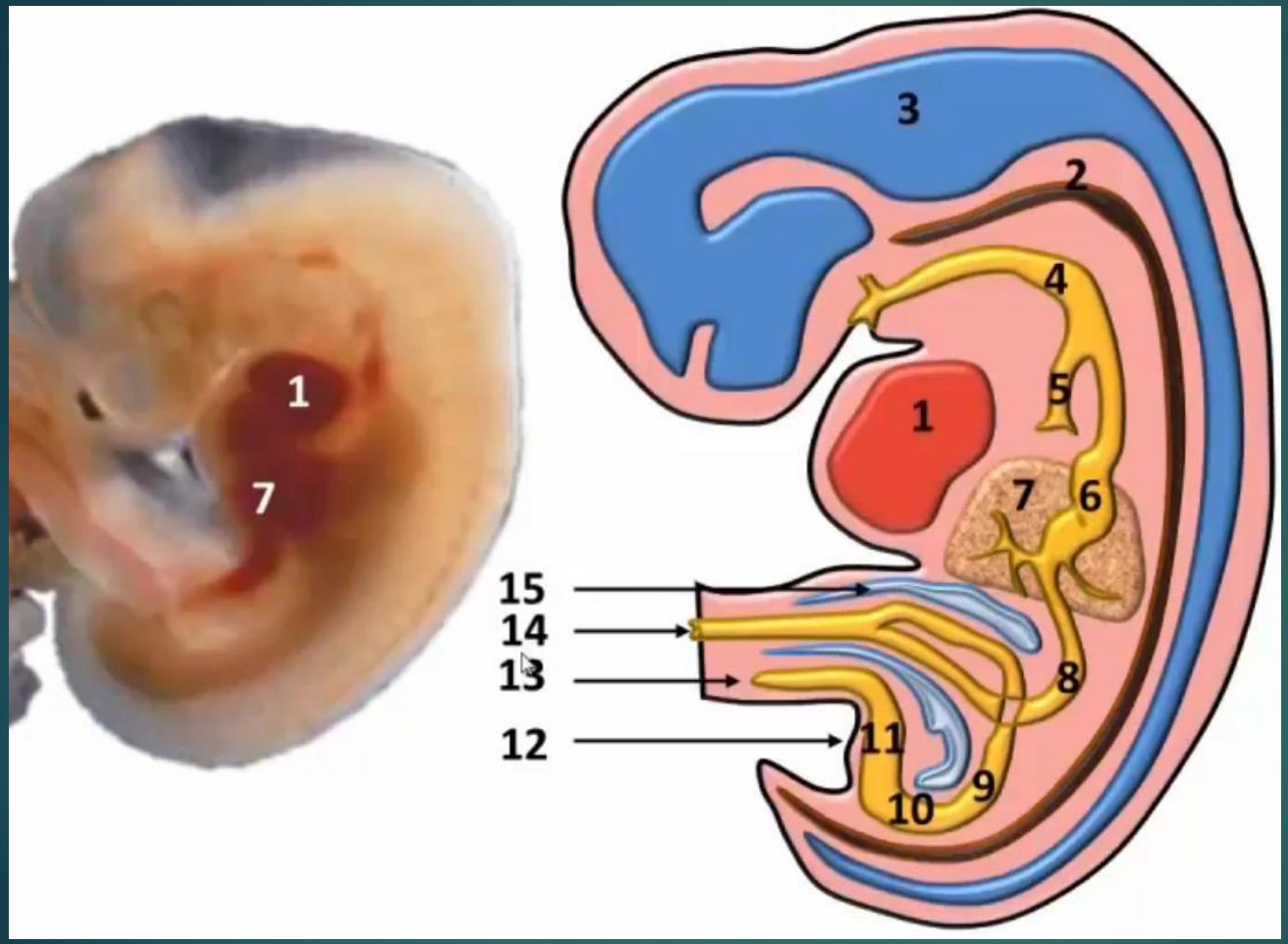
foregut: oesophagus, stomach, superior part of duodenum, liver, pancreas

midgut: inferior part of duodenum, intestinum tenue, caecum

hindgut: descending colon, sigmoid colon, rectum

Ascending colon will form later!

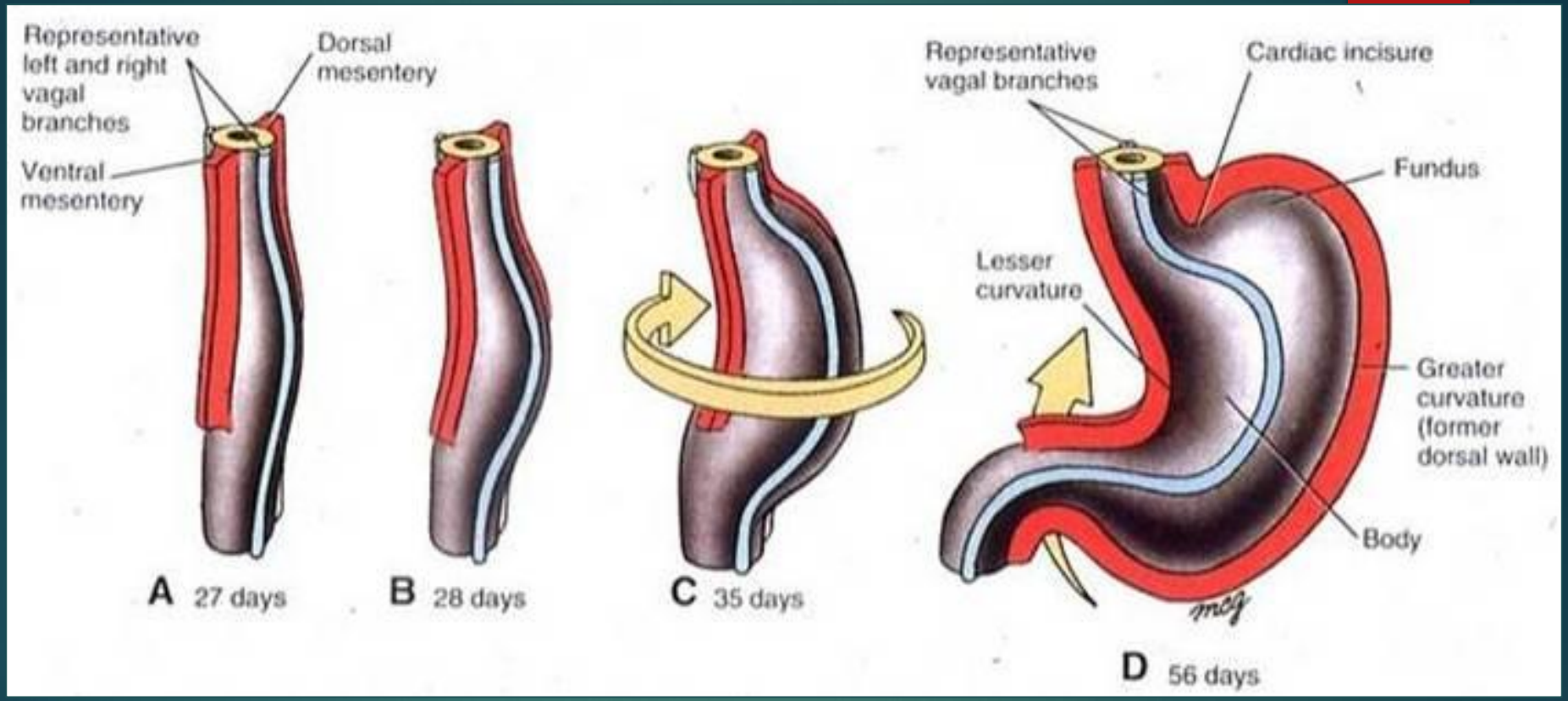
Primitive embryonic gut, 5 week



1 – Heart
2 – Chorda
3 – brain vesicles and neural tube
4 – oesophagus
5 – trachea
6 – stomach
7 – liver
8, 9 – midgut form yolk loop,
10 – hindgut
11 – cloaca
12 – cloacal membrane
13 – allantoise
14 – yolk stalk/duct
15 - celom

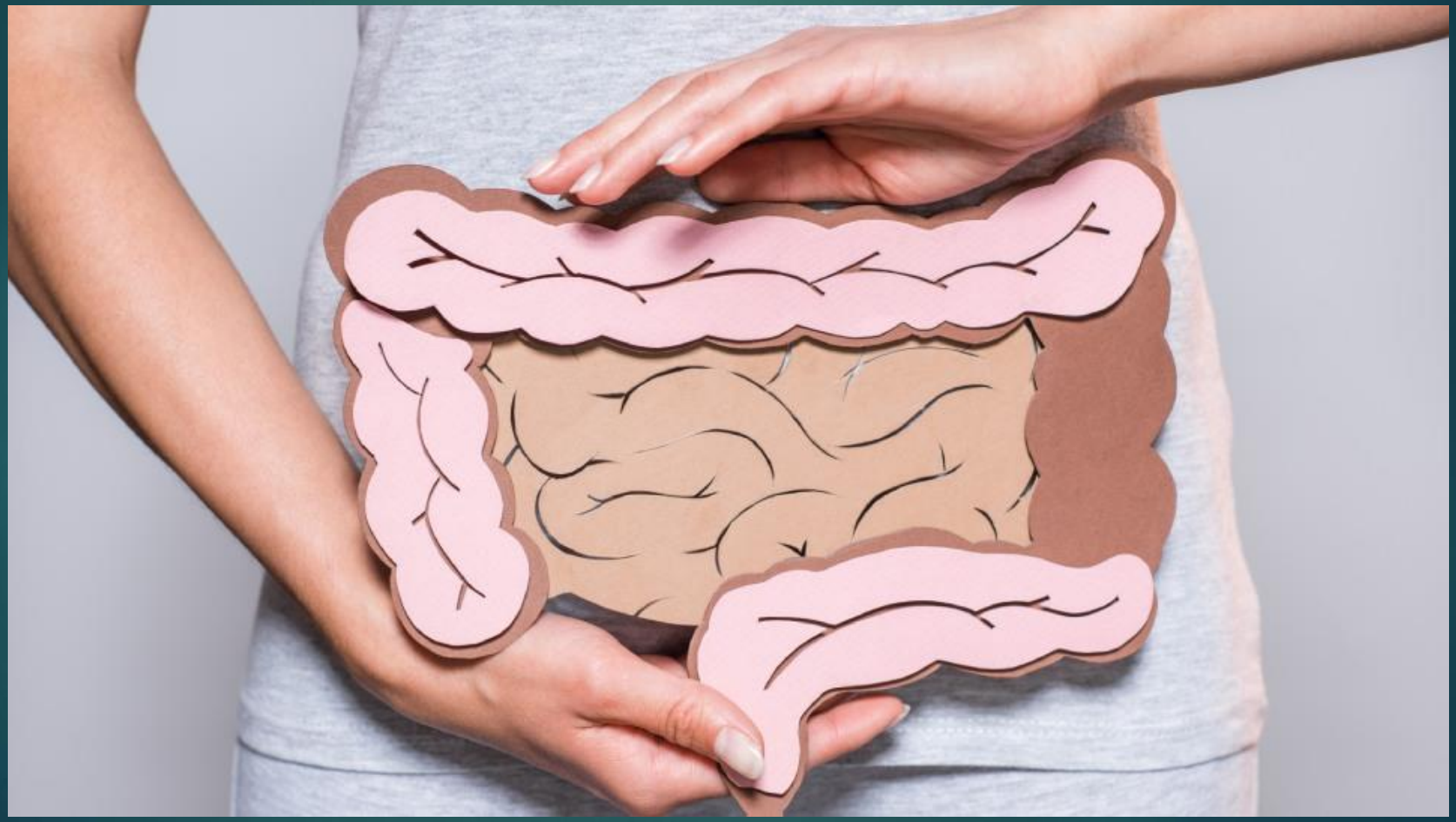
- Midgut forms loop from two knees (ascending and descending);
- Between two knees – yolk stalk directed to yolk sac

Development of the stomach

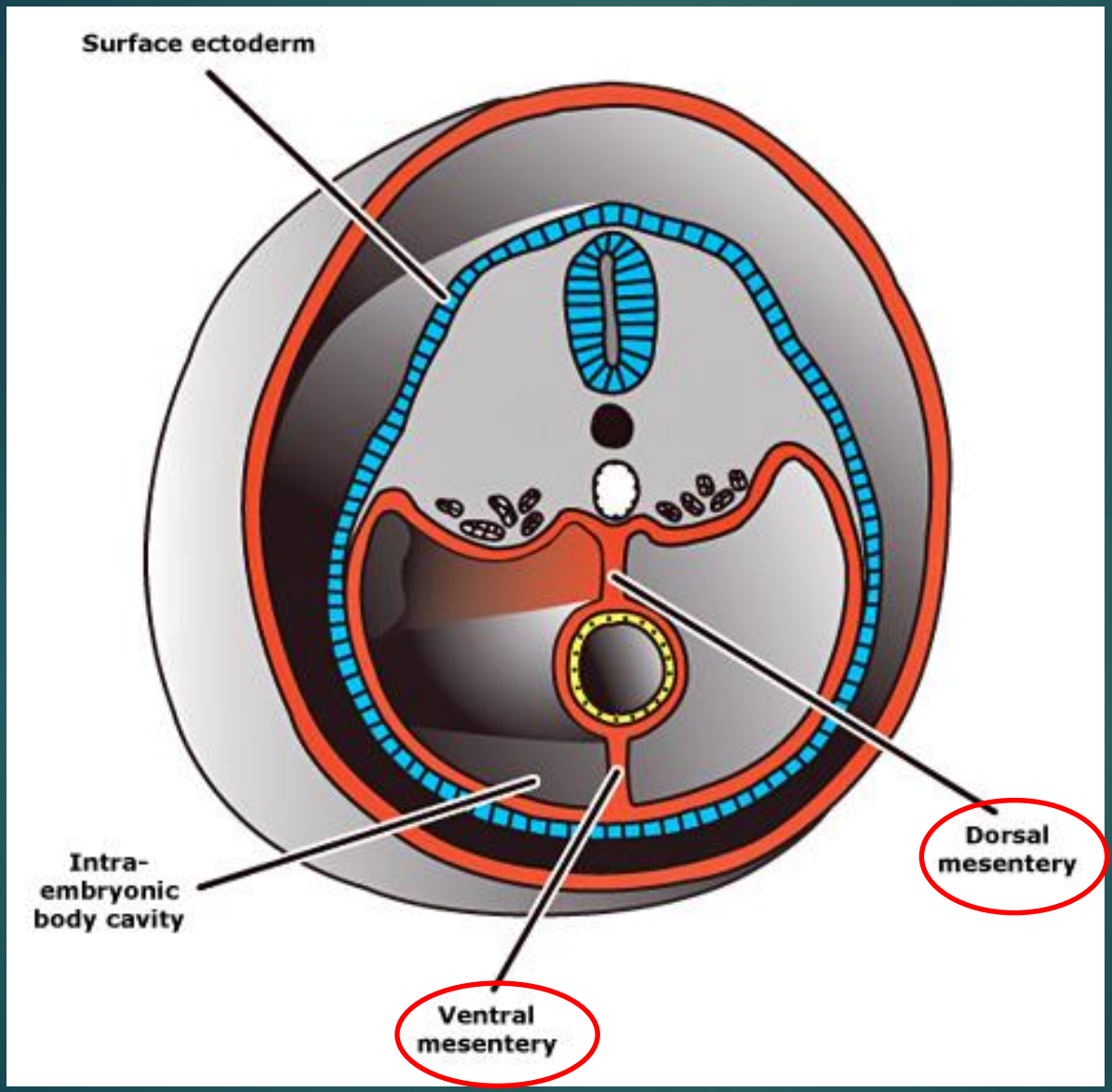


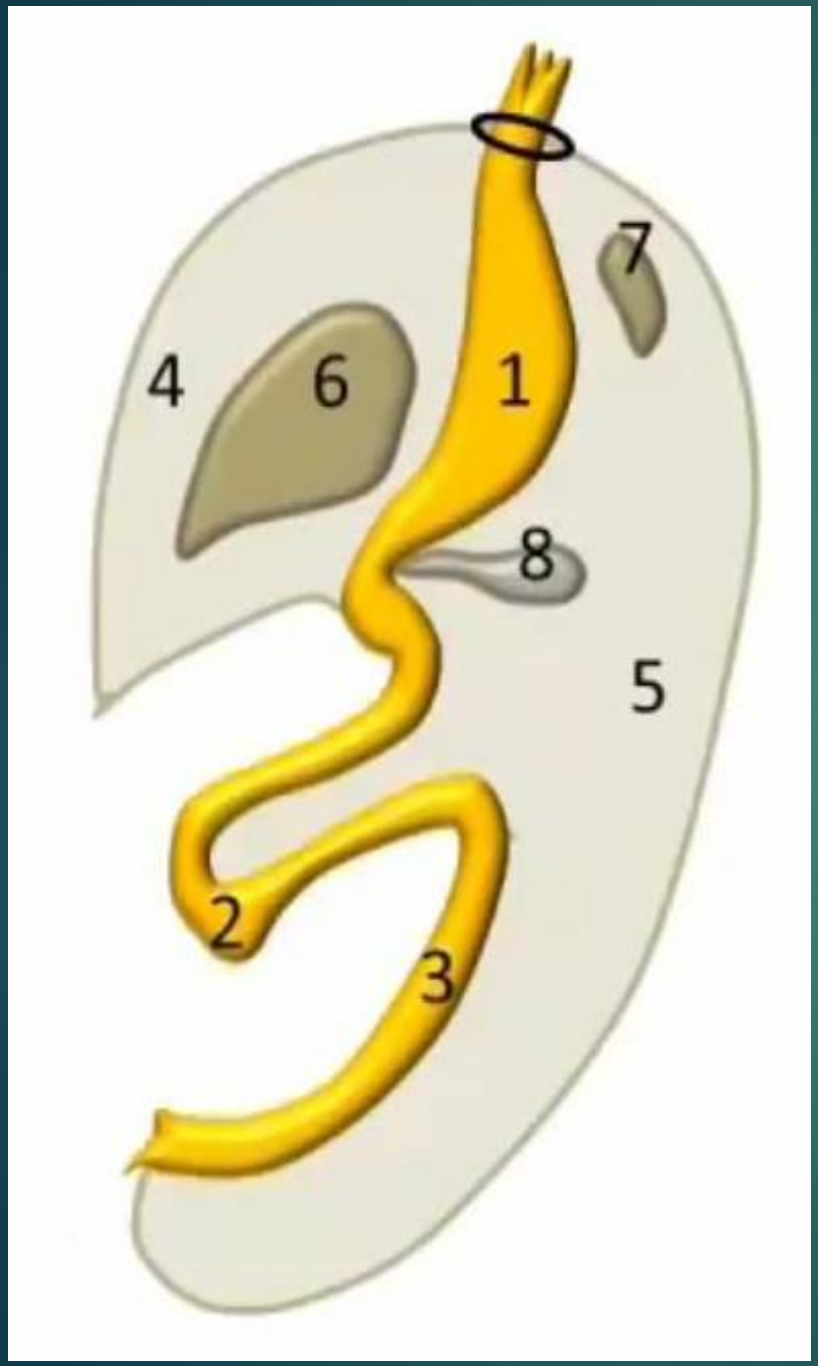
1. The stomach form fusiform dilatation of the foregut, suspended from body wall by a dorsal and ventral gastric mesentery.
2. The dorsal portion grows more rapidly – formation of the greater curvature.
3. The primitive stomach rotates 90 degrees clockwise around longitudinal axis.

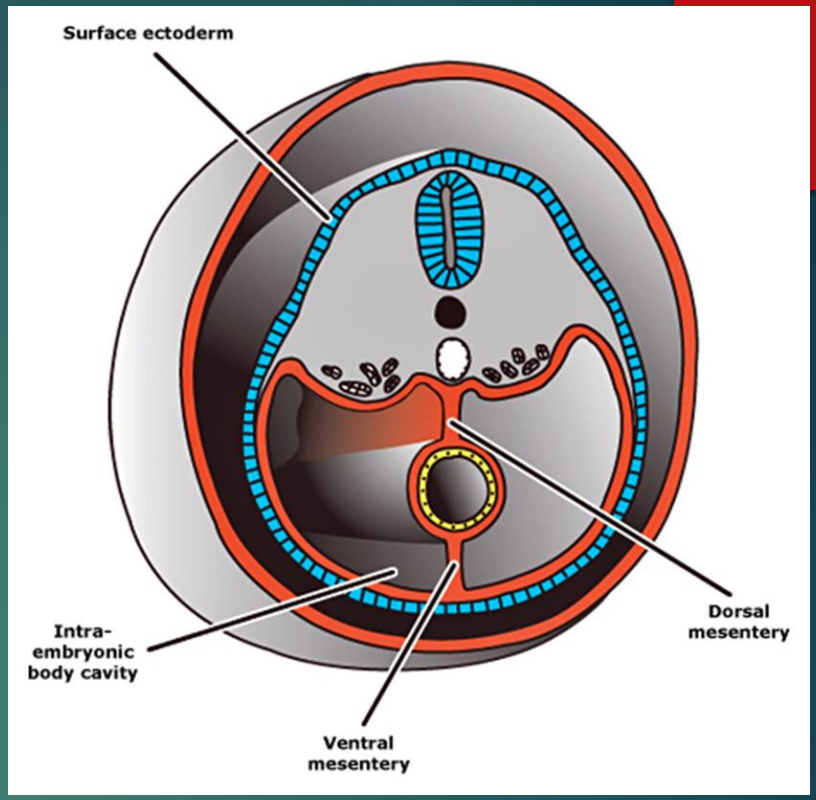
- Why doesn't the gut fall?
- What structures hold it?



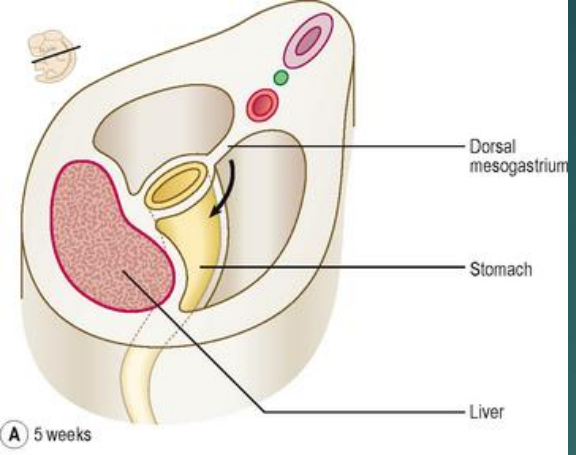
Mesenteries fix the gut

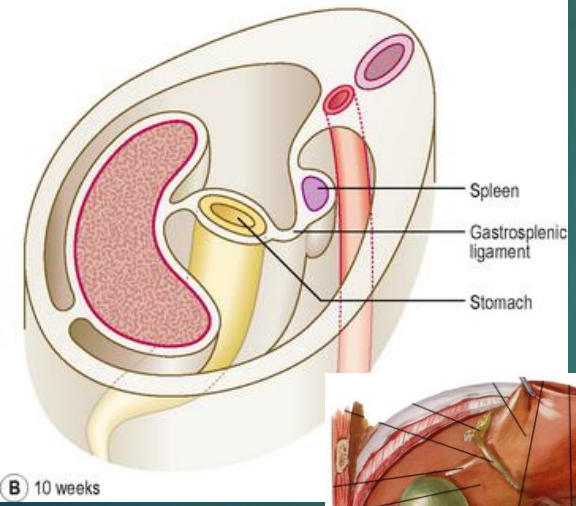


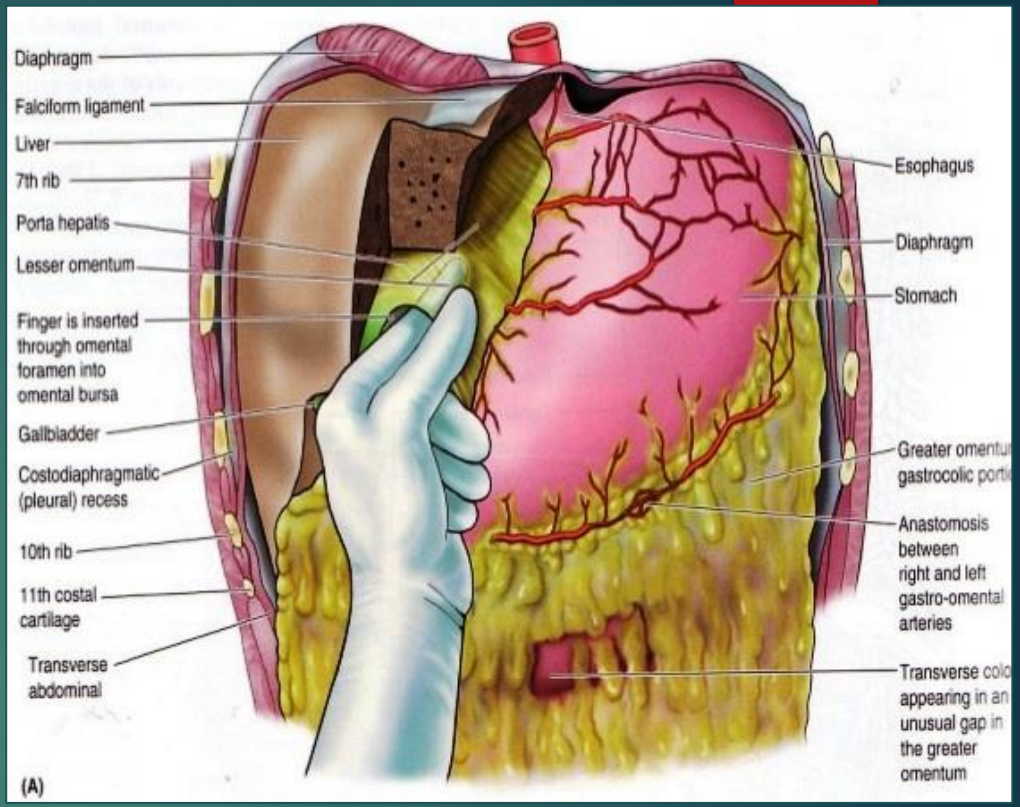


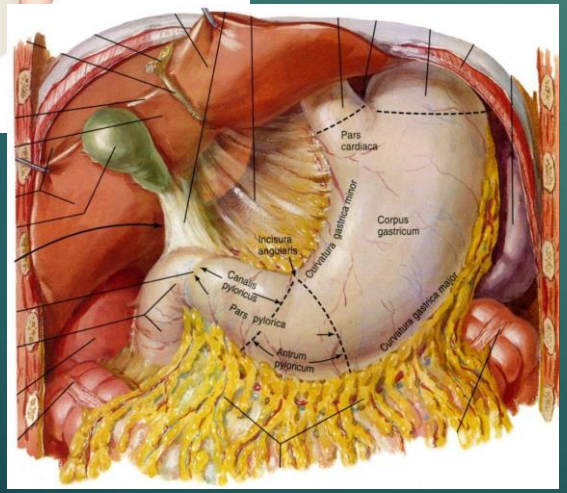


1 – stomach;
2 – caecum (the beginning of the ascending part of midgut)
3 – hindgut
4 – ventral mesentery
5 – dorsal mesentery
6 – liver
7 – spleen
8 – pancreas





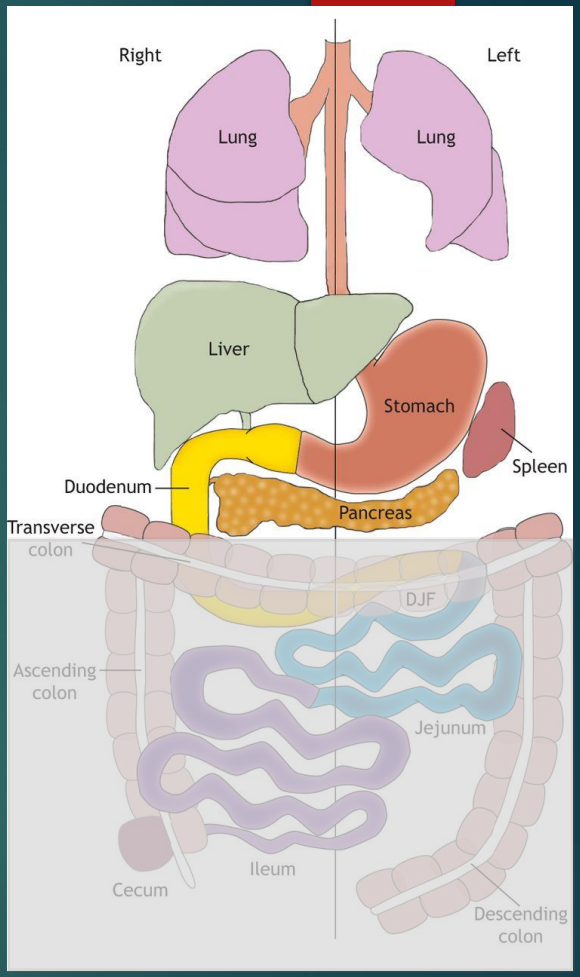




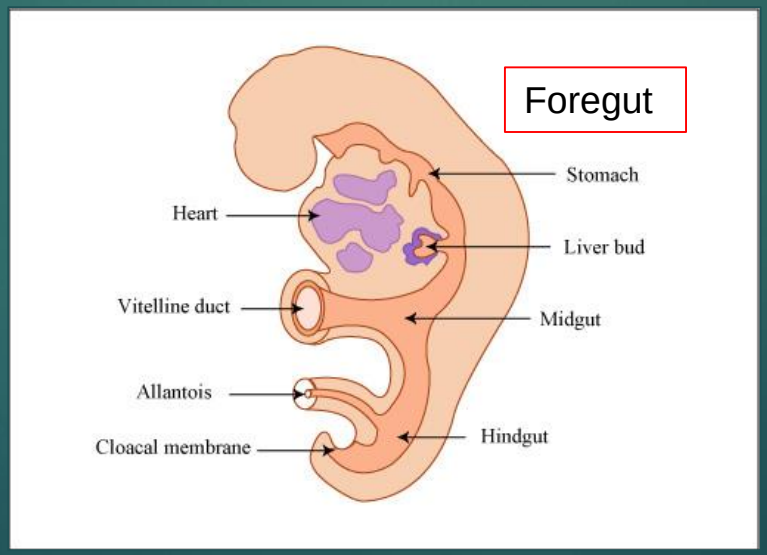
1. Ventral gastric mesentery – **lesser omentum**.
2. Dorsal gastric mesentery – **greater omentum**.
3. **Omental bursa** behind the stomach.

From foregut develop:

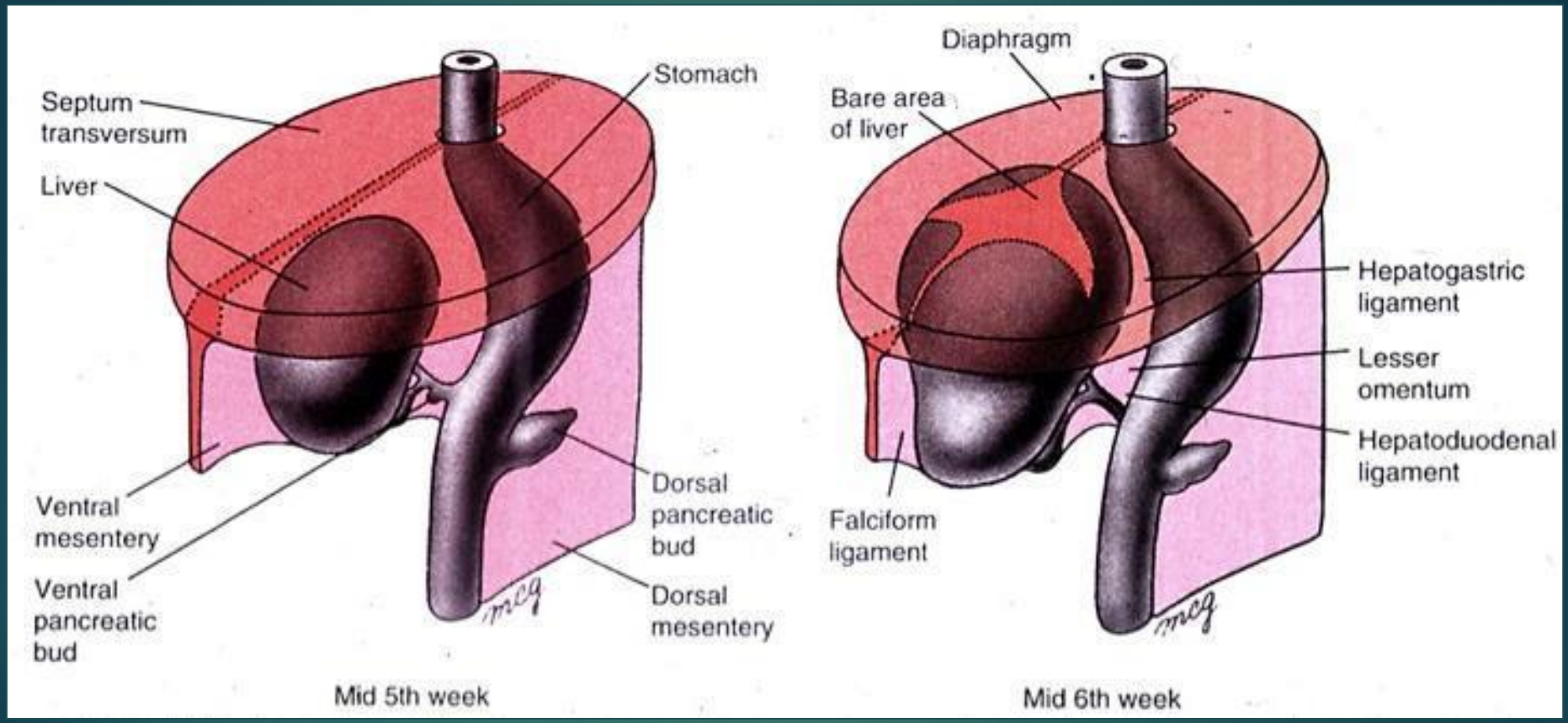
- Respiratory tube (from trachea till lungs)
- Pharynx, Esophagus
- Stomach
- Duodenum (proximal part till the opening of the bile duct)
- Liver, pancreas, gallbladder



Blood supply – *truncus coeliacus*
Sympathetic innervation – *n. splanchnicus major*
Parasympathetic innervation – *n.vagus*

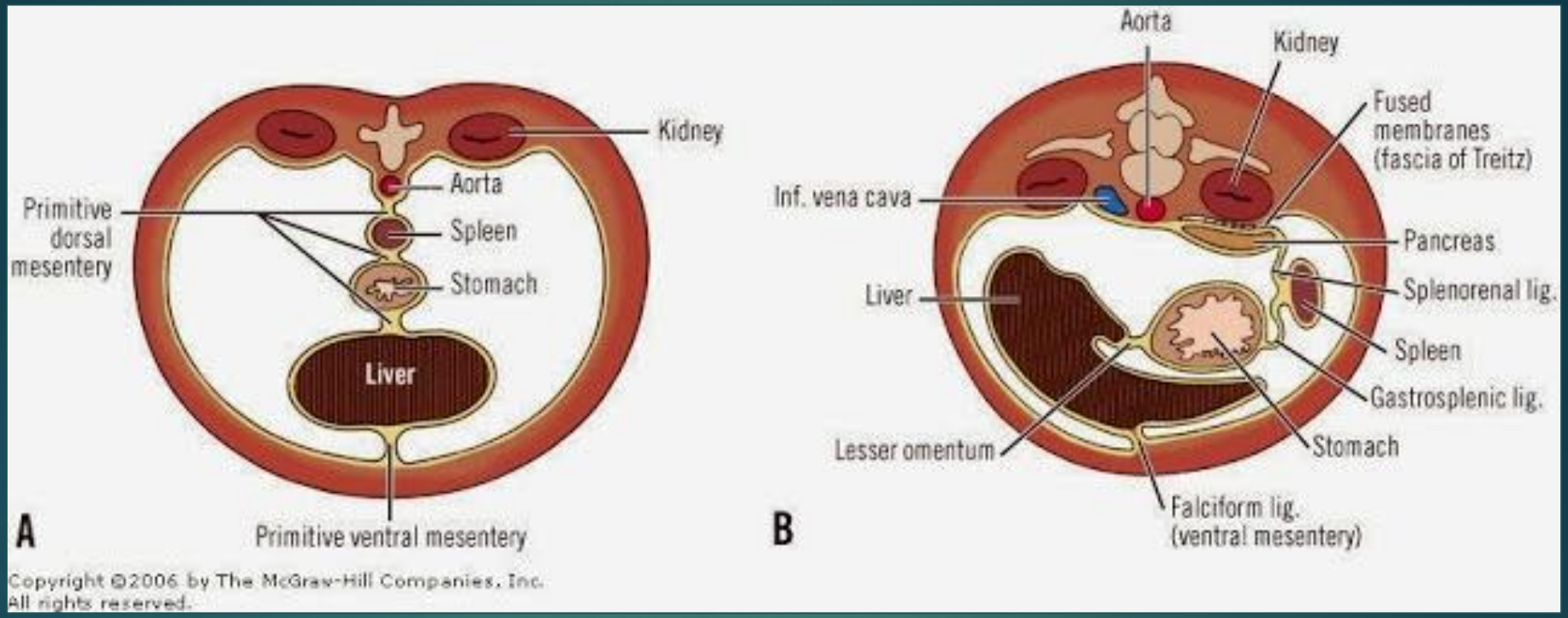


Development of the liver



Liver bud arise from foregut *endoderm* towards *septum transversum* (developing diaphragm) in response to signals from nearby mesoderm

Development of the liver

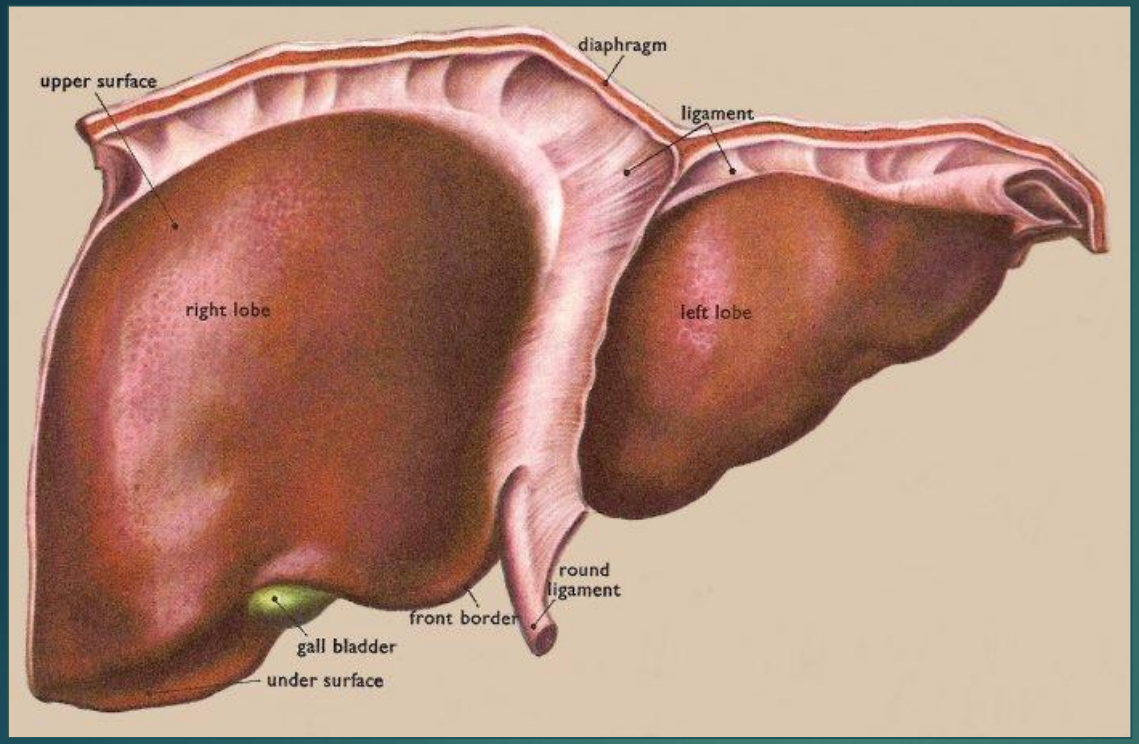


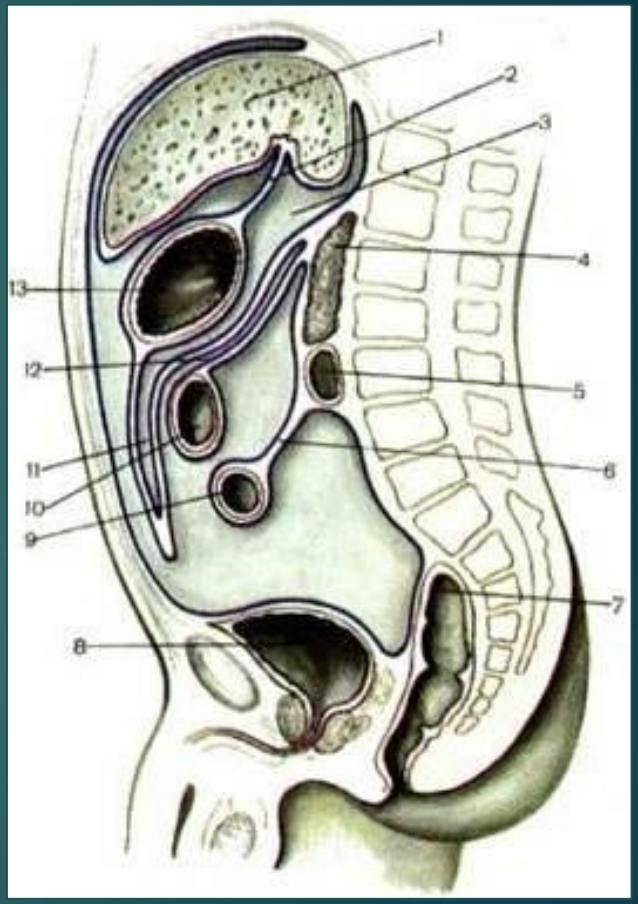
Endoderm ⟹ Liver parenchyma

Mesoderm ⟹ Capsule, stroma

Primitive ventral mesentery ⟹ Falciform ligament

Primitive dorsal mesentery ⟹ Lesser omentum


diaphragm
upper surface
ligament
right lobe
left lobe
round ligament
front border
gall bladder
under surface


1
2
3
4
13
12
5
11
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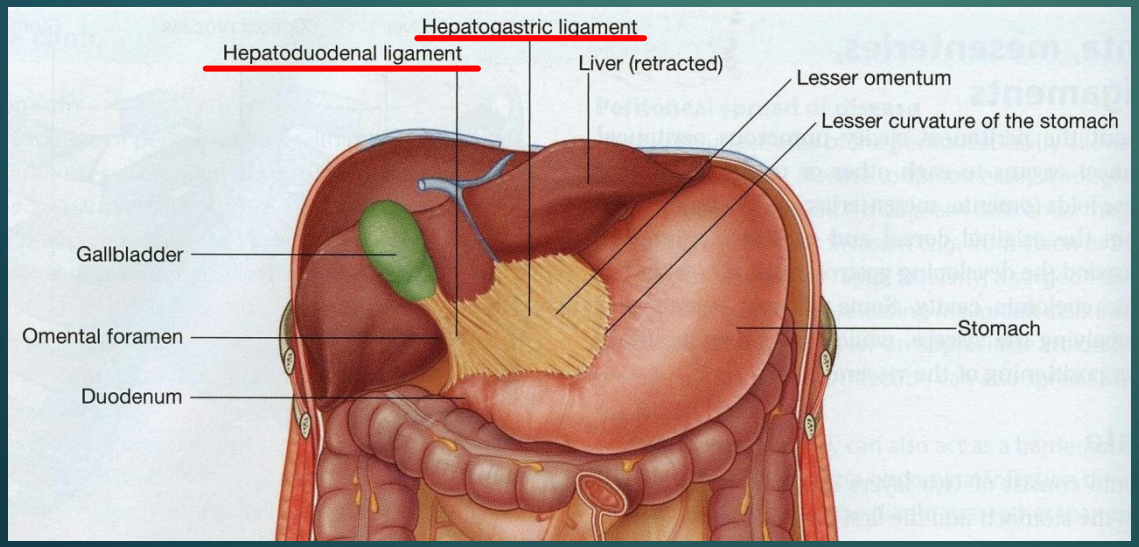
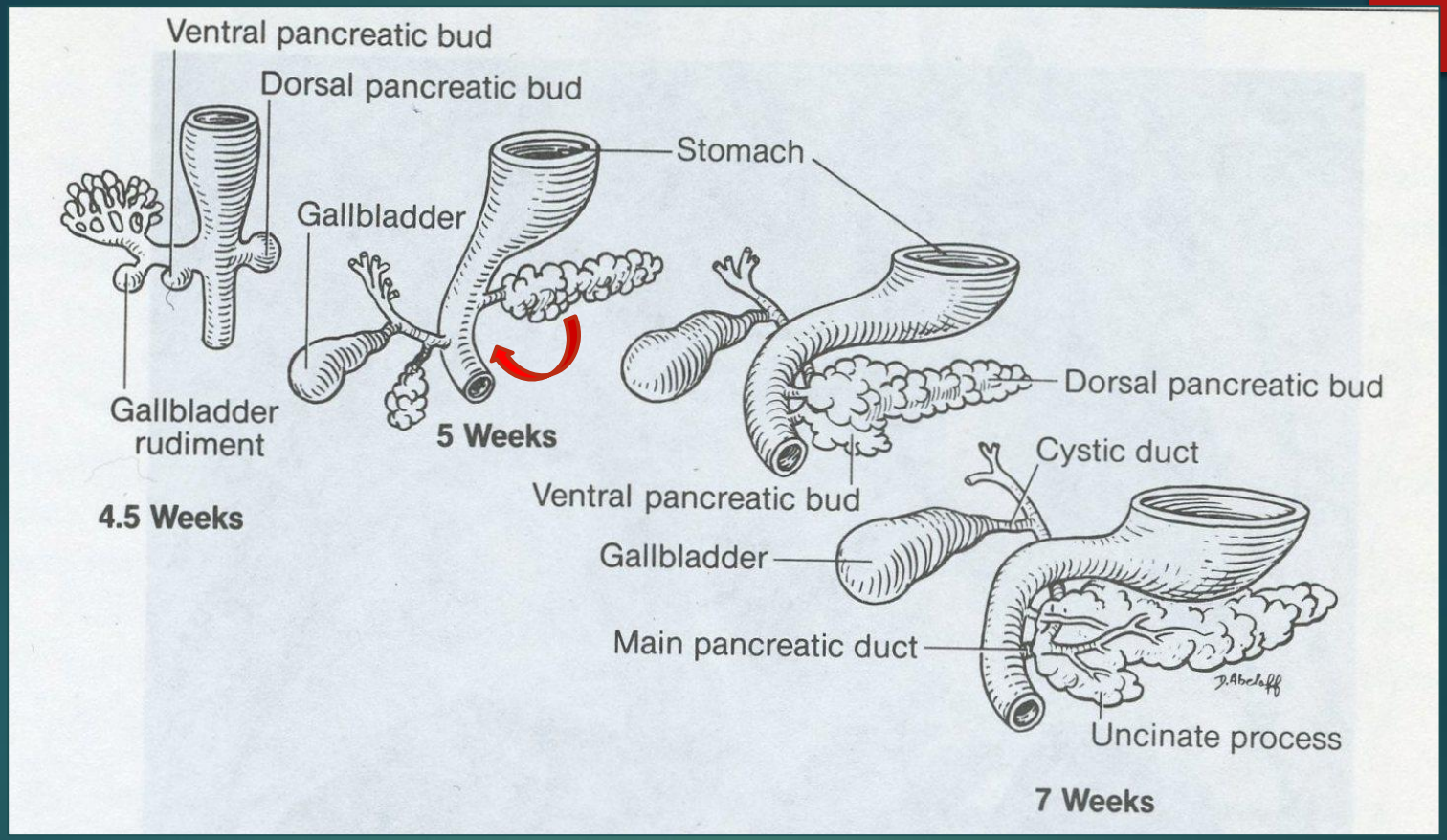
8

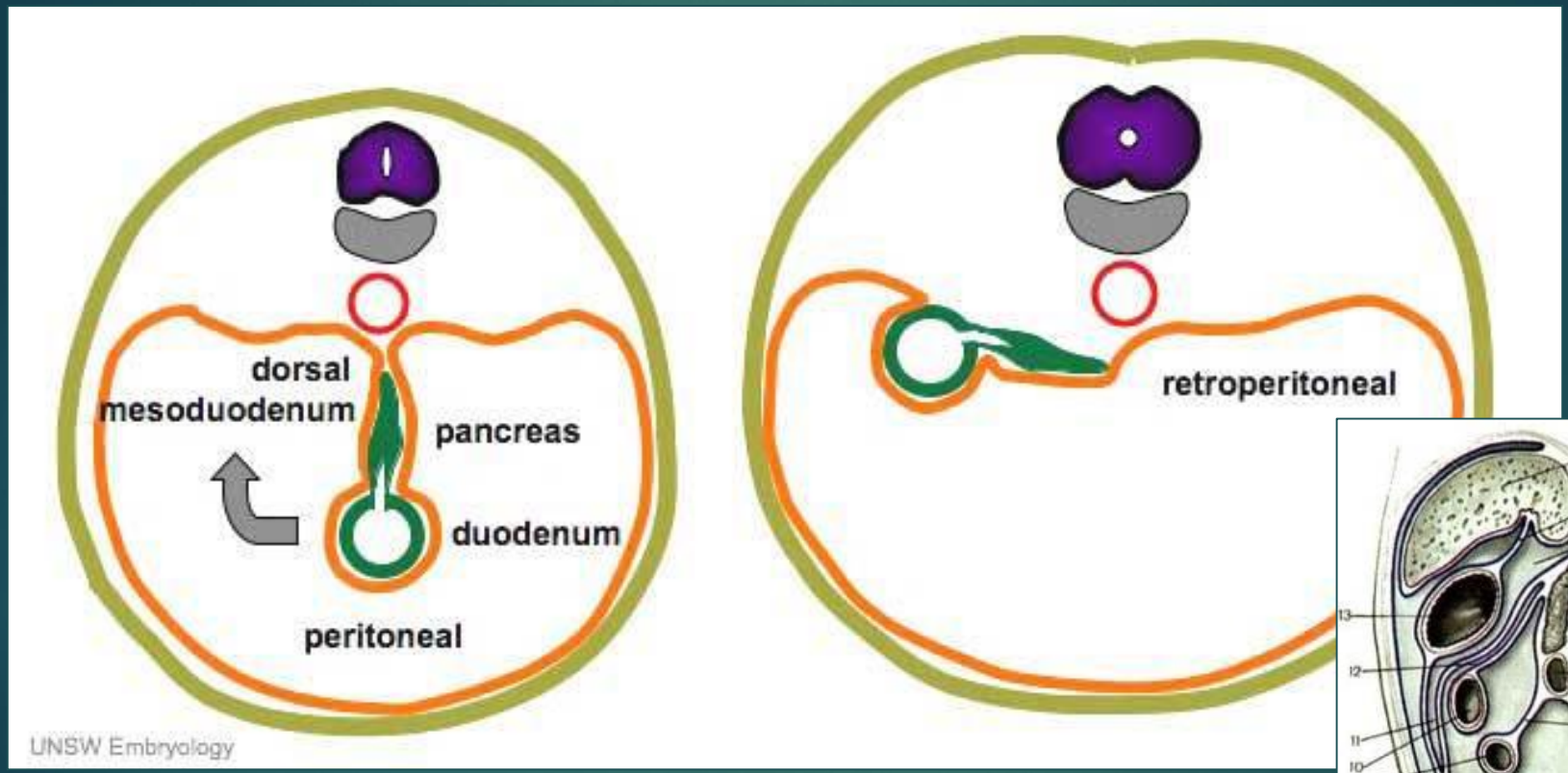

Hepatogastric ligament
Hepatoduodenal ligament
Liver (retracted)
Lesser omentum
Lesser curvature of the stomach
Gallbladder
Omental foramen
Duodenum
Stomach

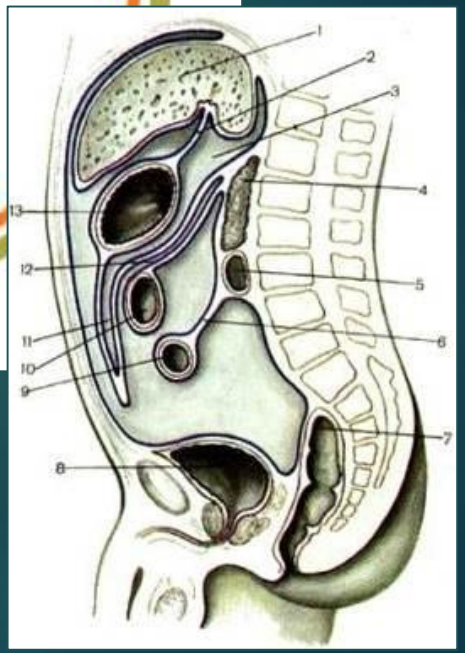
Development of the pancreas



- **Ventral pancreatic bud** – outgrowth of liver bud
- **Dorsal pancreatic bud** – outgrowth of duodenal bud into the stomach mesentery. Dorsal pancreatic bud – accessory pancreatic duct.
- The rotation of the duodenum to the right carries the ventral pancreatic bud dorsally, where it fuses with the dorsal pancreatic bud.

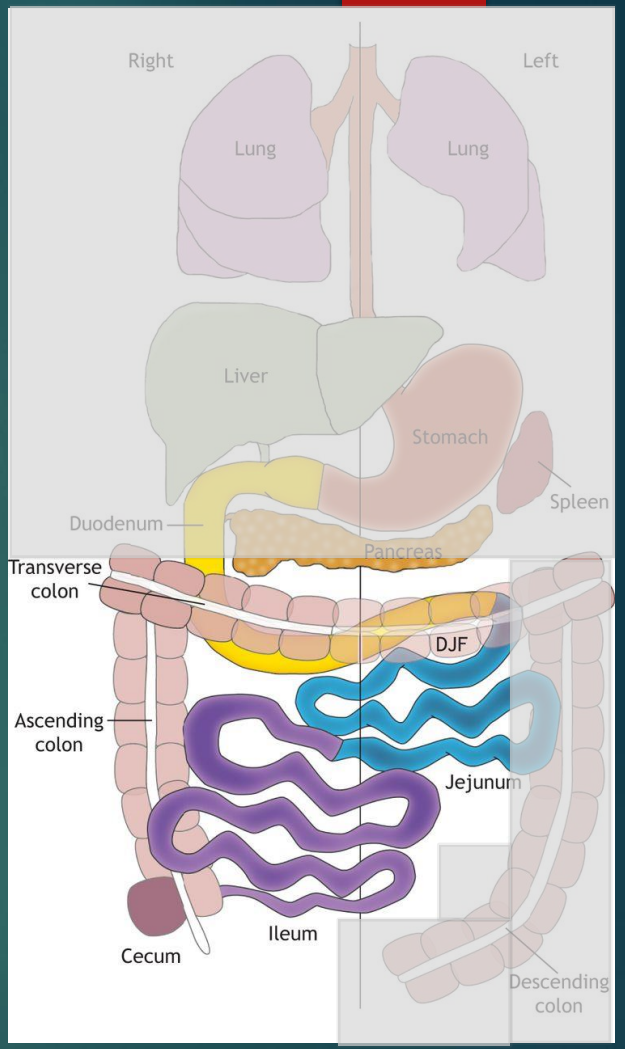
Retroperitoneal position of the pancreas and duodenum



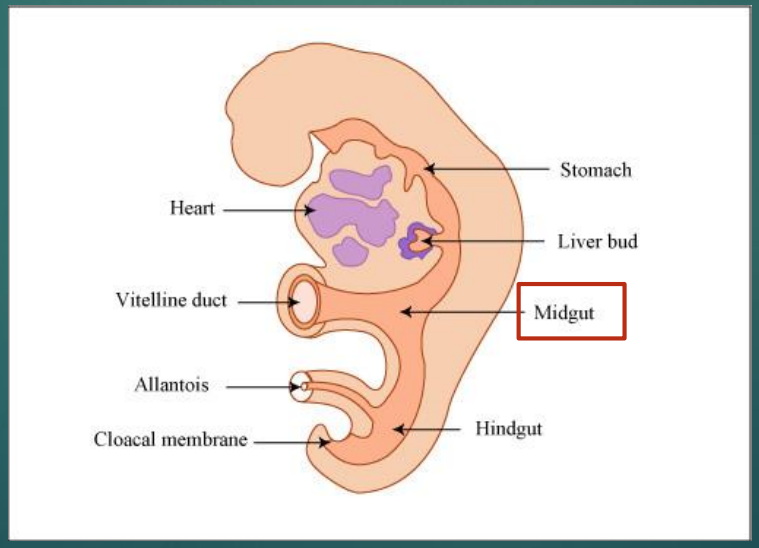


From midgut develop:

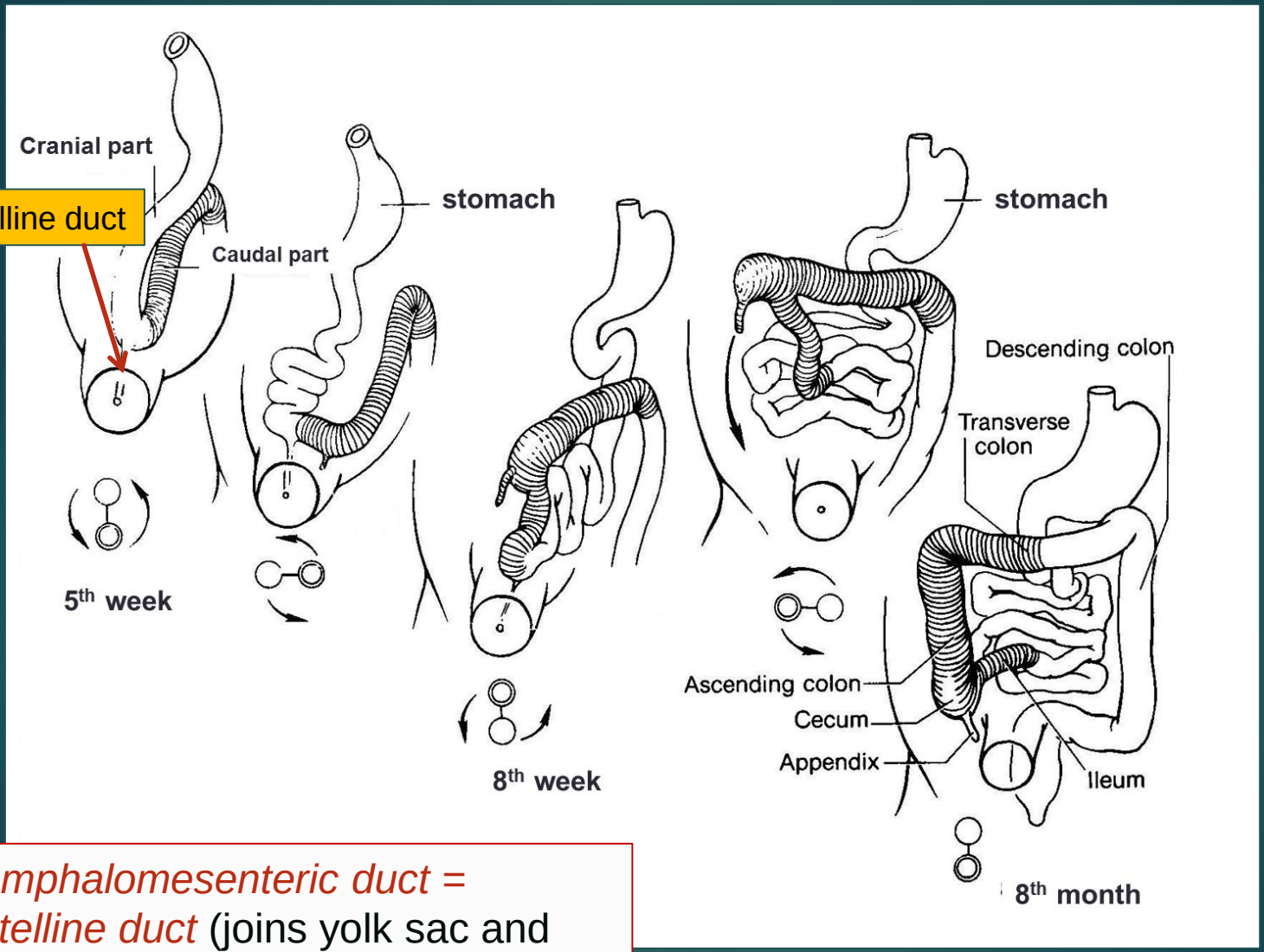
- Duodenum distal to the opening of the bile duct
- The rest of the small intestine (ileum, jejunum)
- Cecum and appendix
- Ascending and proximal 2/3 of transverse colon



Blood supply – *a. mesenterica superior*
Sympathetic innervation – *n. splanchnicus minor*
Parasympathetic innervation – *n.vagus*



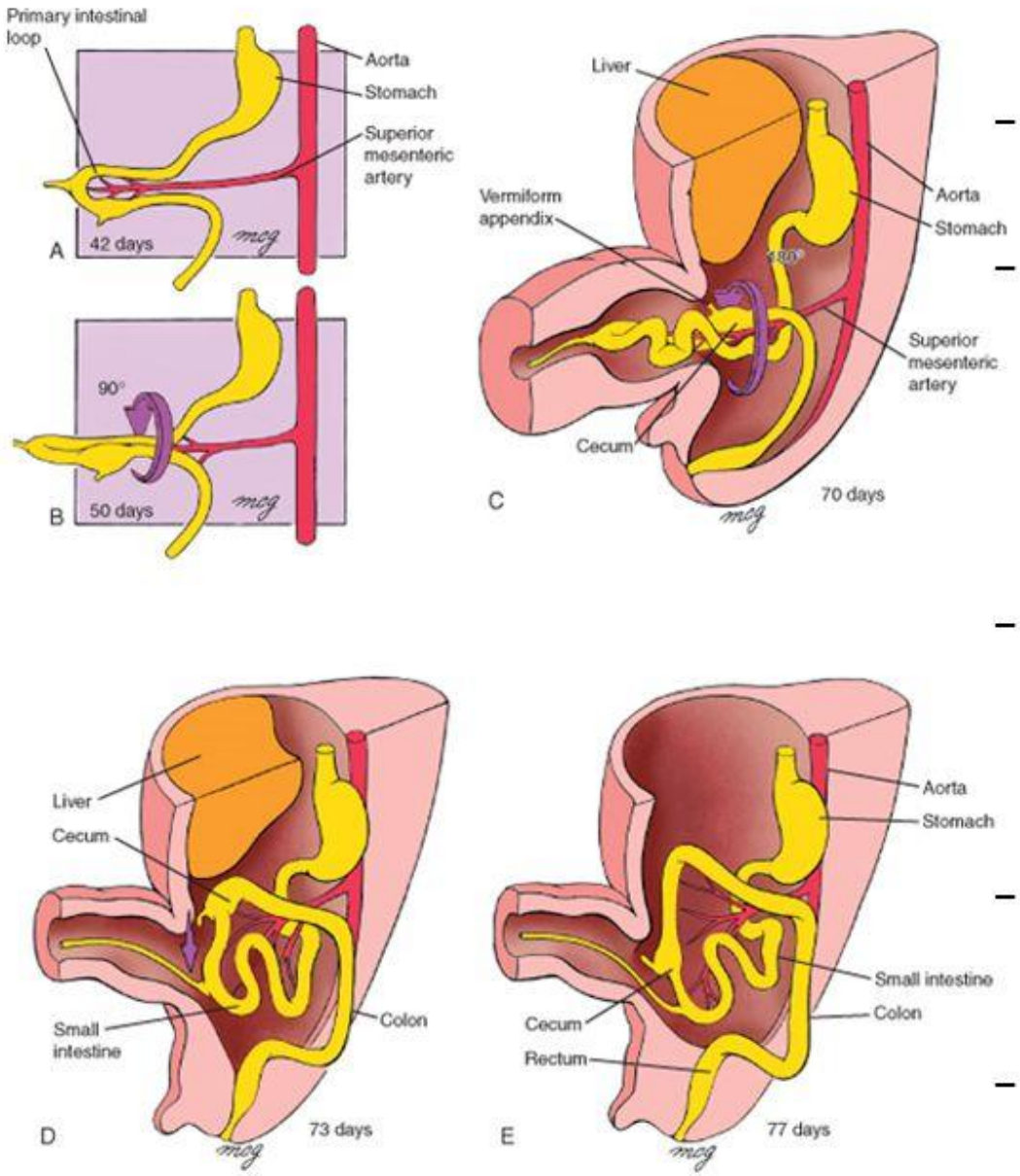
Development of the jejunum, ileum and colon



Ascending colon develops at the end. 20% of population has short ascending colon.

Omphalomesenteric duct = vitelline duct (joins yolk sac and midgut lumen) – axis for rotation

Development of the midgut and colon

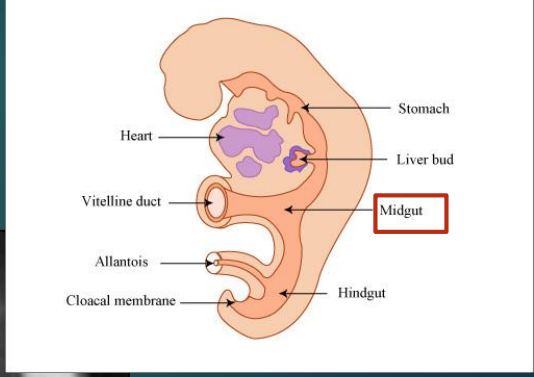


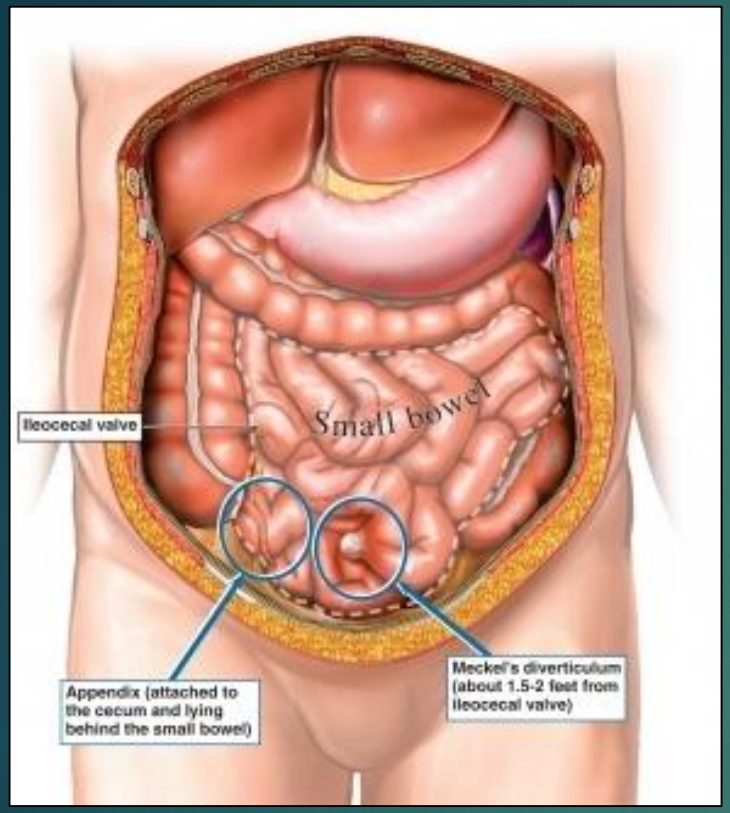
Herniation and rotation:

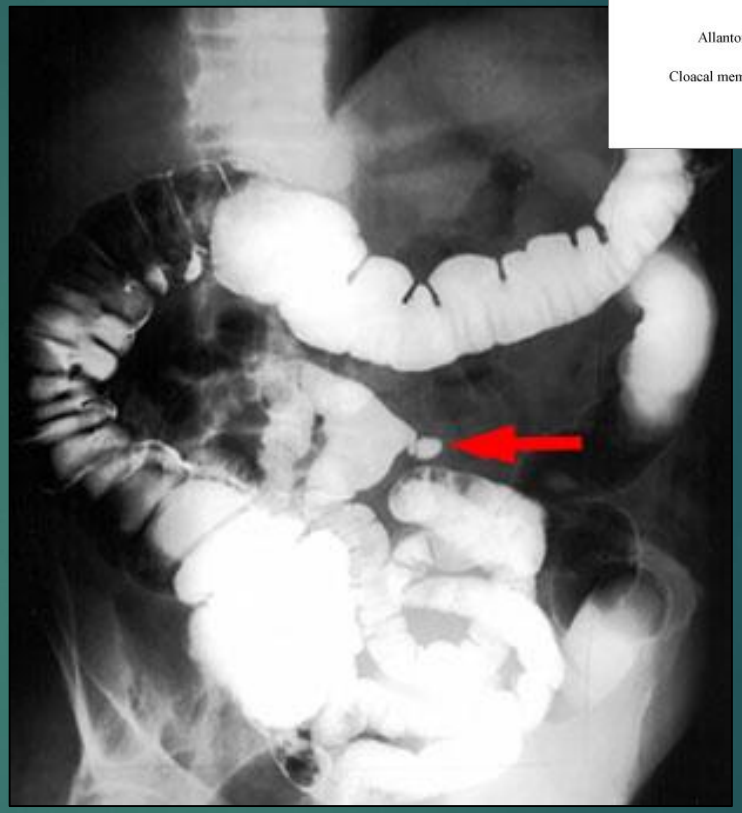
- Growth of the GI tract exceeds volume of abdominal cavity so the tube herniates through umbilicus
- While herniated, gut undergoes a primary rotation (fig B) of 90° "counterclockwise" (when looking at the embryo); this corresponds with the rotation of the stomach, and positions the appendix on the left. The primary rotation also brings the **left vagus n.** to the **FRONT** (hence the change in its name to ANTERIOR vagus n.
- With the growth of the embryo, the abdominal cavity expands thus drawing the gut tube back within the abdominal cavity and causing an additional, secondary rotation (fig C) of 180° CCW (positioning the appendix on the RIGHT)
- Once in the abdominal cavity, the colon continues to grow in length, pushing the appendix to its final position in the lower right quadrant.
- Note the attachment of the vitelline duct to the gut at the region of the ileum. The duct normally regresses during development, but not always….

Meckel`s diverticulum

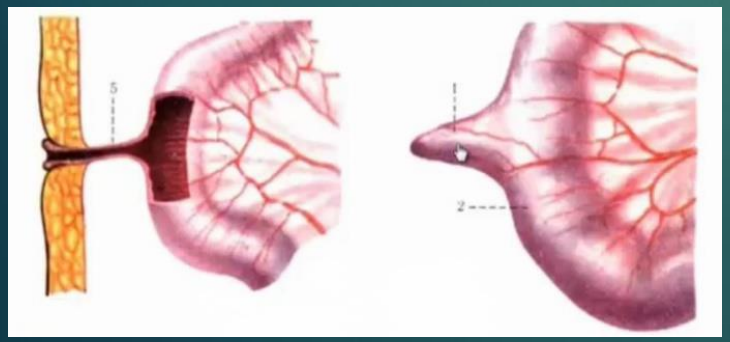
- remnant of the omphalomesenteric duct (the vitelline duct)

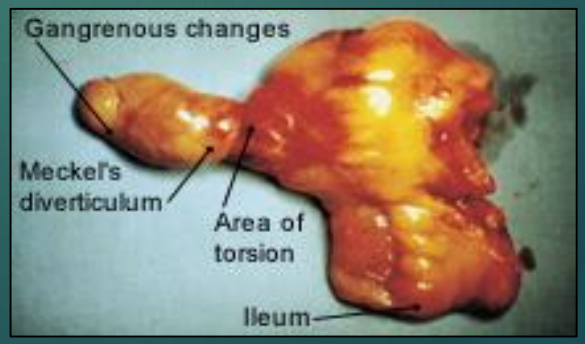






Omphalomes enteric duct = vitelline duct (joins yolk sac and midgut lumen) – **axis for rotation**





Congenital malformations of the digestive system

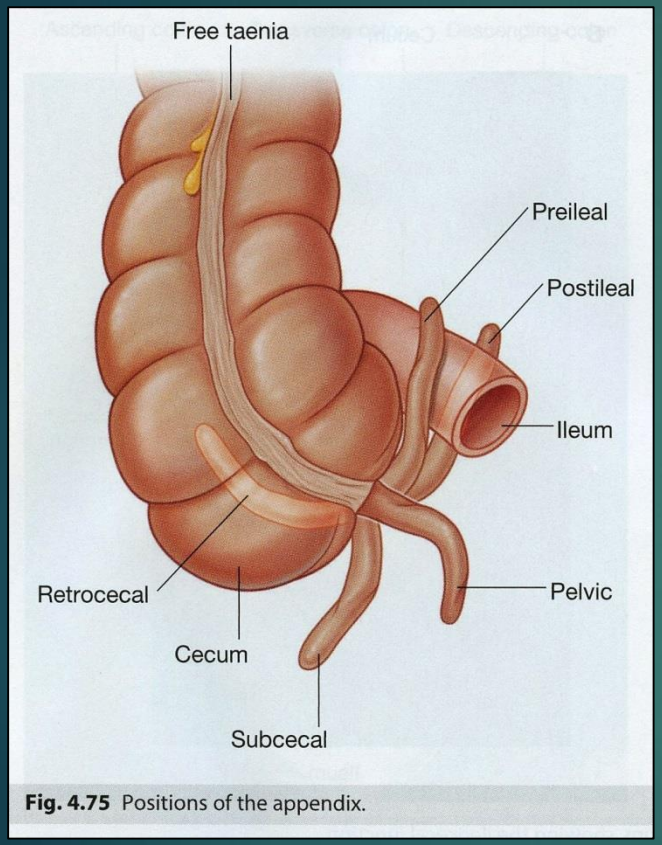
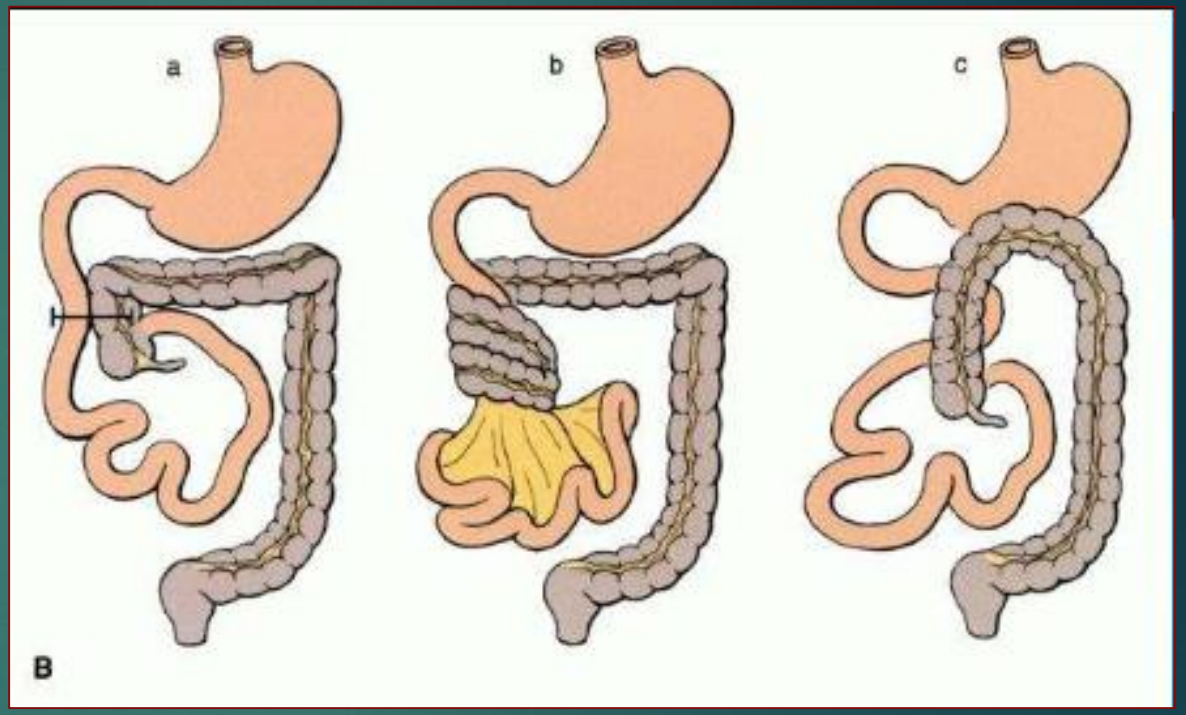


Fig. 4.75 Positions of the appendix.

Variety of appendix position



Intestinal malrotation

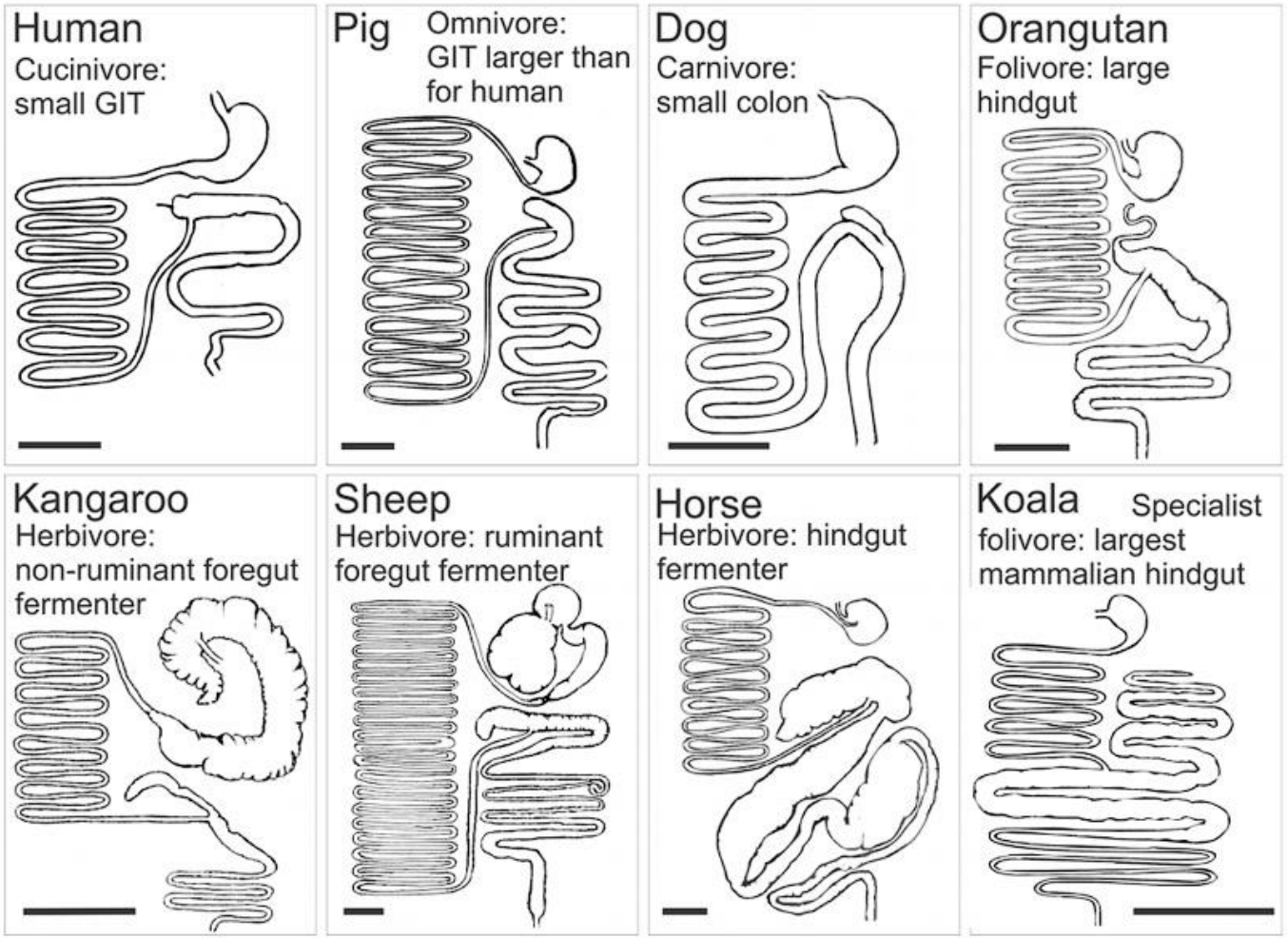
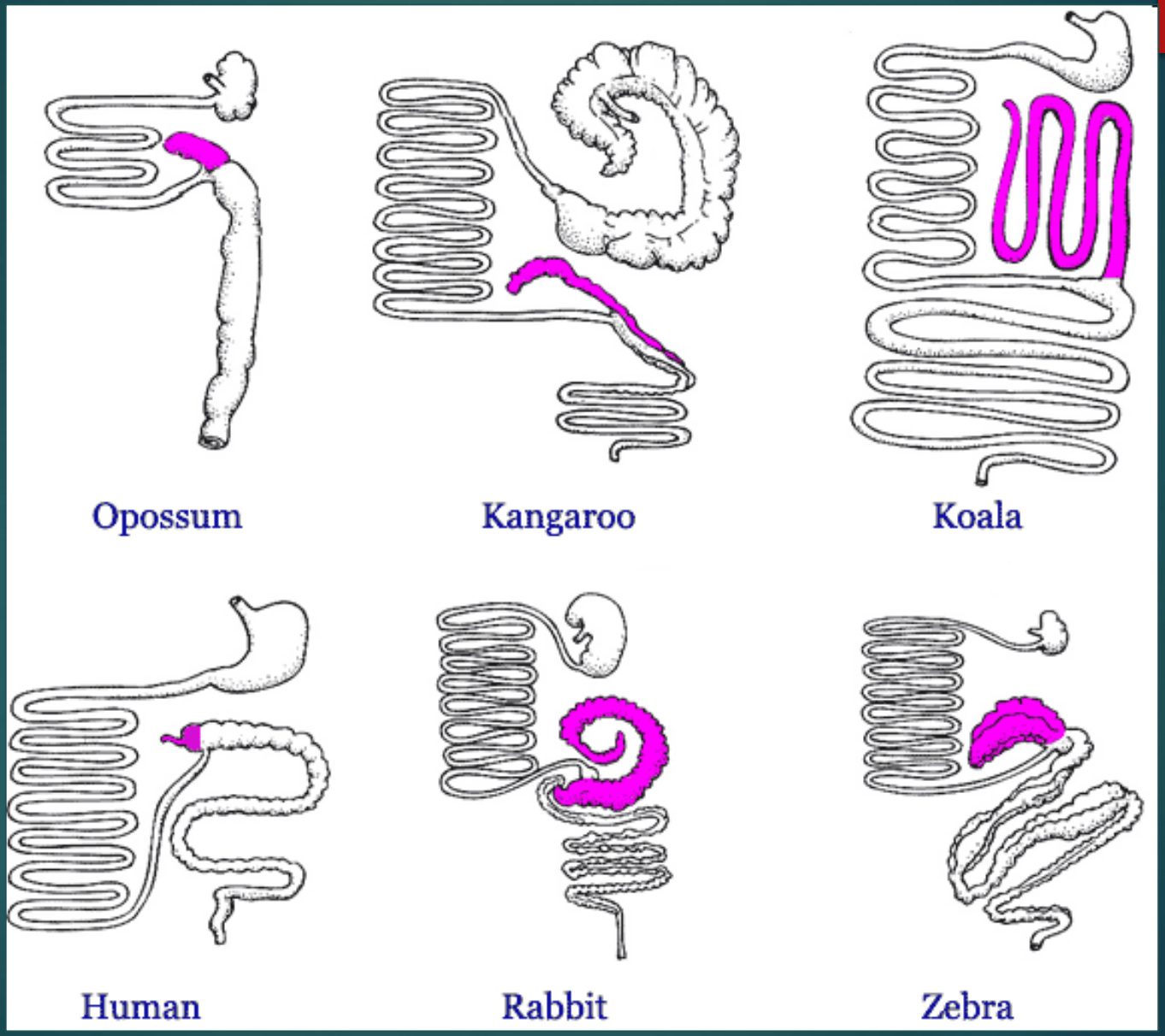


Fig. 1 Relations between diet and digestive tract anatomy. The human digestive tract is relatively small, less than half the size of the pig, an omnivore with similar body size (in the wild, 50–90 kg, which is similar to humans who are not overweight, approx. 70 kg). The dog, a typical carnivore, has a short colon and reduced cecum. The human intestine is also small compared with other hominids, here illustrated by the orangutan. The three herbivores that are illustrated all have capacious intestines with specialised fermentation chambers. The koala, which consumes only eucalypt leaves that are rich in tannins and volatile oils, has an extensive large bowel and reduced small intestine. In proportion to body size, this is the largest cecum plus colon of any mammal. *Scales* 20 cm, *all panels*. Reproduced with permission from Stevens and Hume (1995)

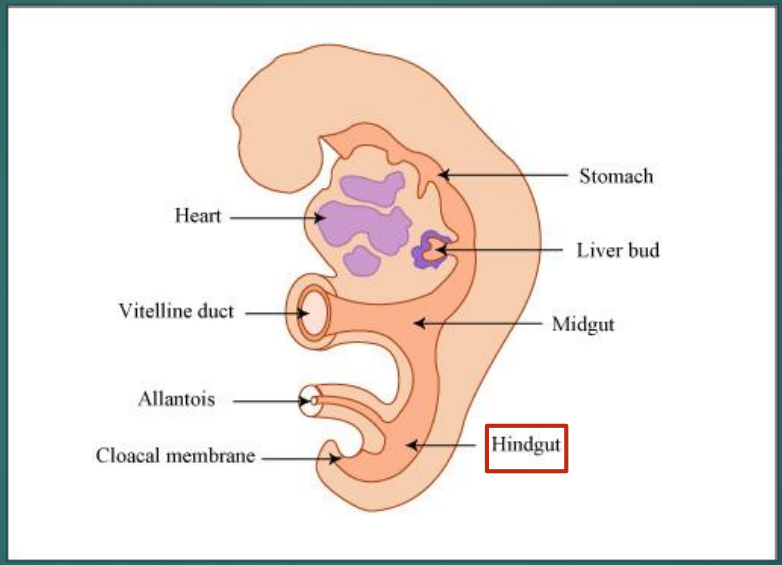
Cecum and appendix

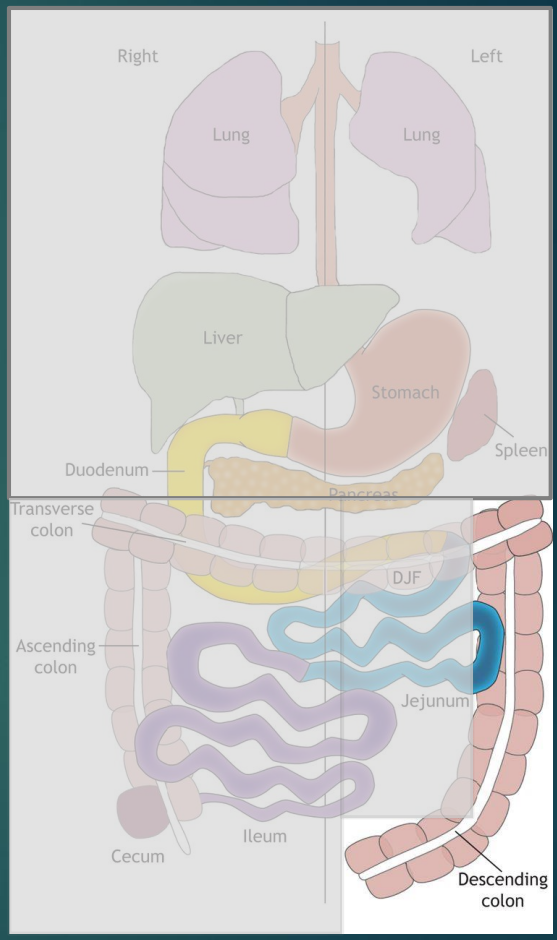


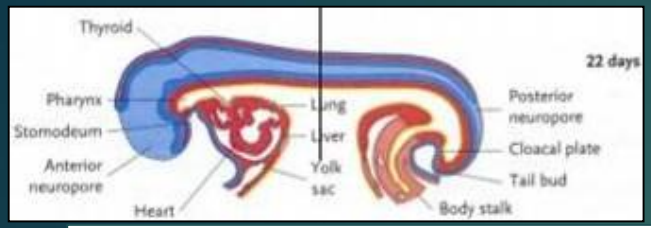
From hindgut develop:

- The rest 1/3 of transverse colon
- Descending and sigmoid colon, rectum

Blood supply – *a. mesenterica inferior*
Sympathetic innervation – *nn. splanchnici lumbales et pelvini*
Parasympathetic innervation – *nn. splanchnici pelvini*



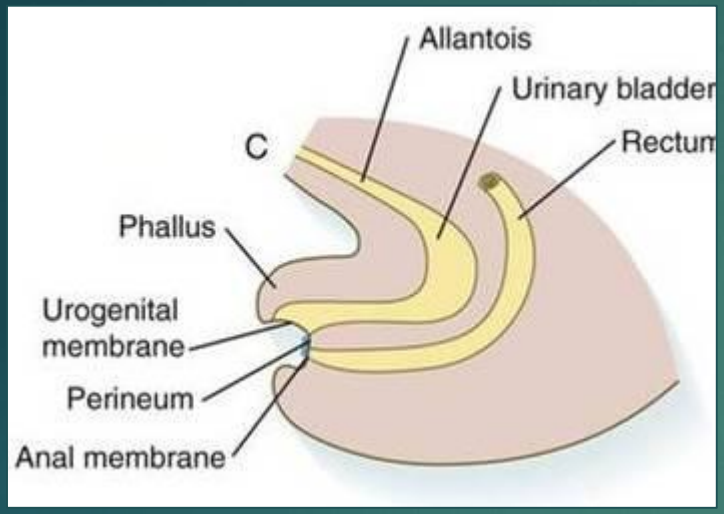


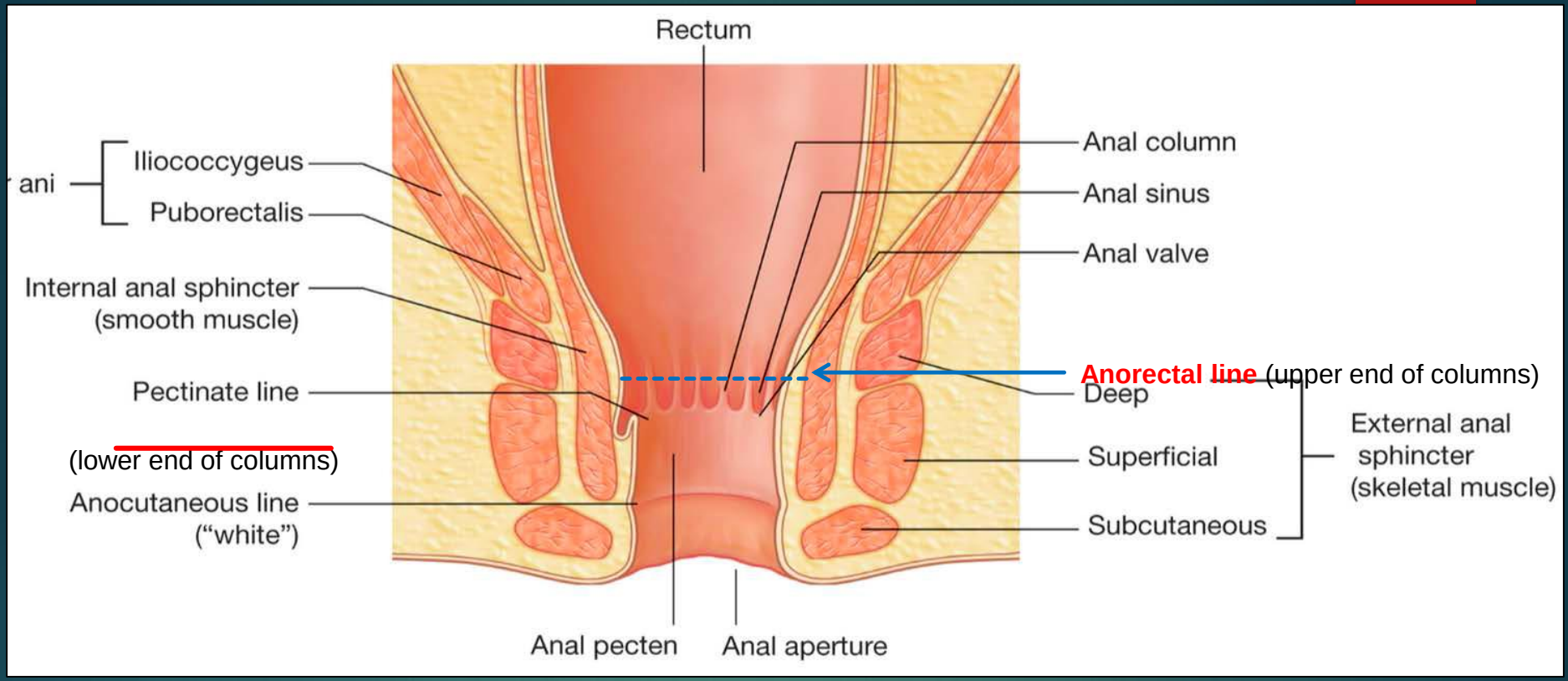


Caudal end of the hindgut – *proctodeum* (9th week)

Urogenital sinus
Urorectal septum
Phallus
B
Allantois
A
Proctodeum
Gut
Rectum
Allantois
Urinary bladder
C
Rectum
Phallus
Cloacal membrane
Urogenital membrane
Urorectal septum
Perineum
Cloaca
Anal membrane

Cloacal membrane is not ruptured
Atresia of rectum





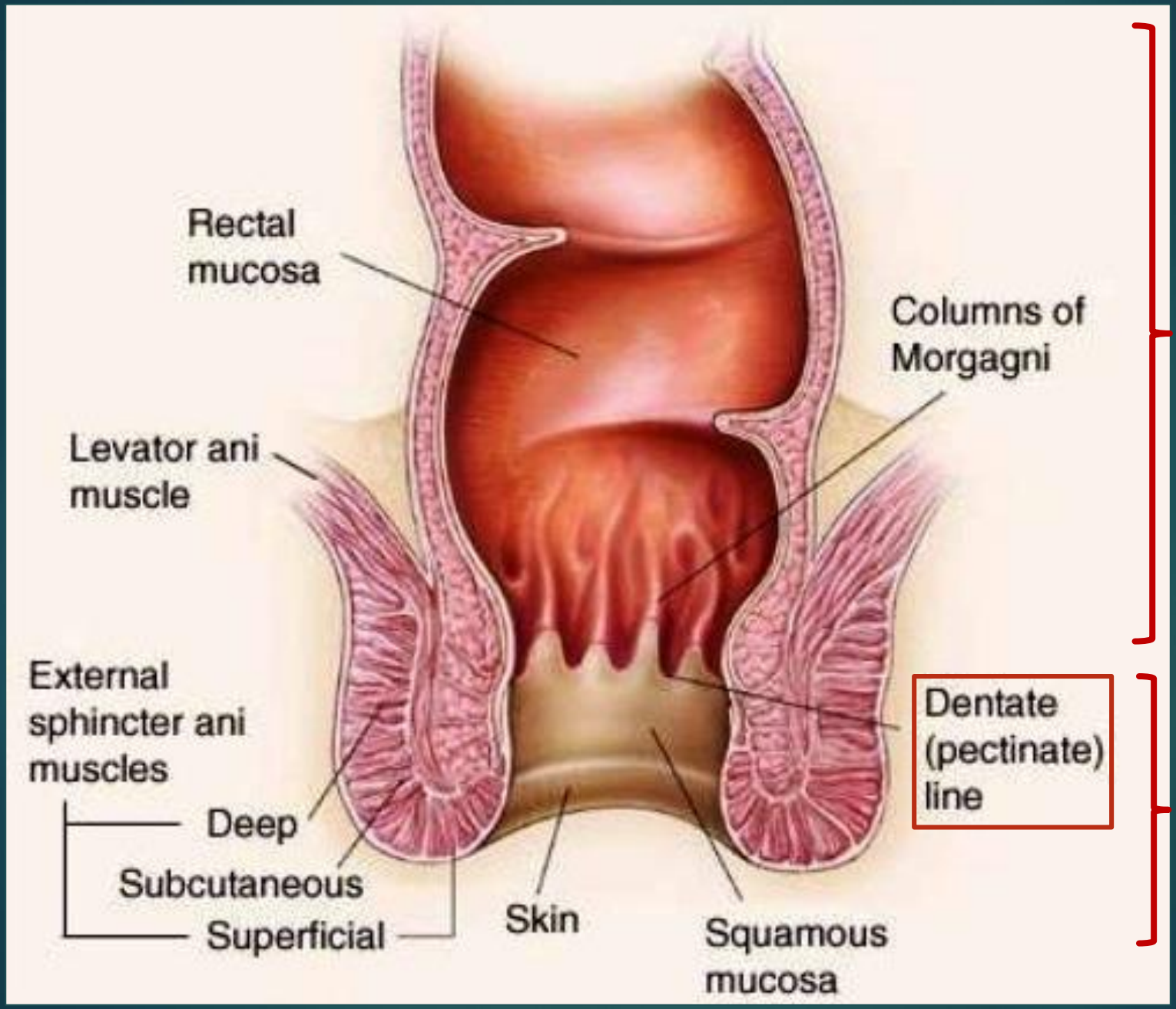
Pectinate line - anatomical border between rectum and anal canal

Anal pecten –

1) place between pectinate and anocutaneous lines;
2) level of internal (involuntary) muscular anal sphincter.

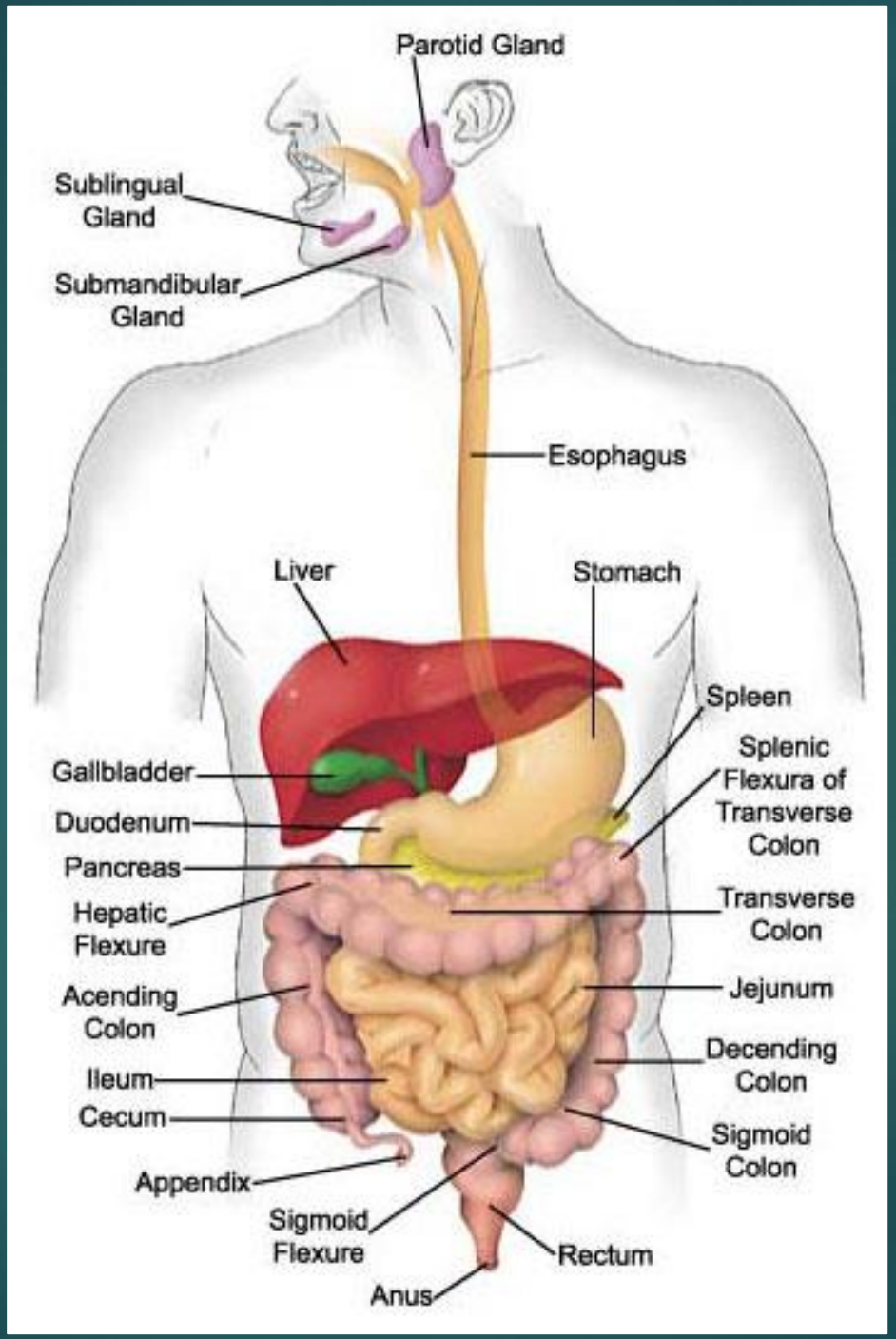
Anocutaneous line ("white line") –

1) lower border of internal anal sphincter;
2) mucous layer changes to skin.

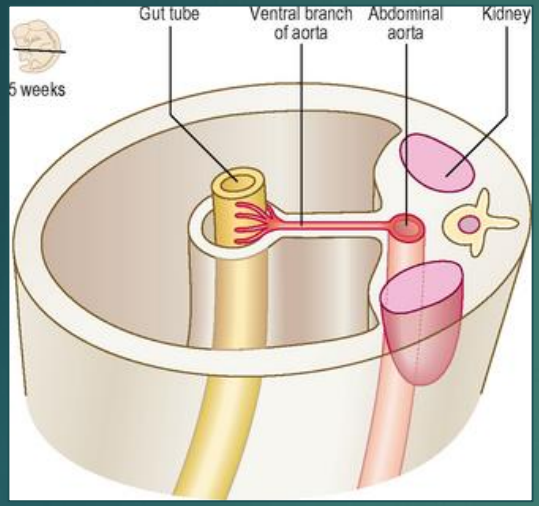


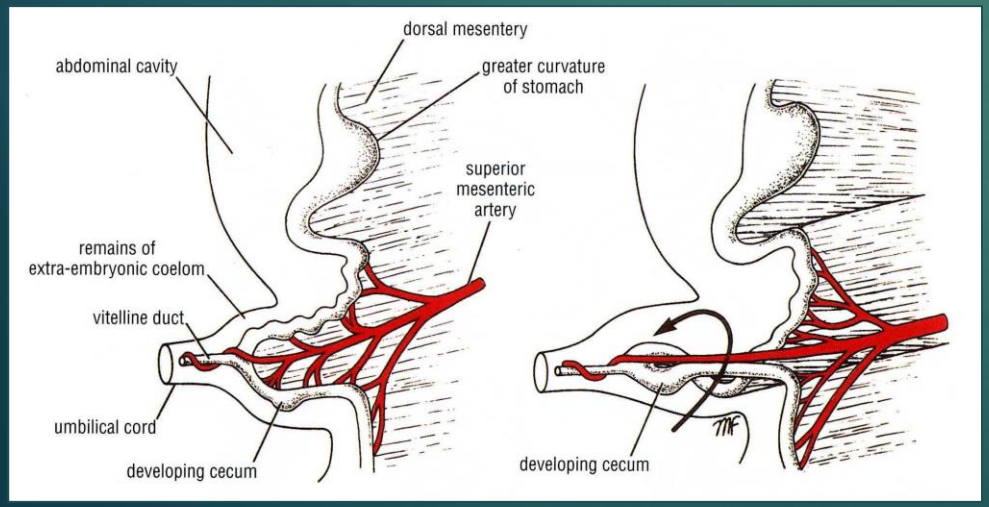
Superior to that line the intestine derives from the embryonic hindgut and the epithelium derives from endoderm.
- a. et v. mesenterica inferior

Inferior to that line the epithelium derives from ectoderm.
- a. et v. iliaca interna


Parotid Gland
Sublingual Gland
Submandibular Gland
Esophagus
Liver
Stomach
Spleen
Splenic Flexura of Transverse Colon
Gallbladder
Duodenum
Pancreas
Hepatic Flexure
Transverse Colon
Acending Colon
Jejunum
Decending Colon
Ileum
Cecum
Sigmoid Colon
Appendix
Sigmoid Flexure
Rectum
Anus

Development of GI and blood supply





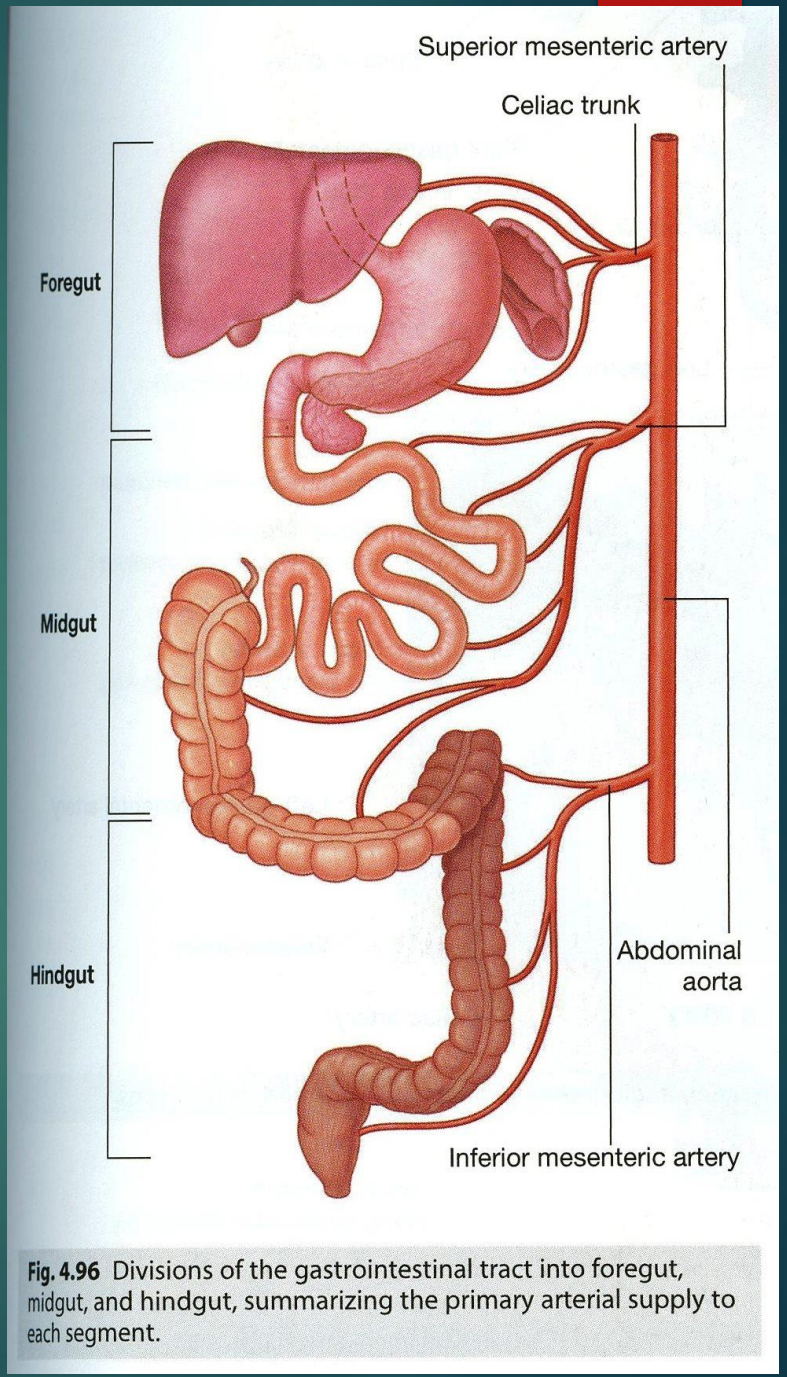


Fig. 4.96 Divisions of the gastrointestinal tract into foregut, midgut, and hindgut, summarizing the primary arterial supply to each segment.

Foregut derivatives include which of the following?

1) The esophagus
2) The stomach
3) The proximal duodenum
4) The ileum
5) The liver
6) The descending colon

1,2,3,5

Midgut derivatives include which of the following?

1) The stomach
2) The distal duodenum
3) The ileum
4) The jejunum
5) The appendix
6) The descending colon

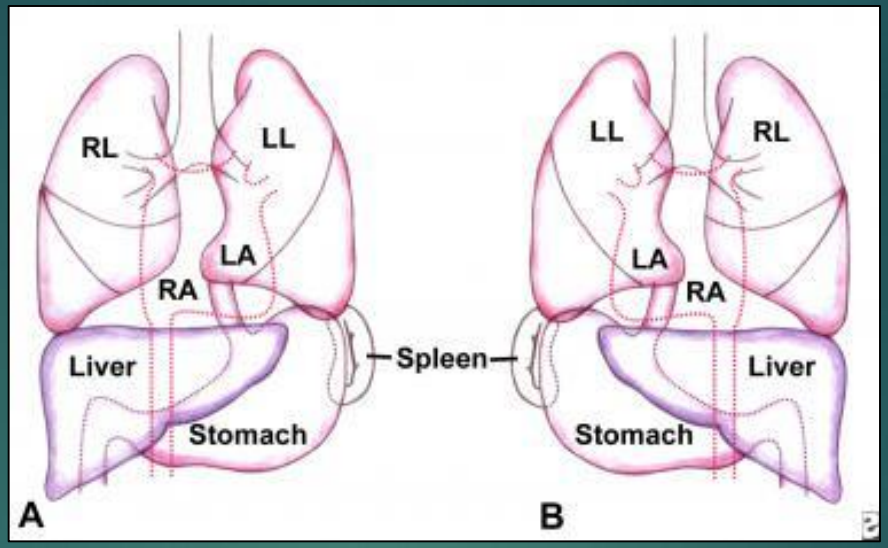
2,3,4,5

Which of the following cells are endodermal derivatives?

1) Pancreatic acinar cells
2) Alpha and beta cells in the islets of Langerhans
3) Liver parenchymal cells
4) Cells lining the lumen of the gallbladder
5) Cells lining the lumen of intestine
6) Muscular layer of intestinal wall
7) Peritoneum
8) Connective tissue and blood vessels of the organs

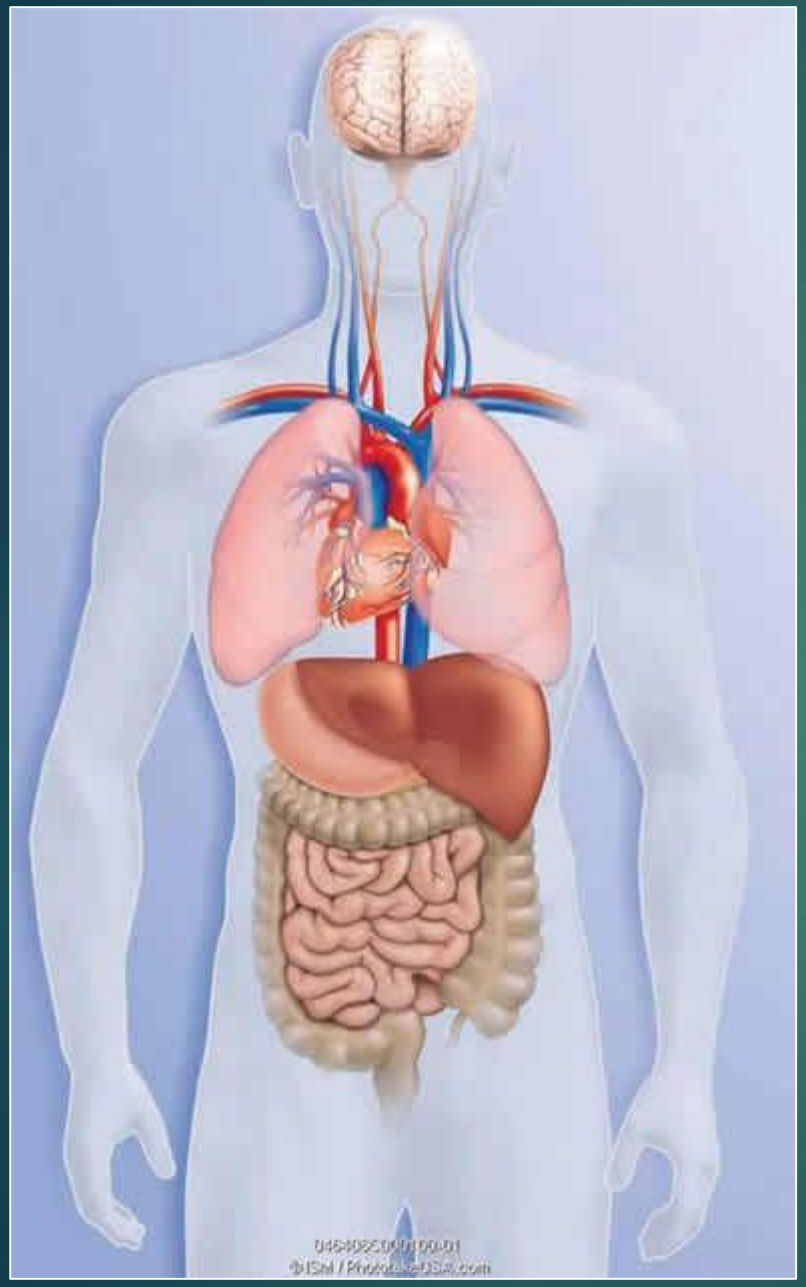
1,2,3,4,5

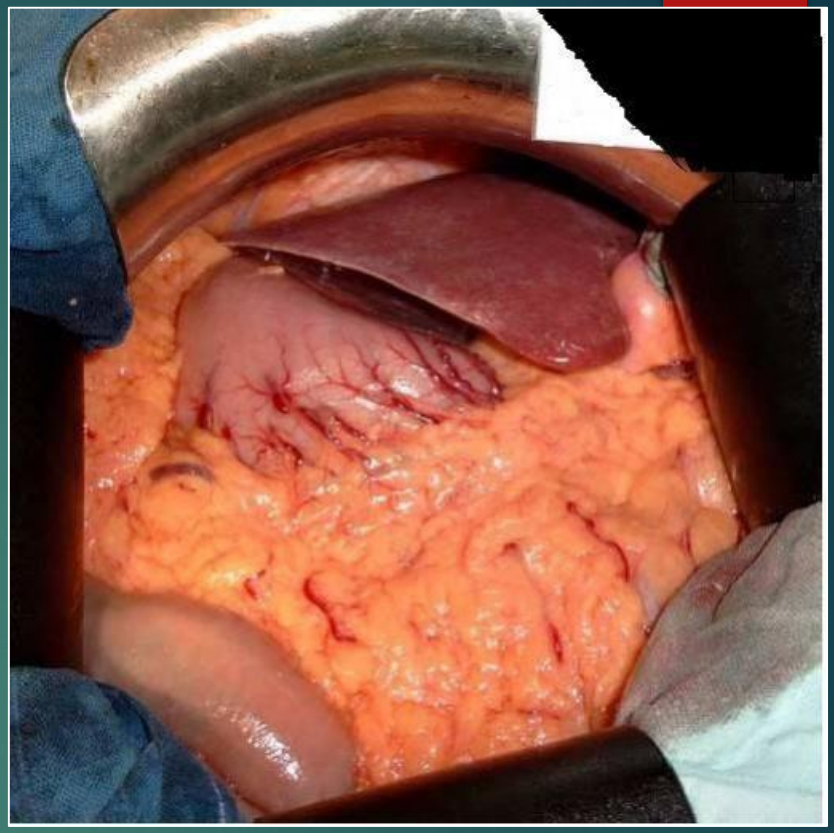
Situs viscerum inversus partialis/totalis

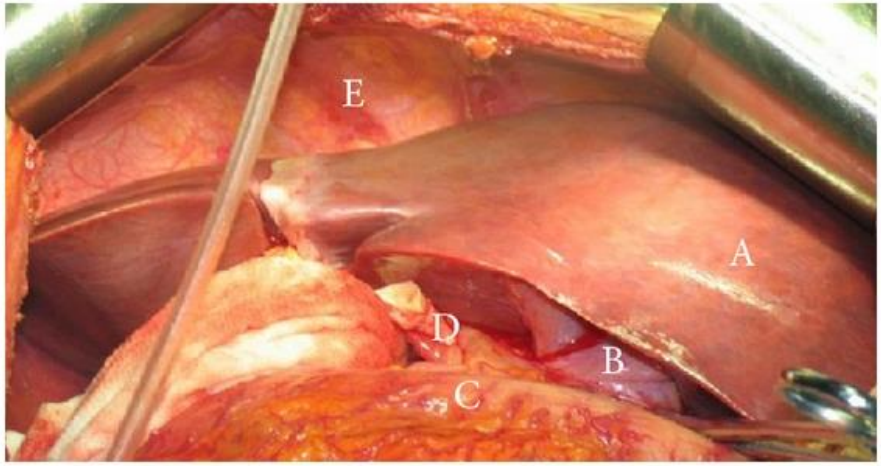


Normal position

Inverse position



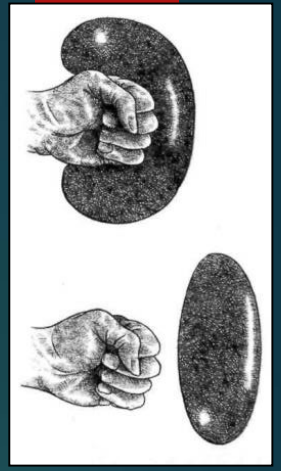



E
A
D
B
C

Development of peritoneum and its derivatives

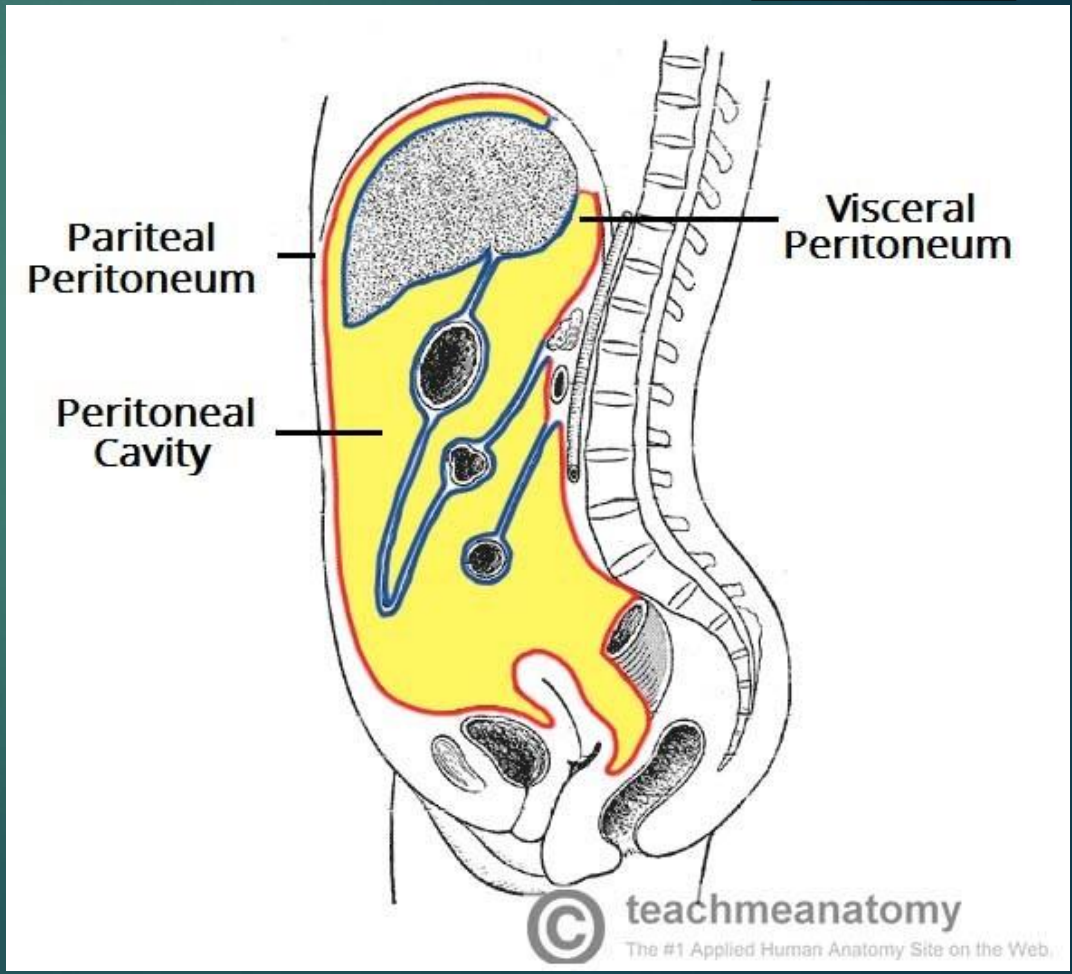
Peritoneum **is serous membrane lining organs and walls of the abdominal cavity**
It is derived from intraembryonic mesoderm

Peritoneal cavity –
a slit-like space between the parietal and visceral peritoneum

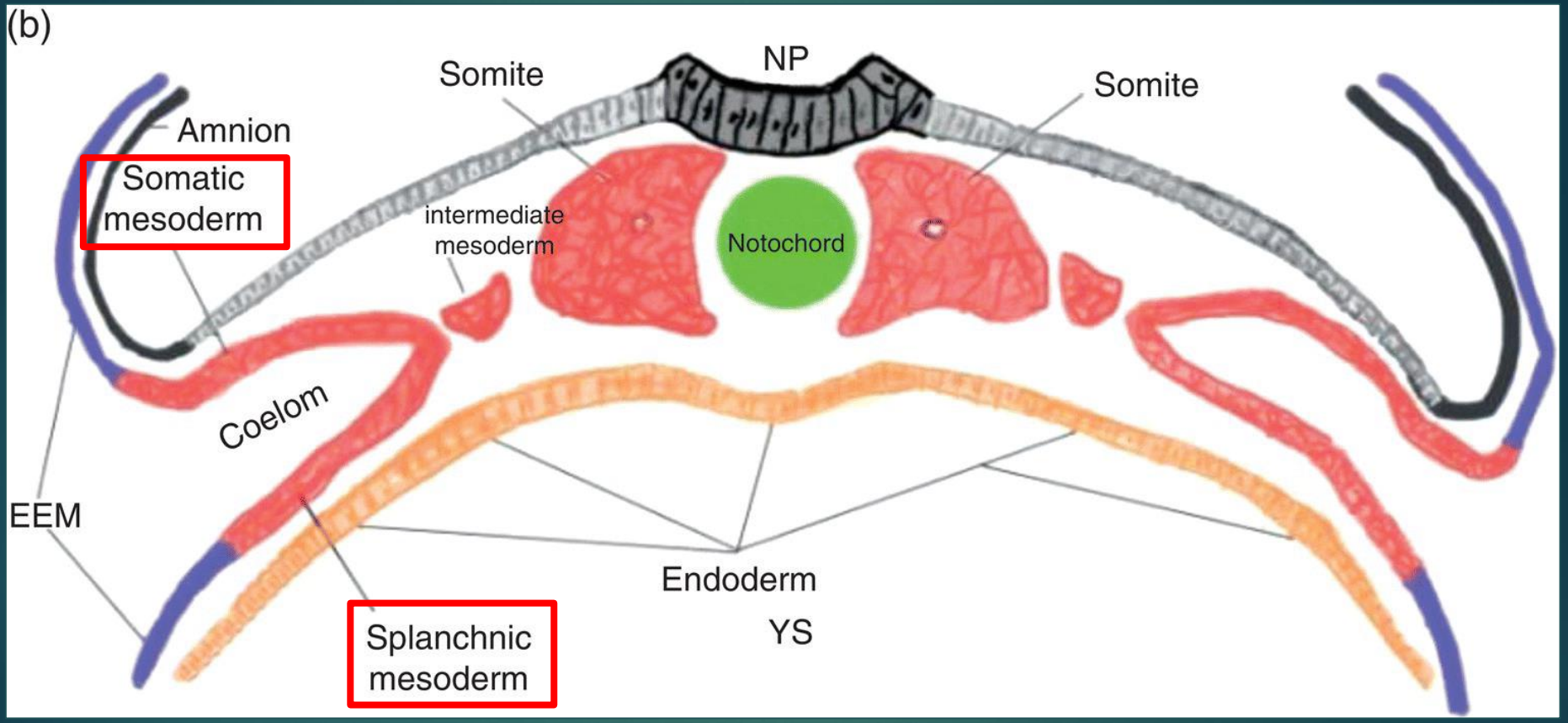


Layers of peritoneum:

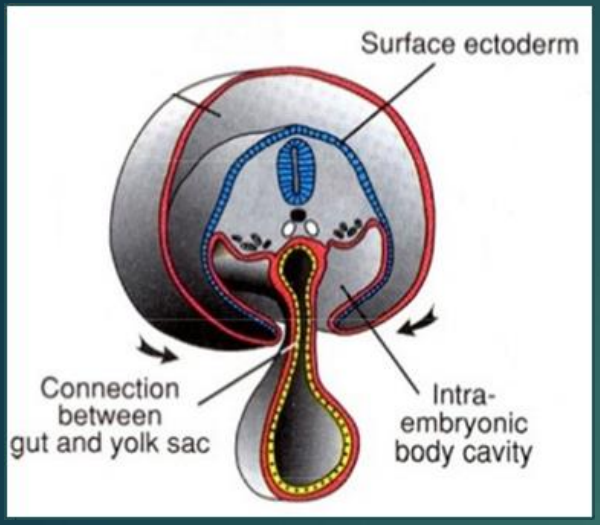
- **Parietal peritoneum** covers abdominal walls
- **Visceral peritoneum** forms serous covering of the internal organs
- Layers continue one to another without any gap

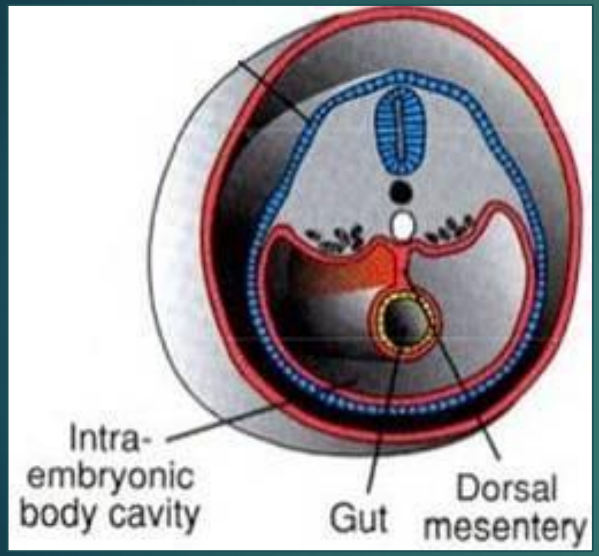


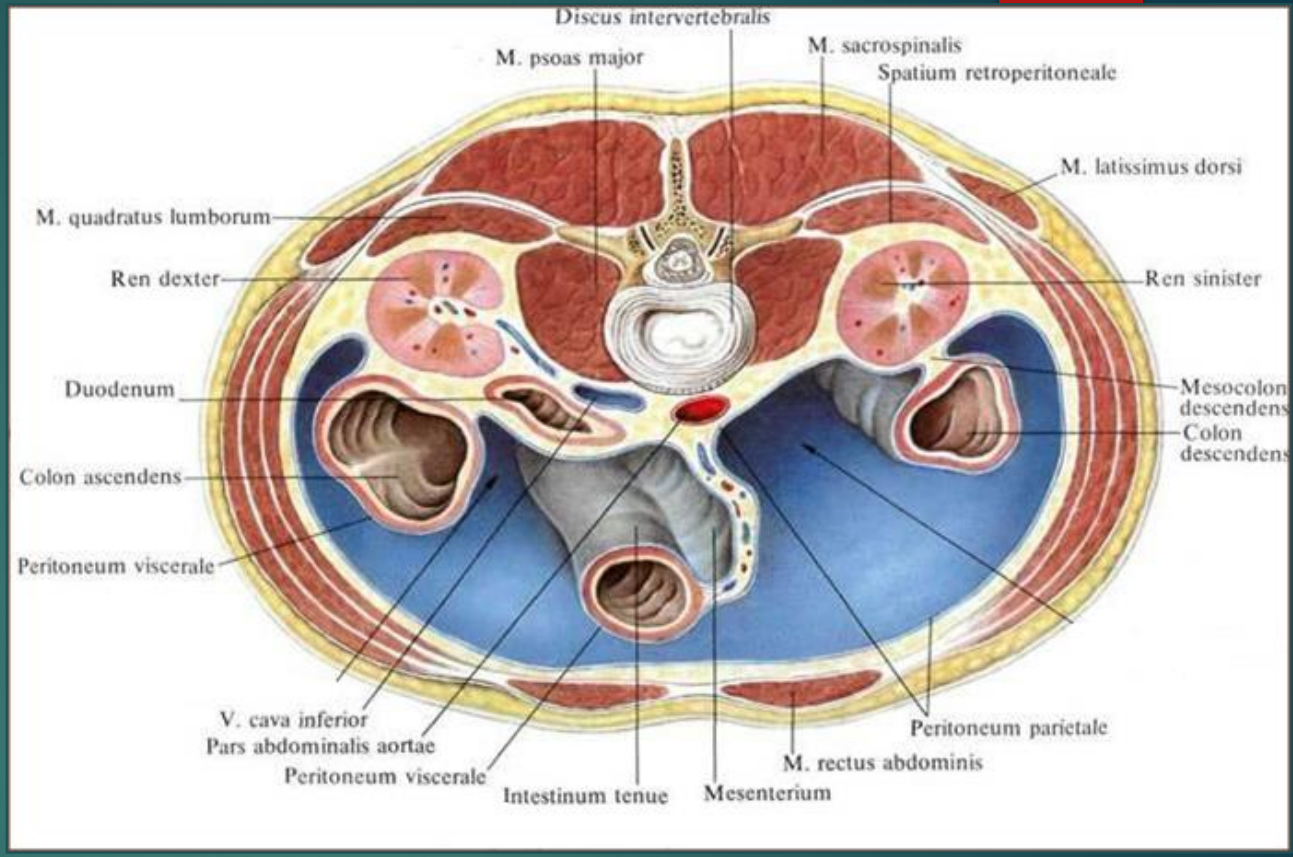
Lateral mesoderm forms two plates: somatic and splanchnic



EEM, extraembryonic mesoderm; YS, Yolk sac; NP, neural plate.

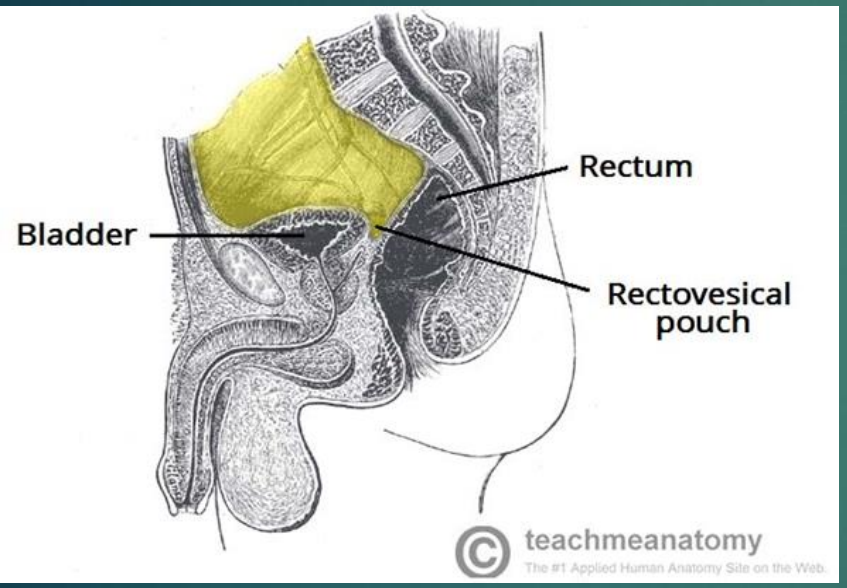


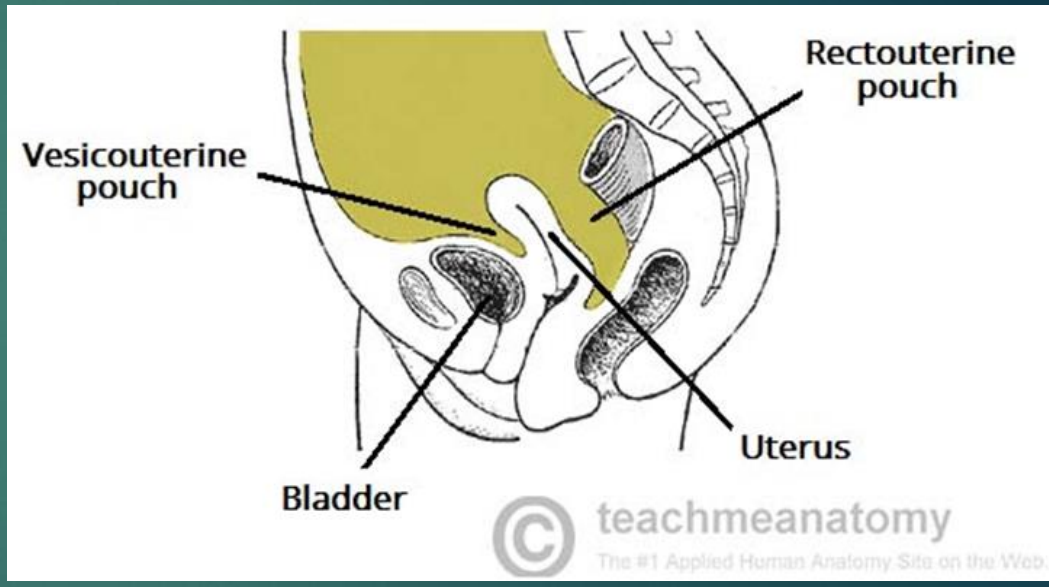




Intraembryonic body cavity (coelom) ⟹ Peritoneal Cavity
Somatic mesoderm ⟹ Parietal peritoneum
Splanchnic mesoderm ⟹ Visceral peritoneum

Peritoneal cavity – a slit-like space between the parietal and visceral peritoneum





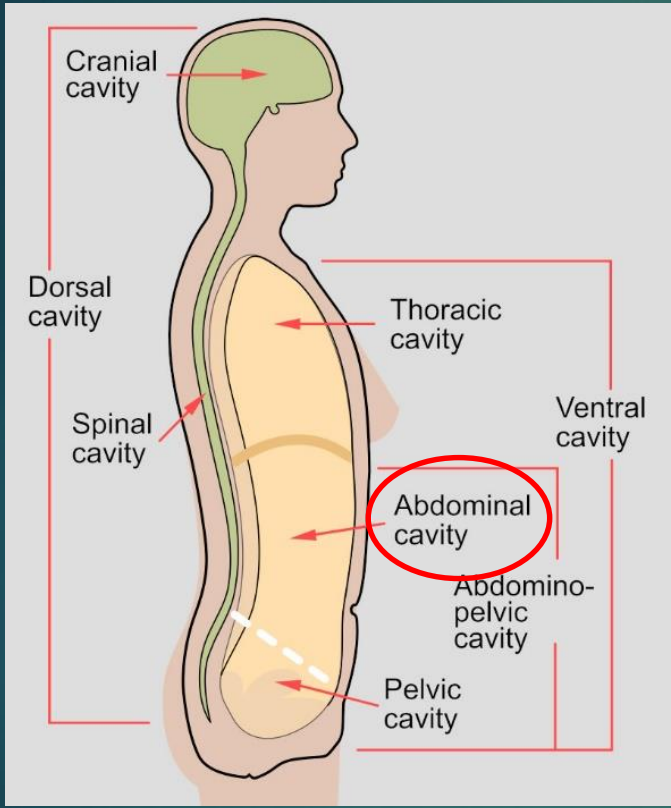
Male

– it is closed serous sac

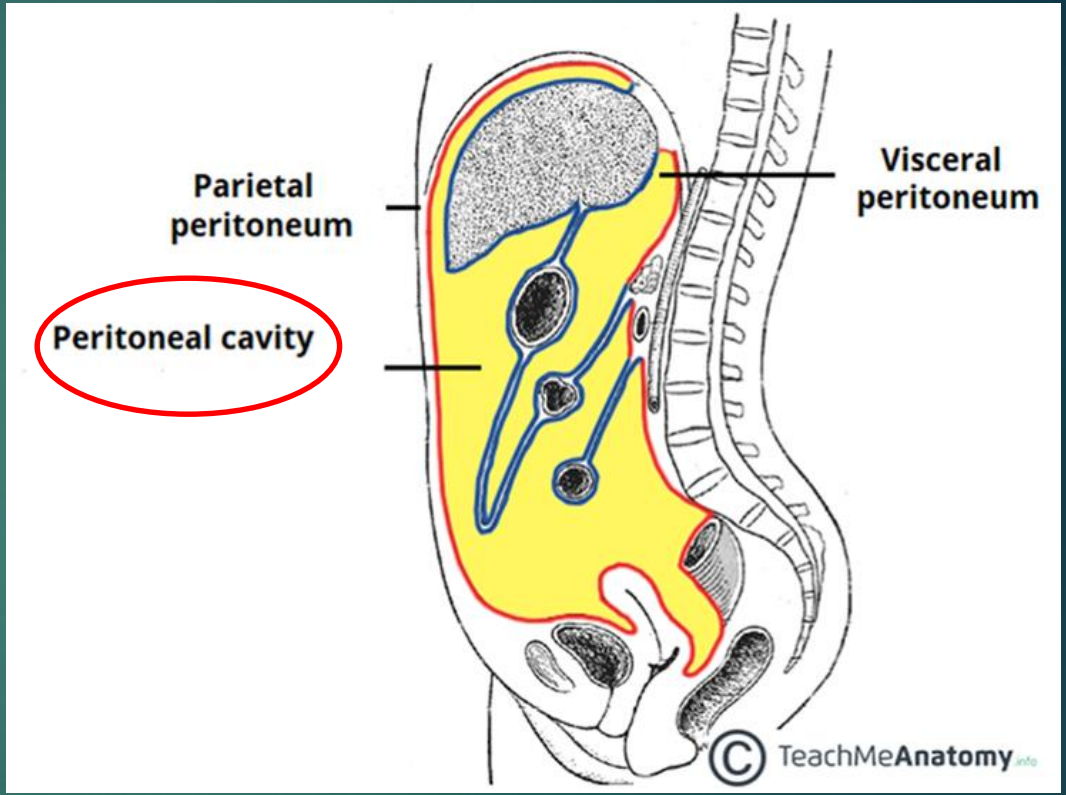
Female

– it communicates with external environment through fallopian tubes-uterine-vagina

Abdominal cavity vs Peritoneal cavity



It is a space bounded by the parietal peritoneum

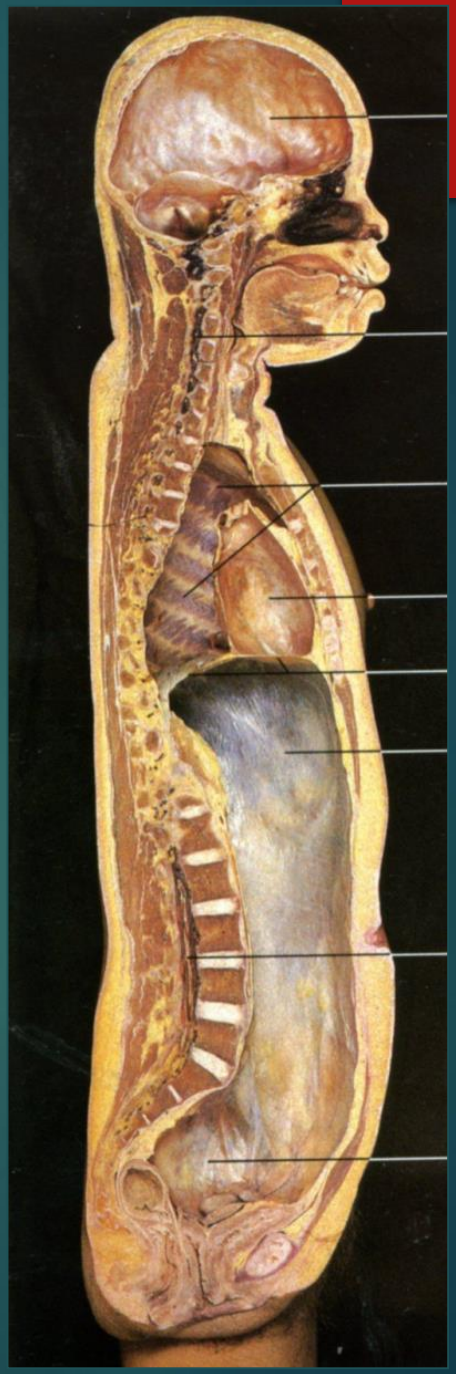


It is a slit-like space between the parietal and visceral peritoneum

Abdominal cavity

- Space in the trunk below diaphragm;
- Bounded by the endoabdominal facia

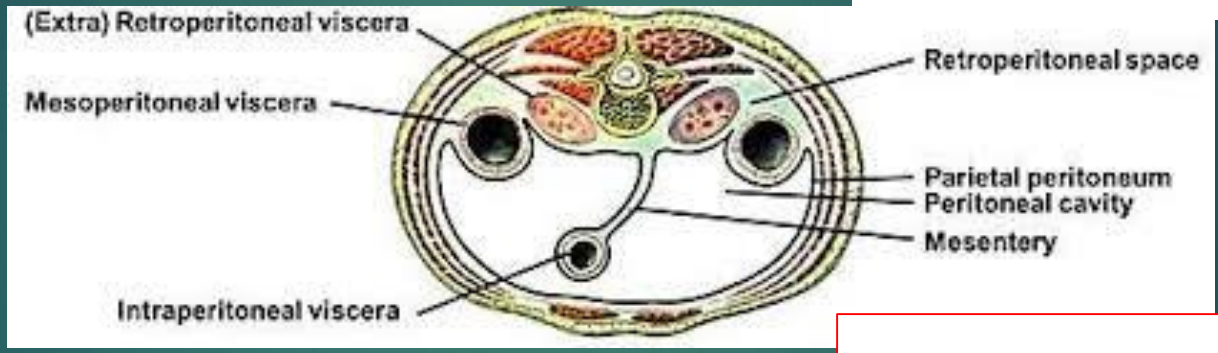
- **Walls**:
- Superior – diaphragm
- Anterior and lateral – broad muscles of abdomen
- Posterior – the lumbar segment of the spine and muscles (m. psoas major, m. quadratus lumborum)
- Inferior – iliac bones and pelvic diaphragm



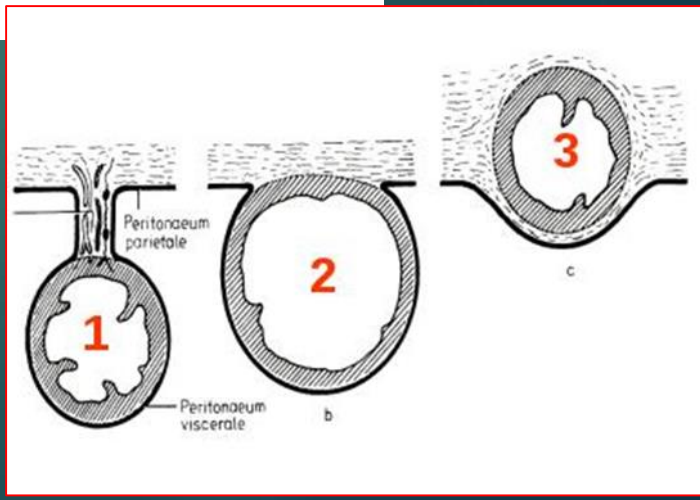
The visceral peritoneum covers the organs differently

Mesoperitoneal organ is covered by covered by the peritoneum from three sides, and one its side is fused with the abdominal wall. **2**

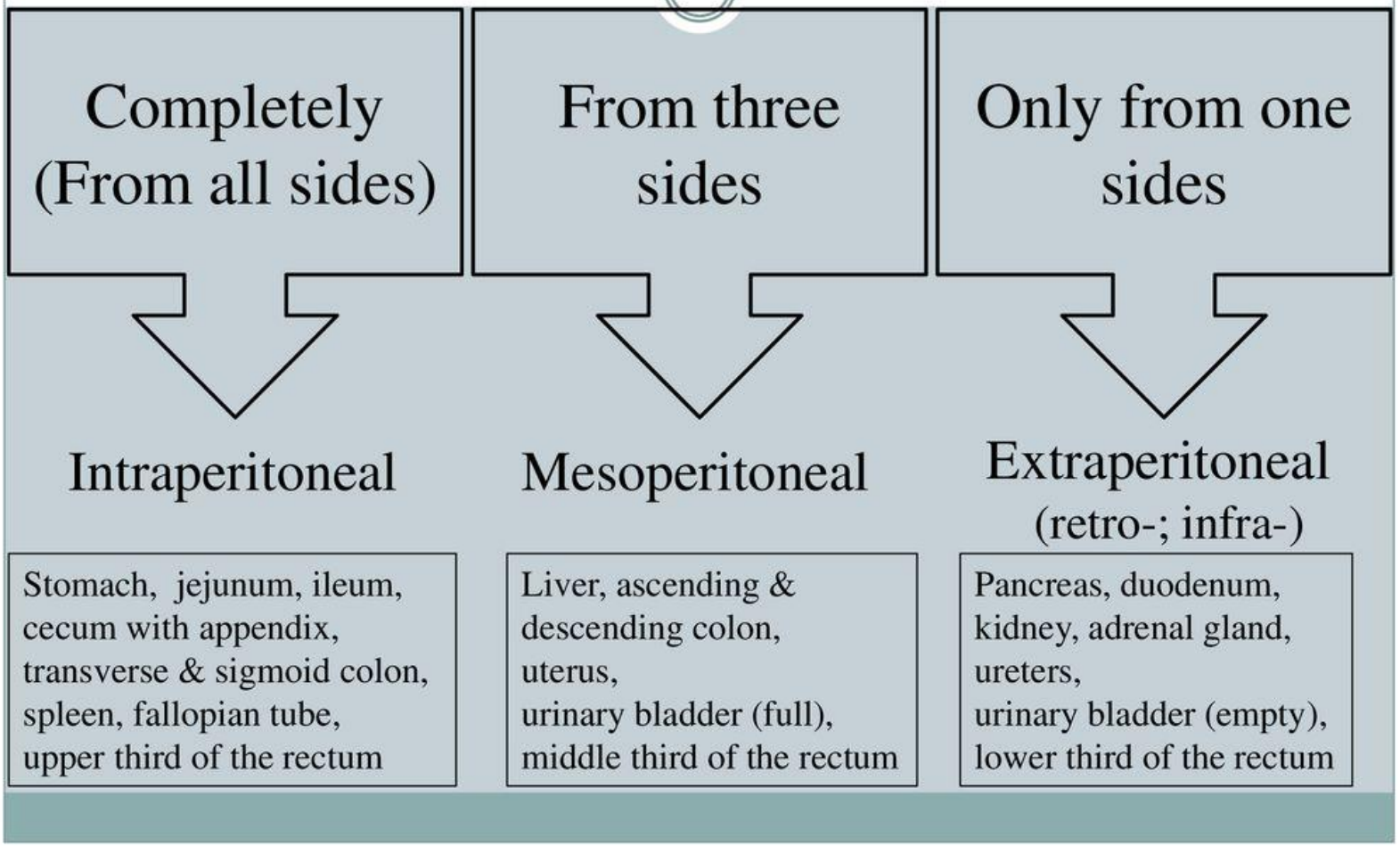
Extraperitoneal organs (located in the retroperitoneal, anteperitoneal or subperitoneal spaces) are covered be the peritoneum only from one side, while other sides have an adventitia. **3**



Intraperitoneal organ is covered by the peritoneum completely (from all sides), except a narrow area, along which the mesentery is attached. **1**

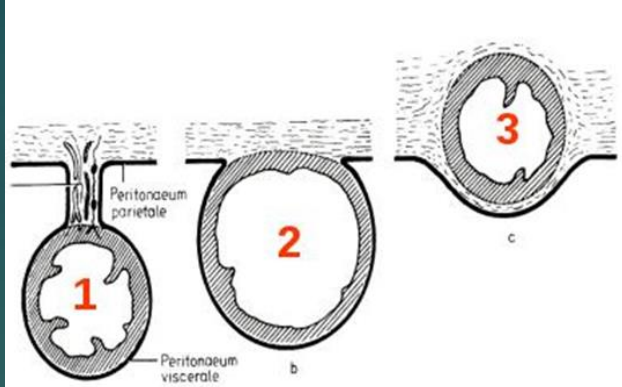


How does a peritoneum cover organs?



* Only one organ is intraperitoneal but has no mesentery.
Thus is the caecum, which has the form of a sack, fixed to the ascending colon.
** Only one organ has a particular relation to the peritoneum. This is the ovary. It is covered by a single layer of the embryonic mesothelium and situated inside the peritoneal cavity, intra cavum peritonei.

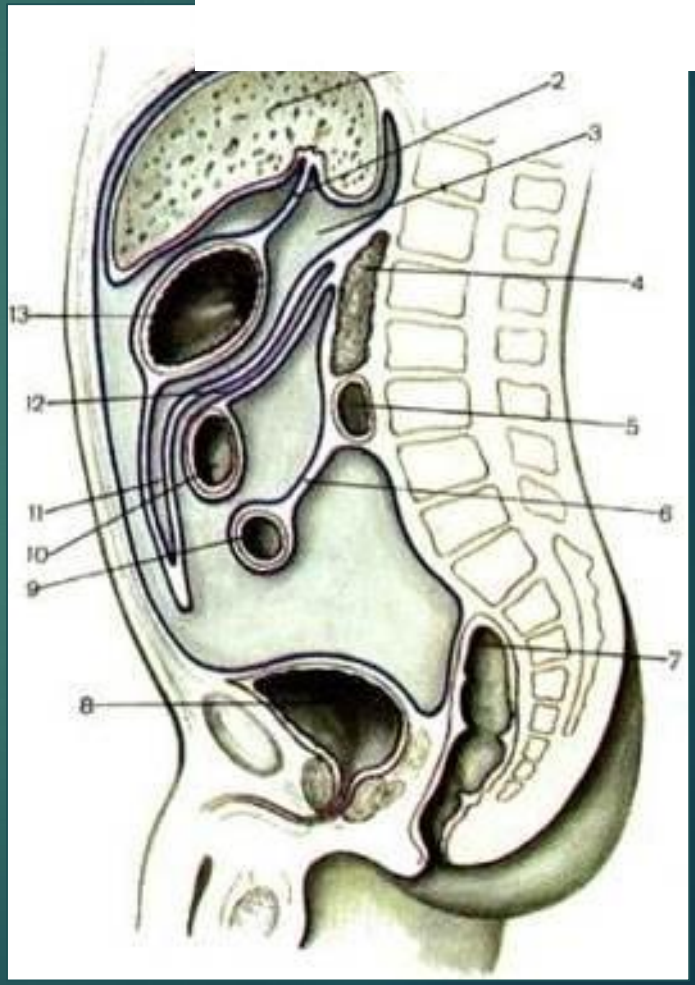
Position of the organs



Intraperitoneal

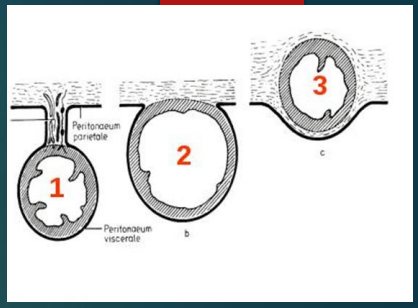
totally covered by peritoneum

- Liver (?-area nuda=bare area)
- Stomach (++)
- Spleen
- Jejunum (+)
- Ileum (+)
- Caecum (-)!
- Appendix vermiformis (+)
- Sigmoid colon (+)
- Superior part of rectum (+)
- Uterus (+) ?



+ - presence of mesenterium

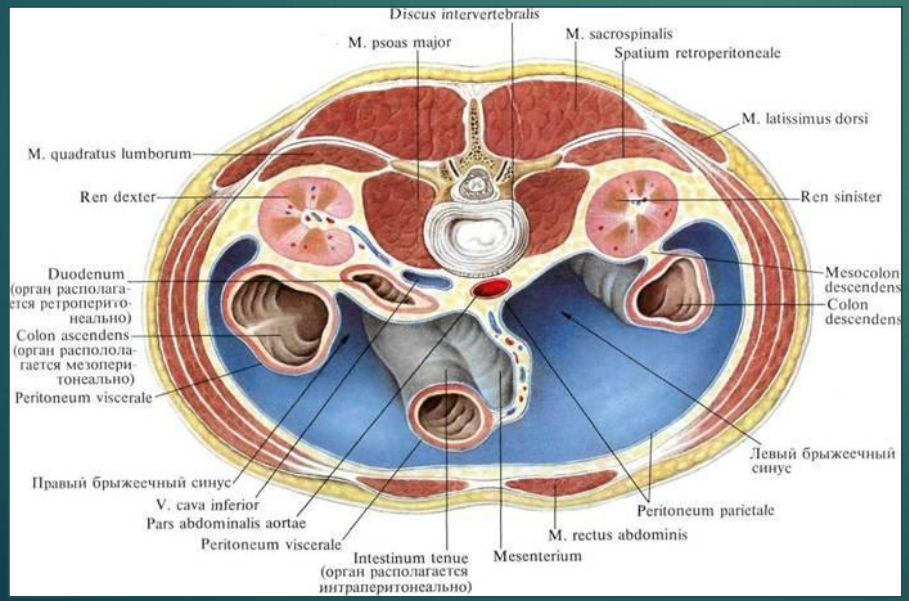
Position of the organs

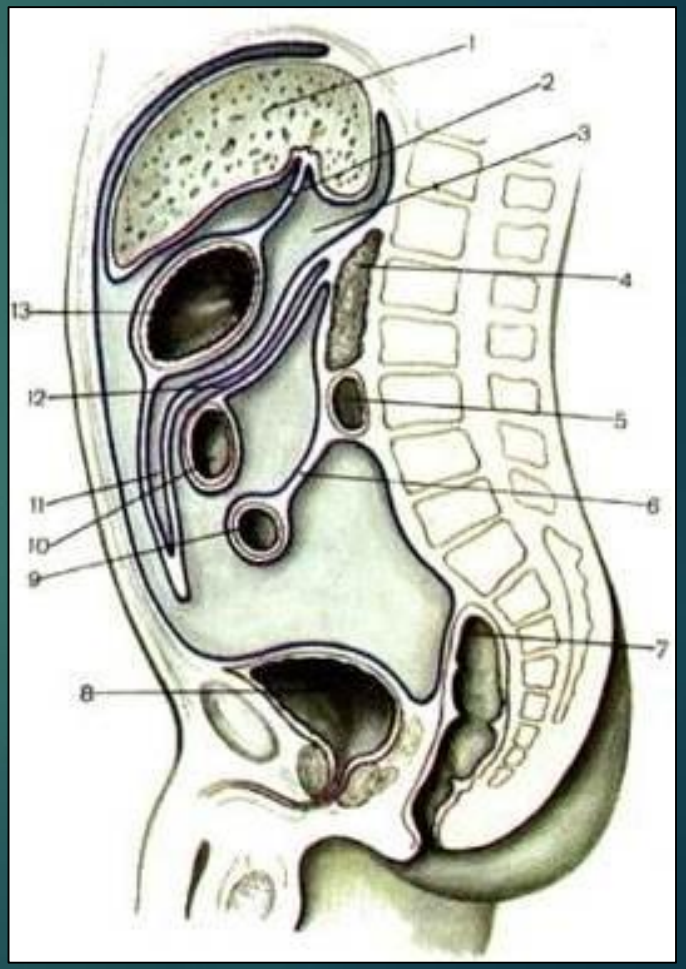


- **Mesoperitoneal**

3 sides are covered (the 4th side is covered by adventitia)

- Ascending and descending colon
- Middle part of the rectum
- Full gallbladder and urinary bladder
- Liver (?-area nuda)
- Uterus (? – vaginal part of the cervix uteri)



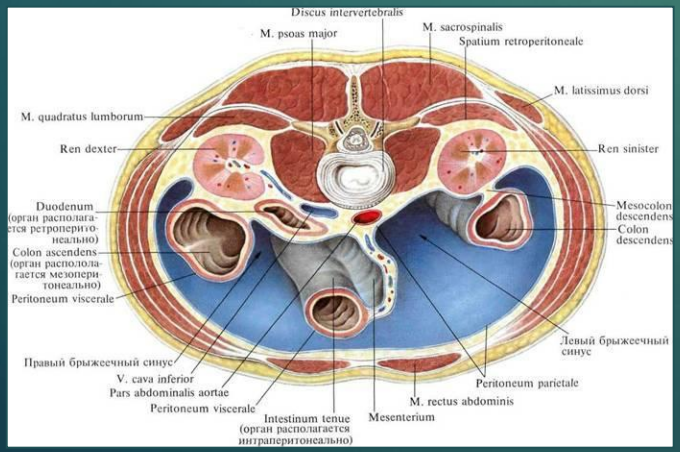


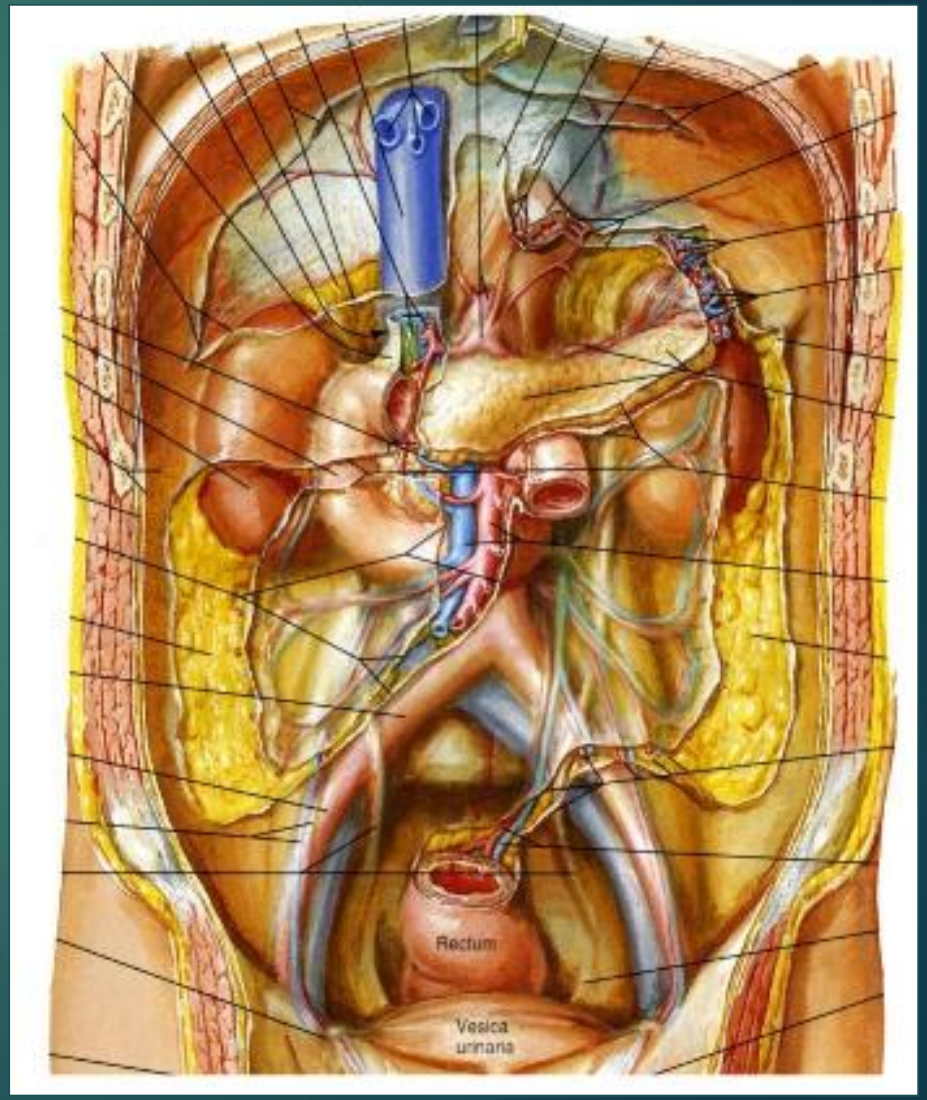
Position of the organs

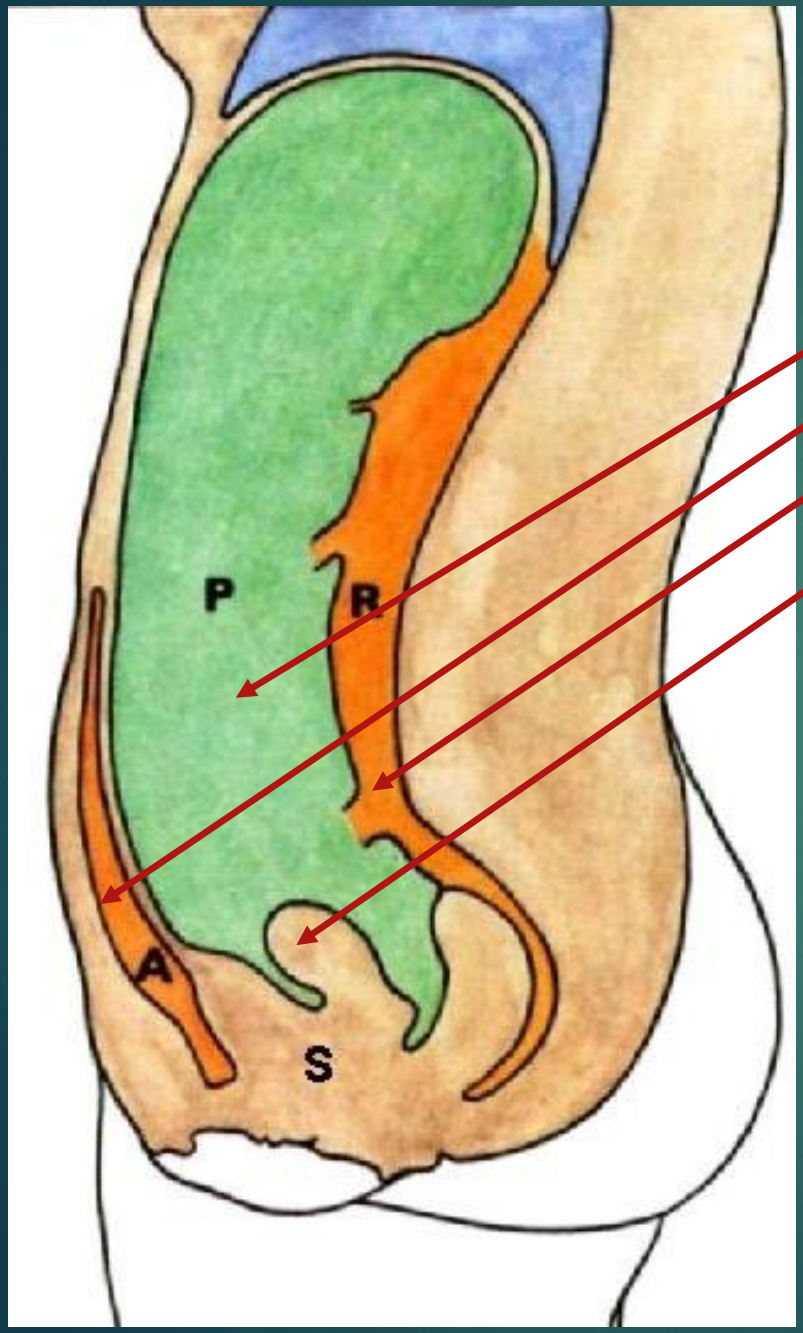
- **Extraperitoneal / retroperitoneal**

not covered (or only 1 side)

- Duodenum
- Pancreas
- Kidney
- Ureter
- Empty gallbladder and urinary bladder

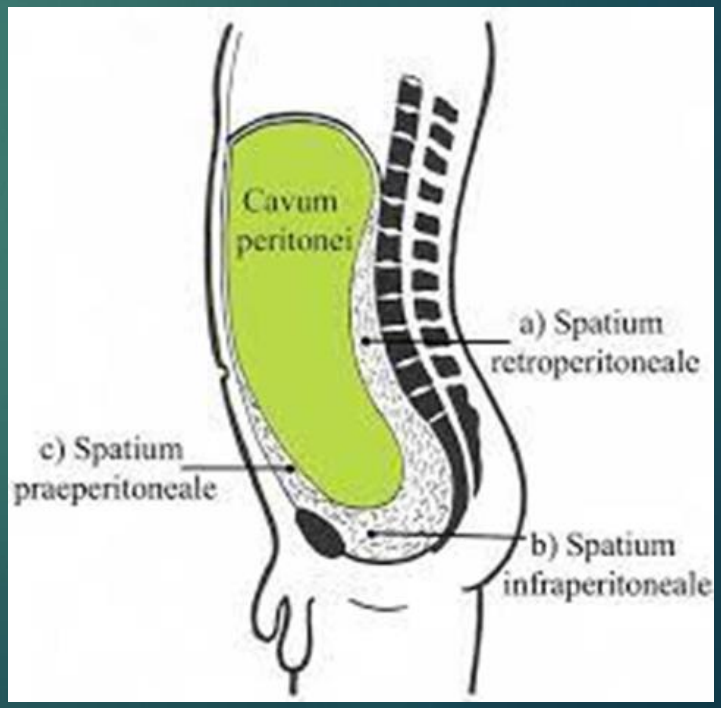






CAVITAS ABDOMINALIS

P – cavitas peritonealis
A – spatium preperitoneale
R – spatium retroperitoneale
S – spatium subperitoneale (infraperitoneale)



Retroperitoneal space

- Space between the endoabdominal fascia of the posterior abdominal wall and the peritoneum
- filled with the fat and the organs:

✓ duodenum,

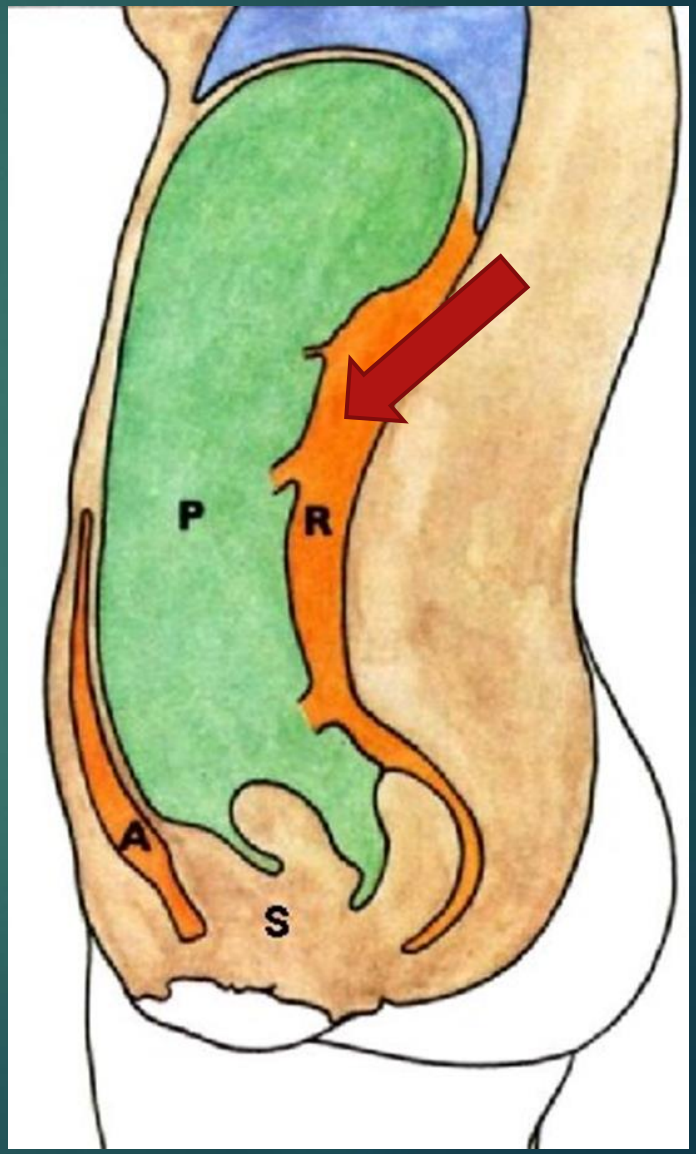
✓ pancreas,

✓ adrenal glands,

✓ kidneys,

✓ aorta,

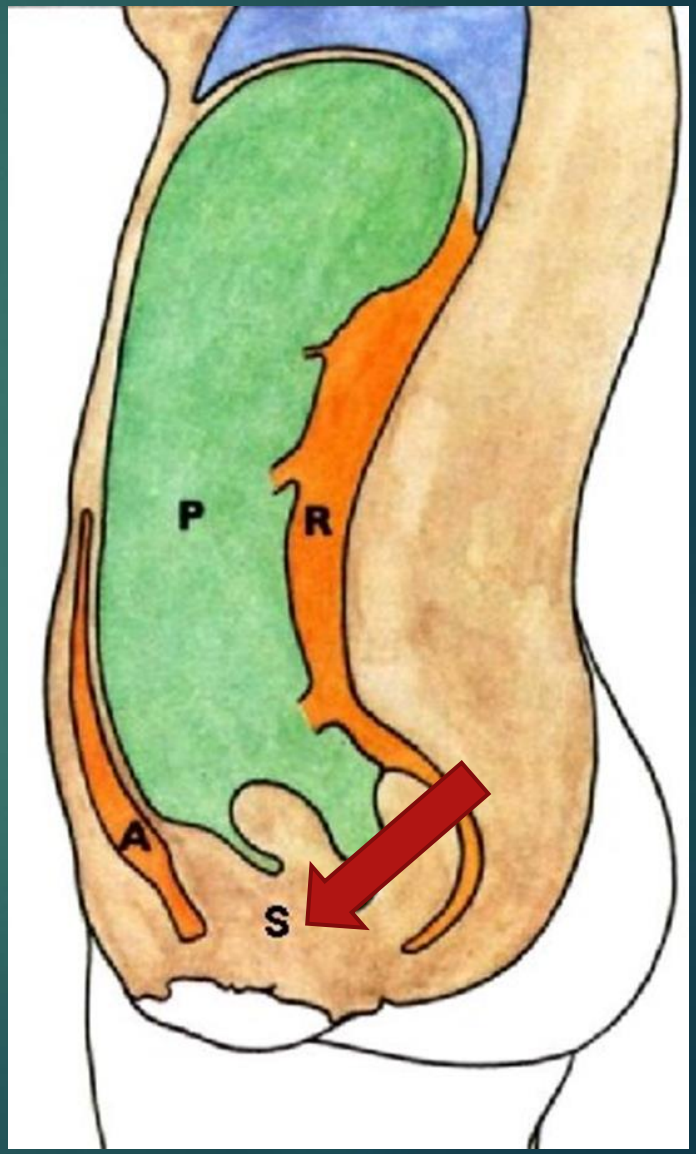
✓ inferior vena cava etc.



Subperitoneal (infraperitoneal) space

- Space on the bottom of the lesser pelvis between the parietal peritoneum and pelvic fascia
- contain the fat and the organs:

✓ prostate,
✓ seminal vesicles in males,
✓ the cervix of the uterus in females.
✓ the part of the vagina in females.

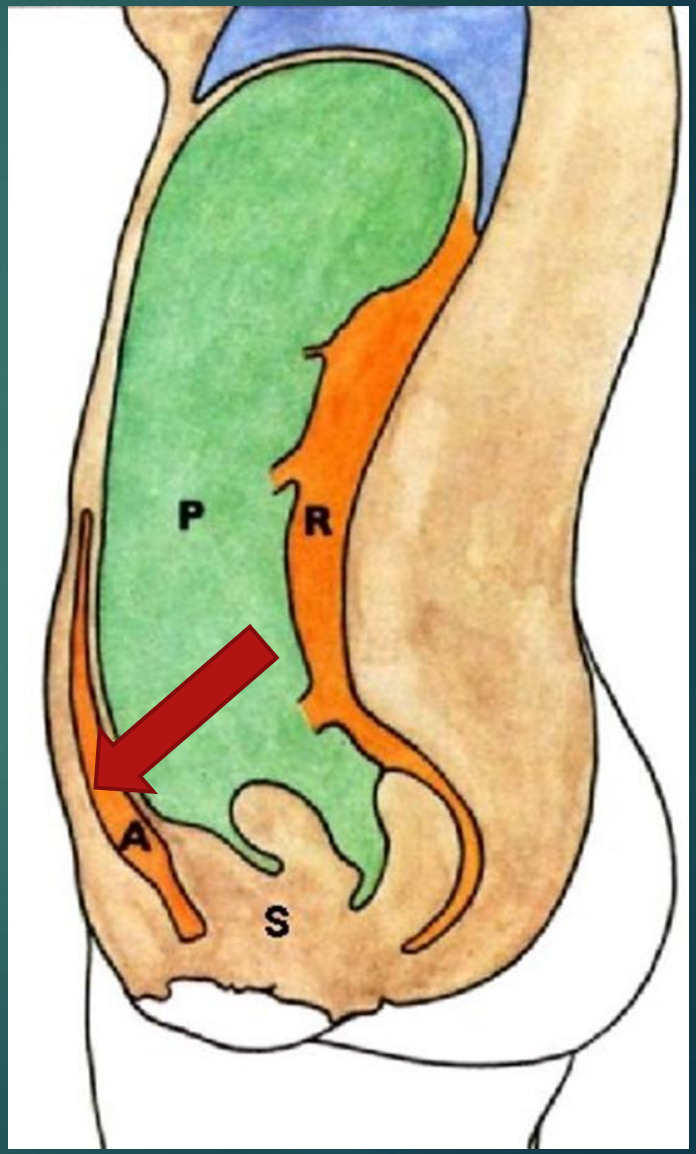


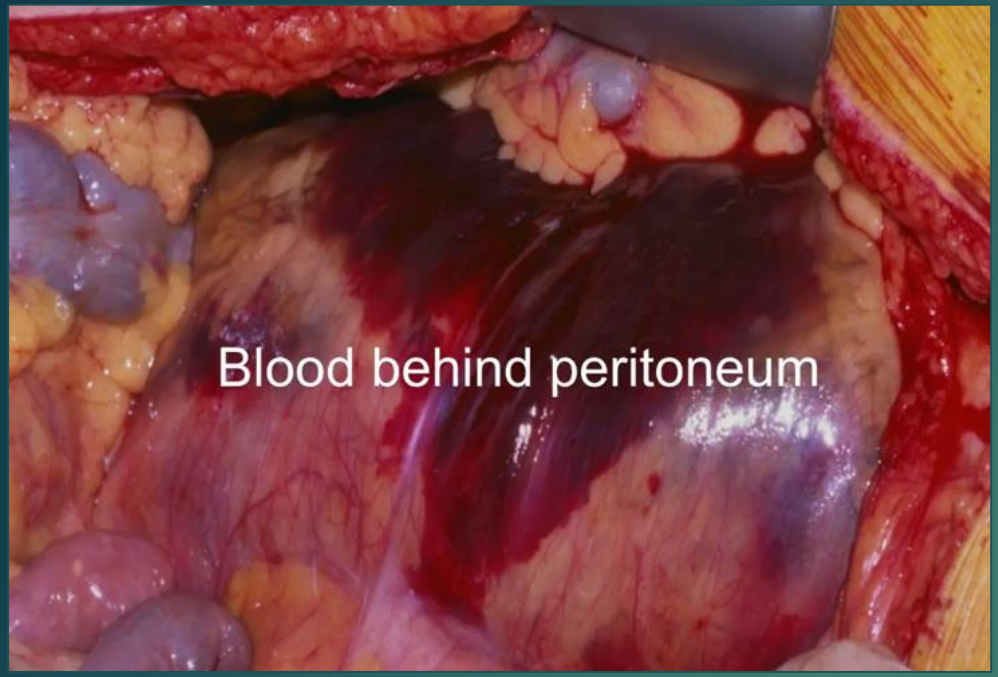
Anteperitoneal (praeperitoneal) space

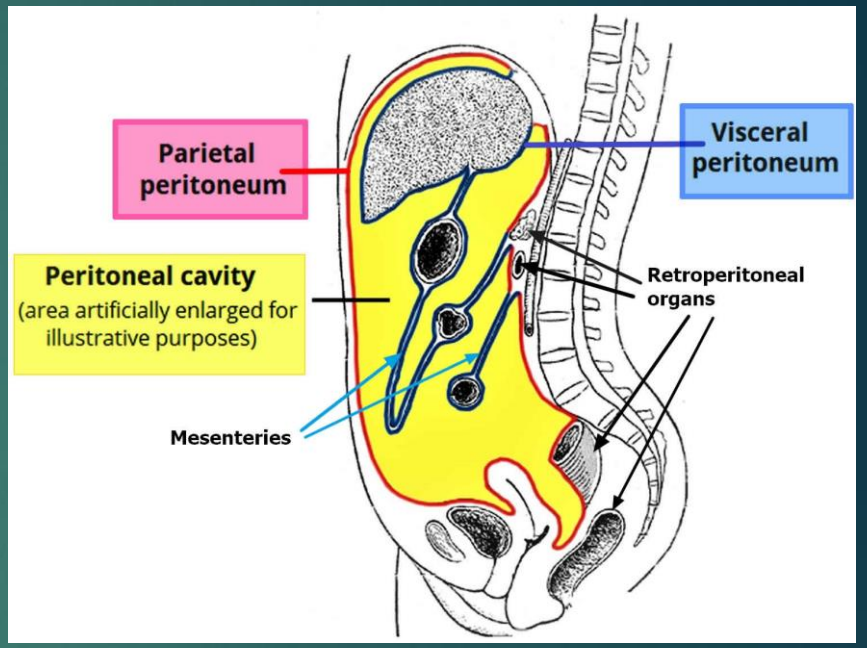
- Space is in the area of the urinary bladder (on the anterior wall of the lesser pelvis).

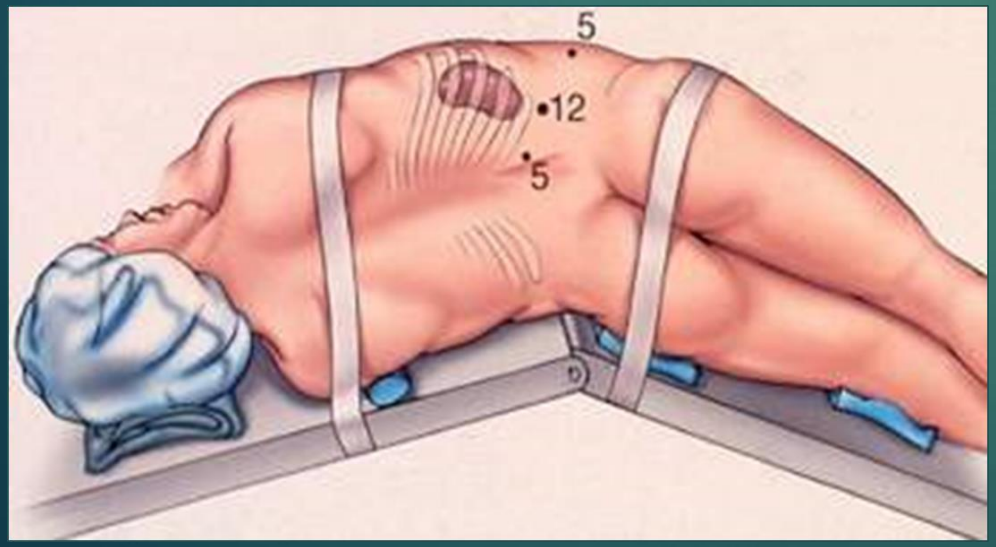
- Includes:

✓ the retropubic space, *spatium retropubicum*,
✓ retroinguinal space, *spatium retroinguinale*.





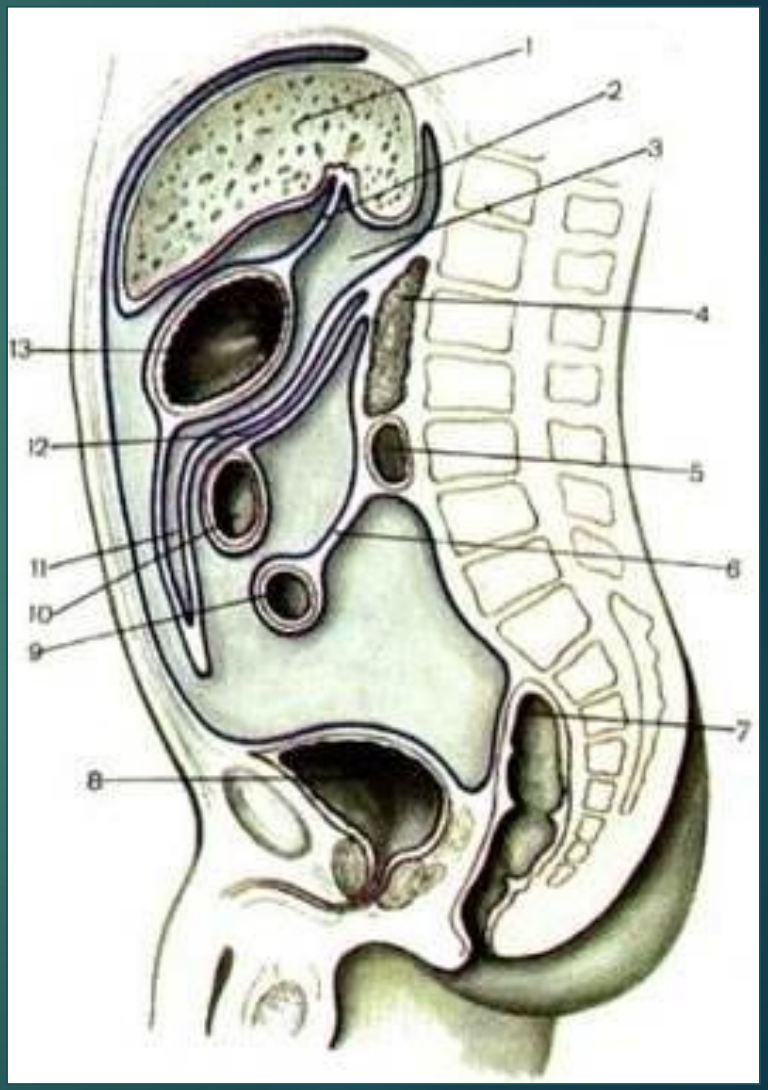




Kidney access surgery

Derivatives of the peritoneum

- Ligaments
- Mesentery (mesenterium and mesolon)
- Omenta (majus and minus)
- Folds

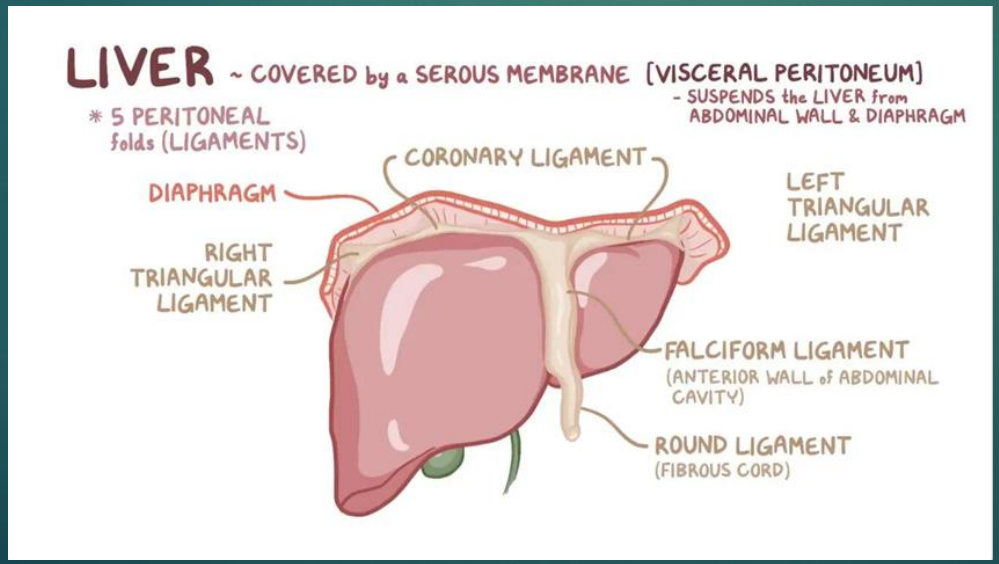


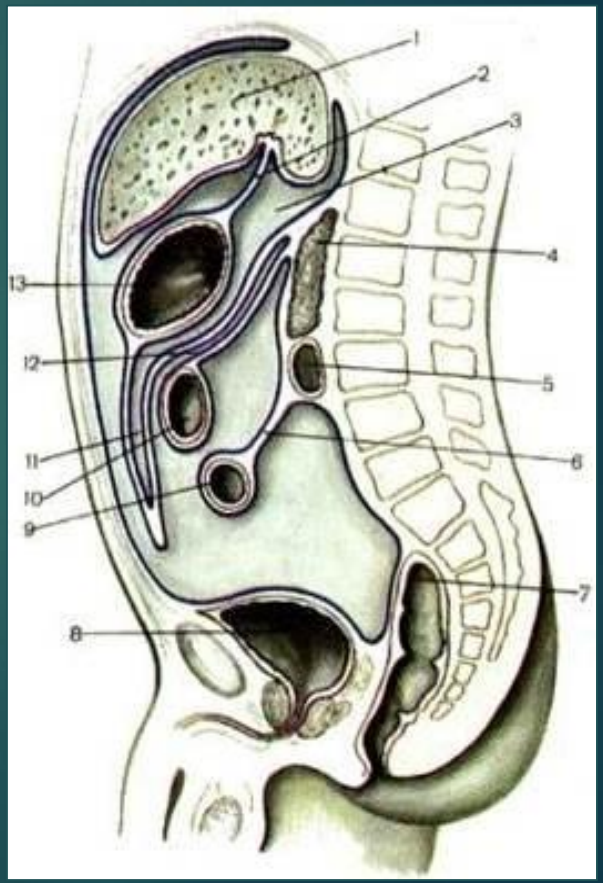
1 Derivatives of the peritoneum

Ligaments = 1 or 2 layers of peritoneum

- Lig. falciforme
- Lig. coronarium
- Lig. hepatogastrica
- Lig. hepatoduodenale
- Lig. hepatorenale
- etc.

Important for fixation of the organs to the abdominal wall





2 Derivatives of the peritoneum

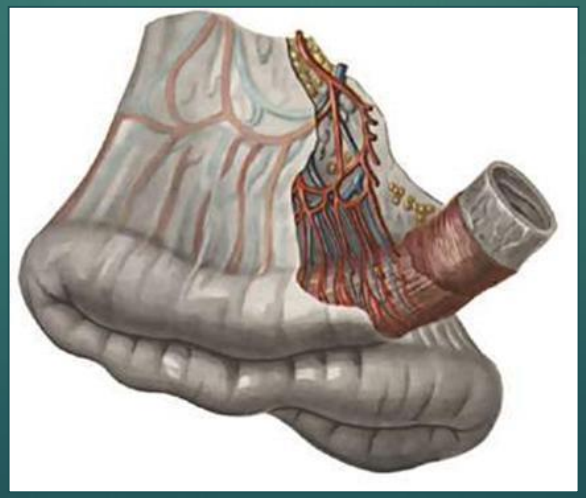
Mesentery =

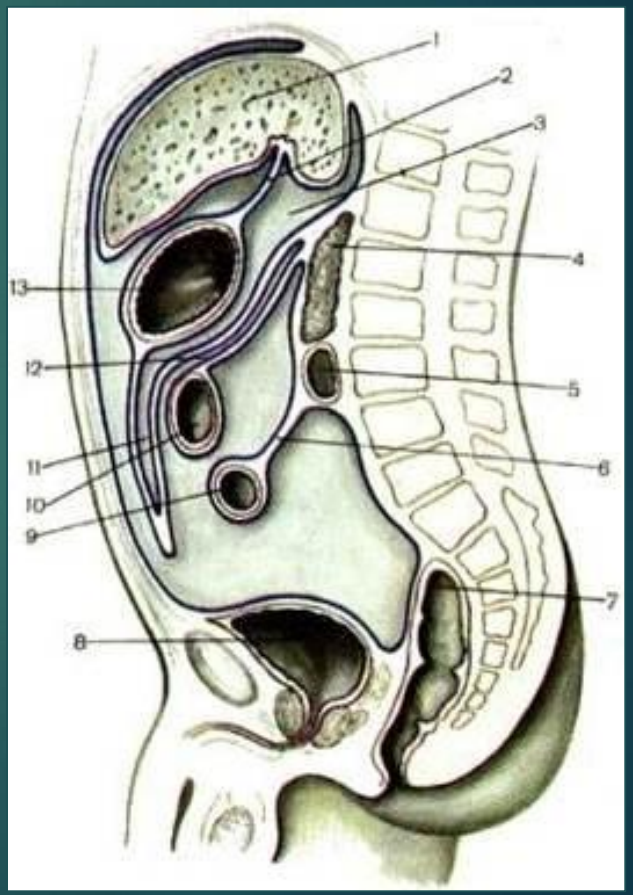
= 2 layers of peritoneum + vessels and nerves

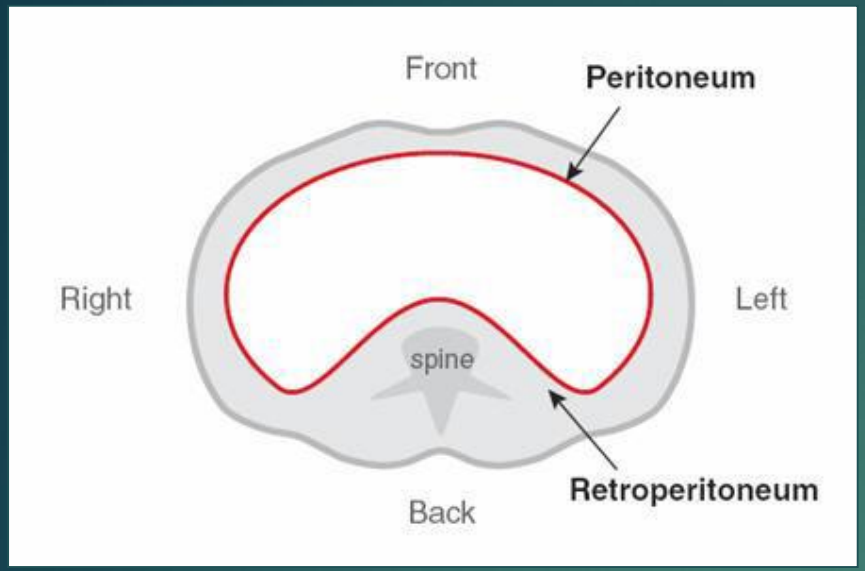
- Structures that suspend visceral organs from the body wall
- Carry arteries, veins, lymphatic vessels and nerves

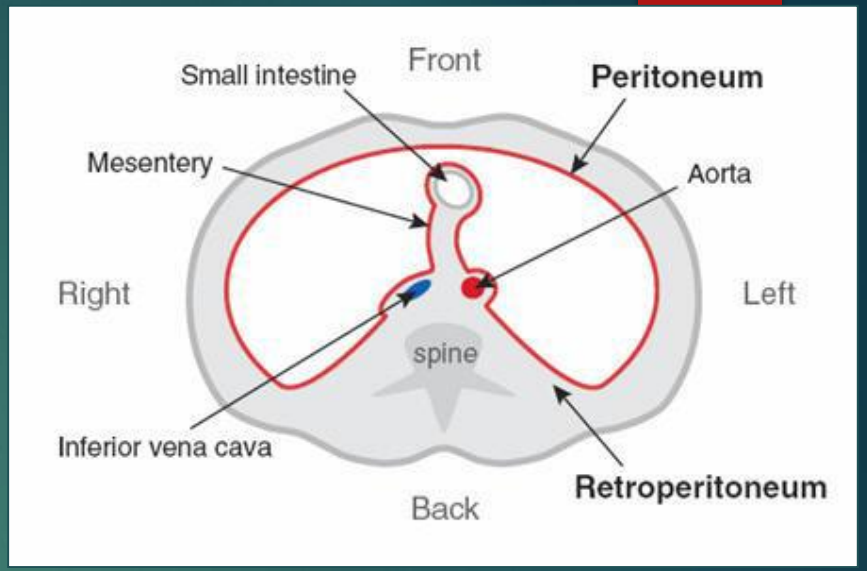
Meso + Greek name of the organ

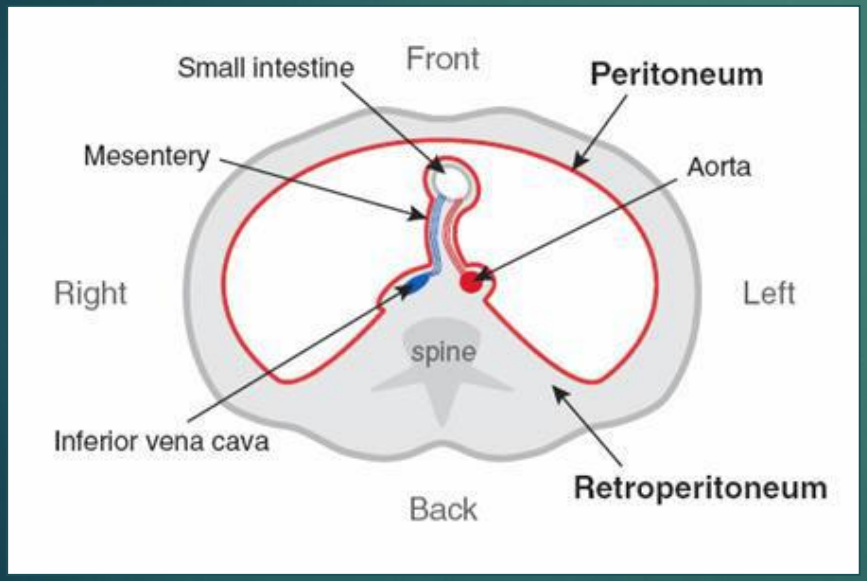
- The mesenterium (small intestine)
- The mesoappendix
- The transverse mesocolon
- The sigmoid mesocolon

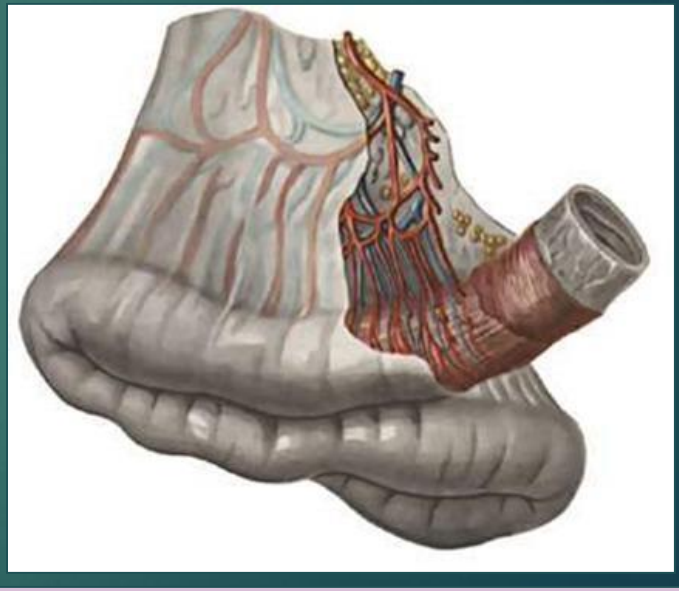






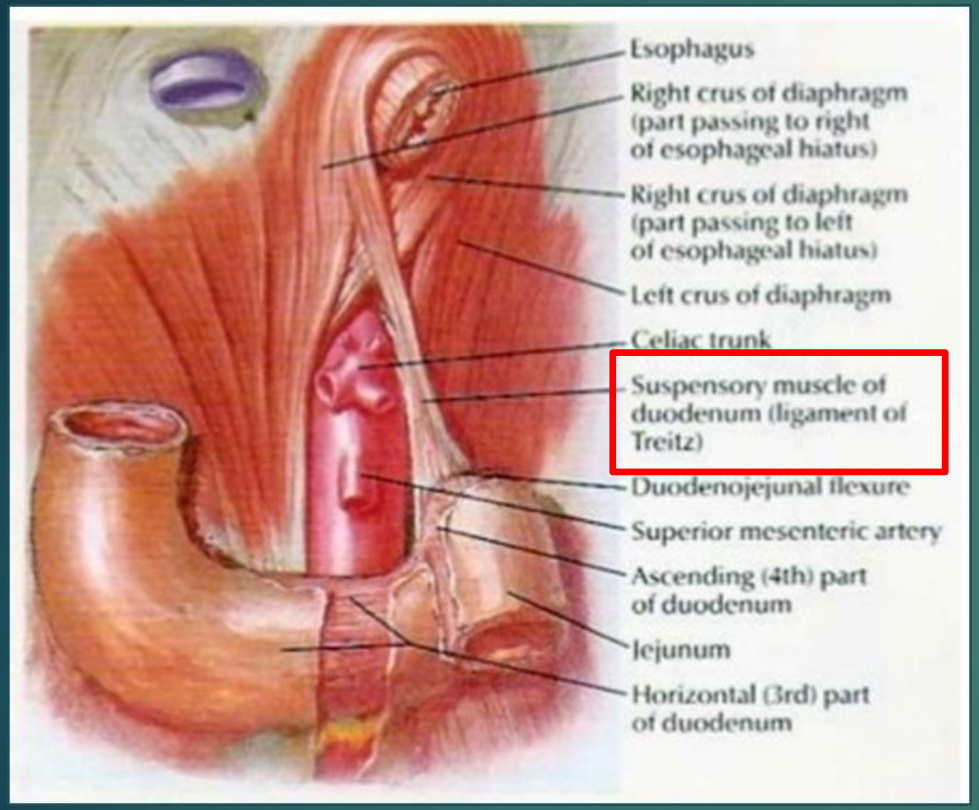




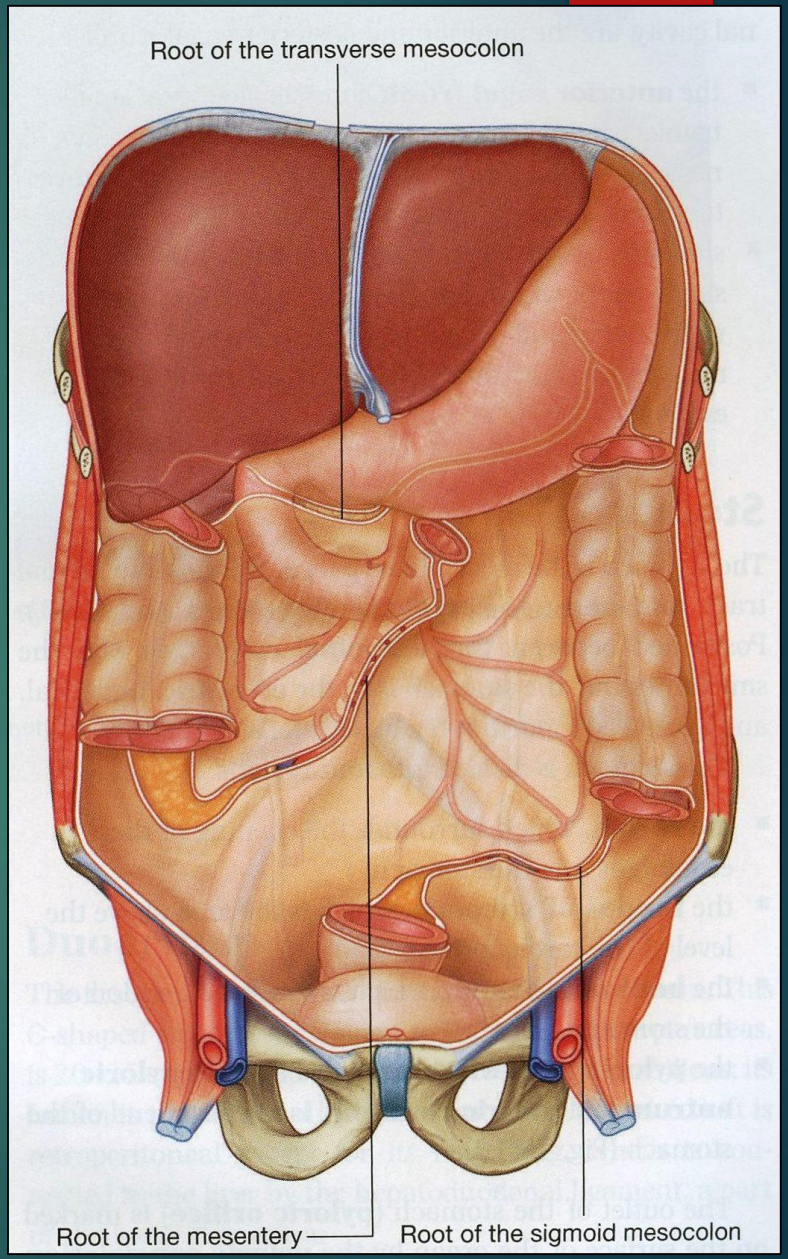


Mesenteries are established as the visceral organs grow into the intraembryonic coelom and carry their mesothelial covering and vessels with them

The root of mesentery

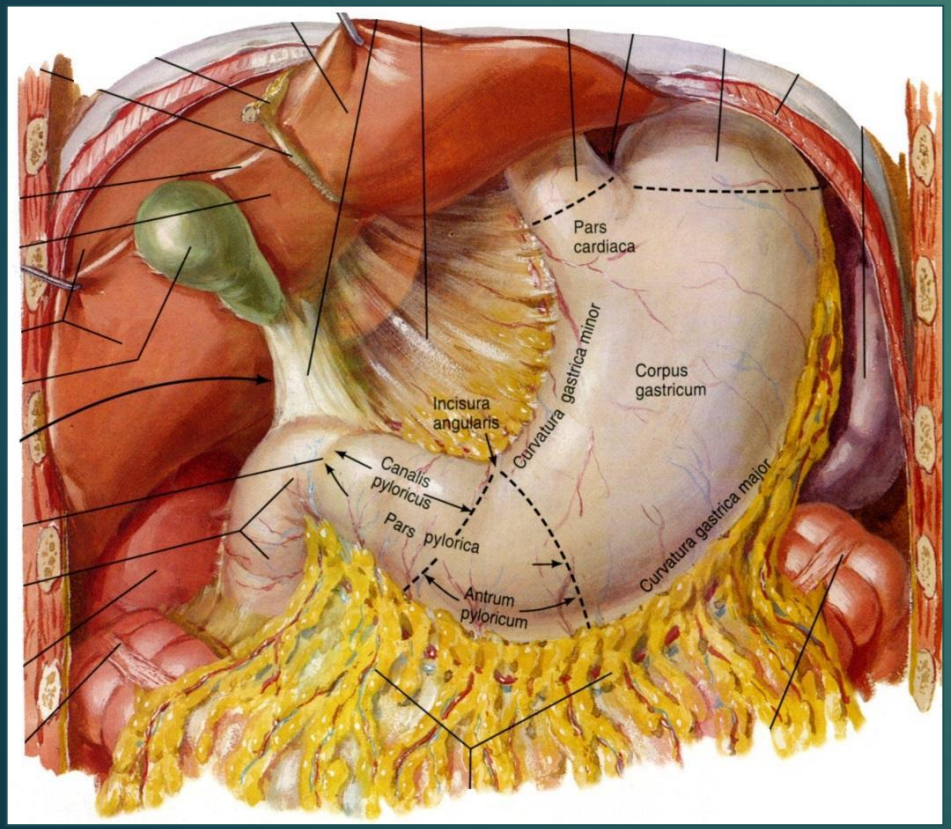


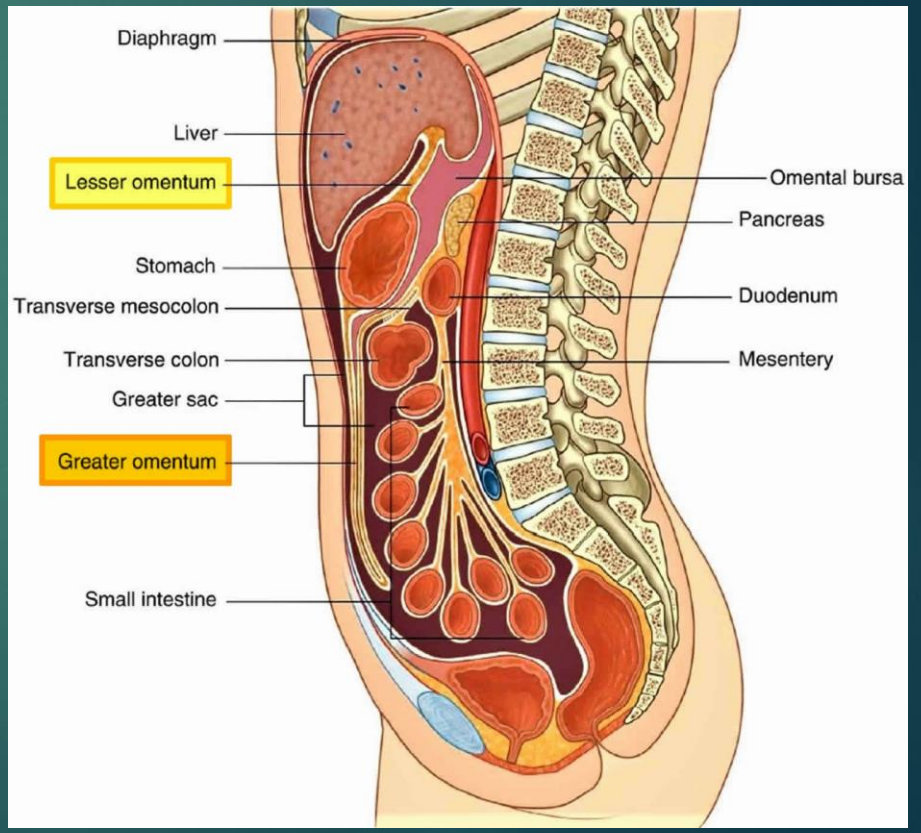
Ligament of Treitz



3 Derivatives of the peritoneum

Omentum= 2 or 4 layers of peritoneum + fatty tissue





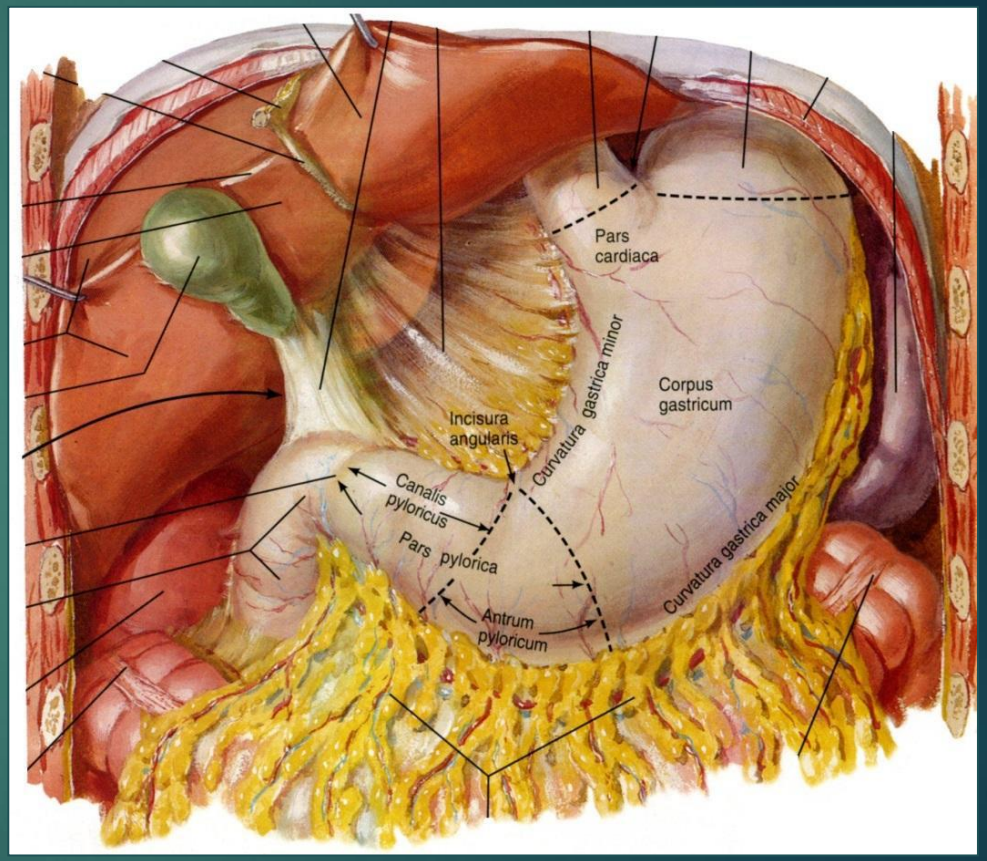
Lesser omentum, *omentum minus*

Omentum minus = 2 layers of peritoneum + fatty tissue

- Lig. hepatogastricum
- Lig. hepatoduodenale

Contain:

- Ductus hepaticus communis
- V. porta
- A. hepatica

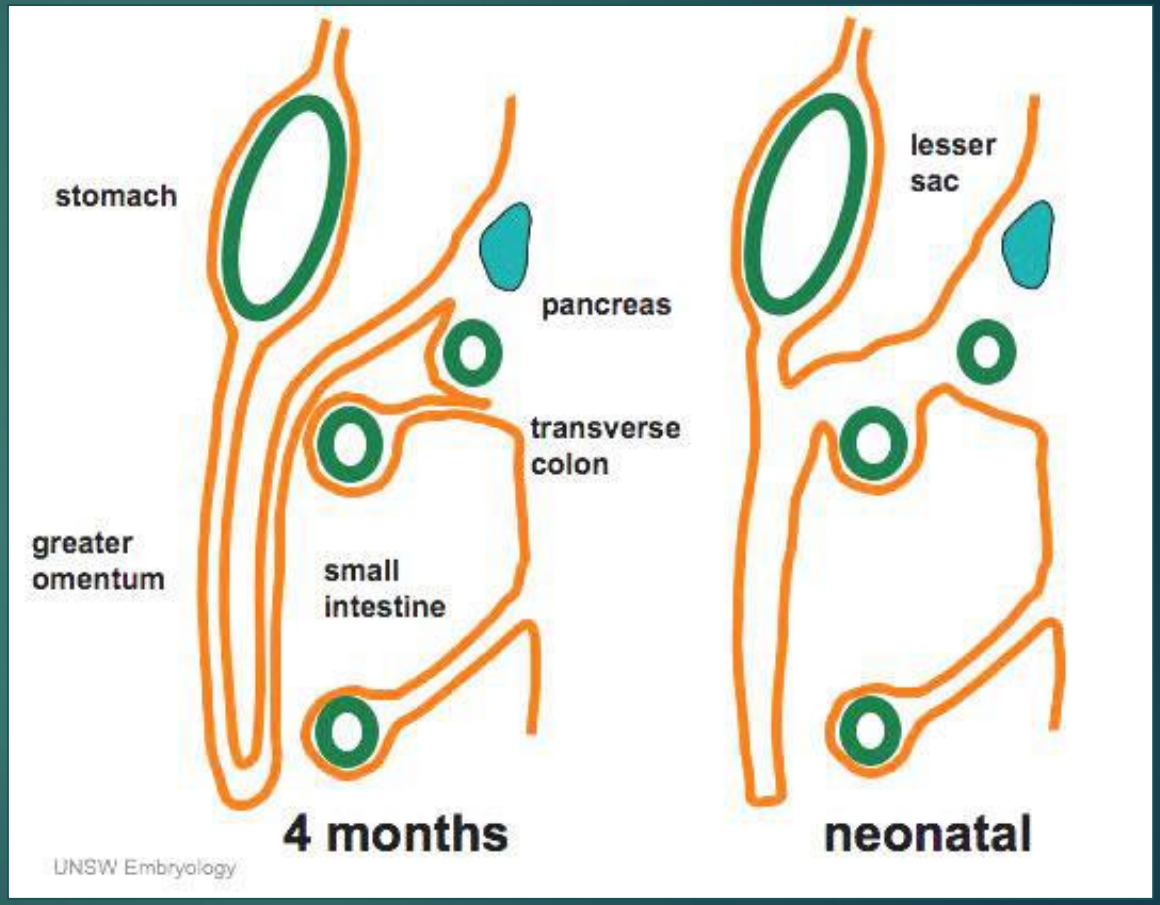


Omentum minus - ventral mesentery of the stomach

Greater omentum, *omentum majus*

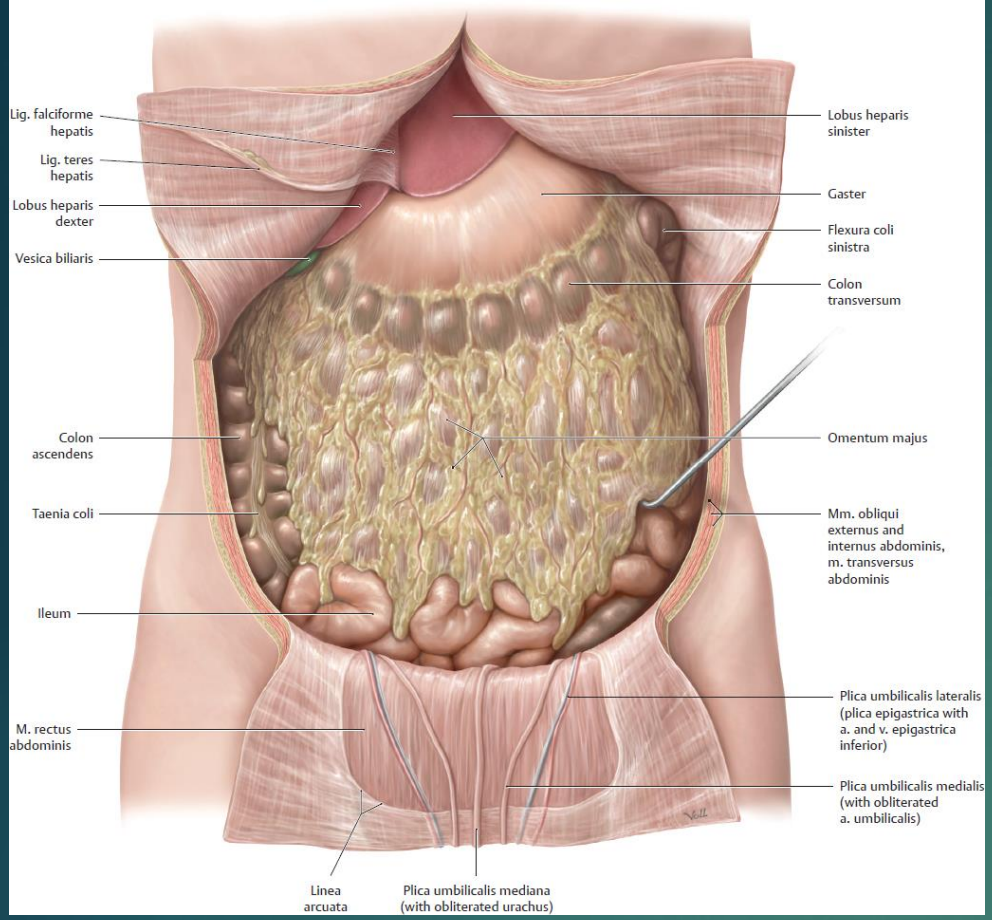
Omentum majus = 4 layers of peritoneum + fatty tissue

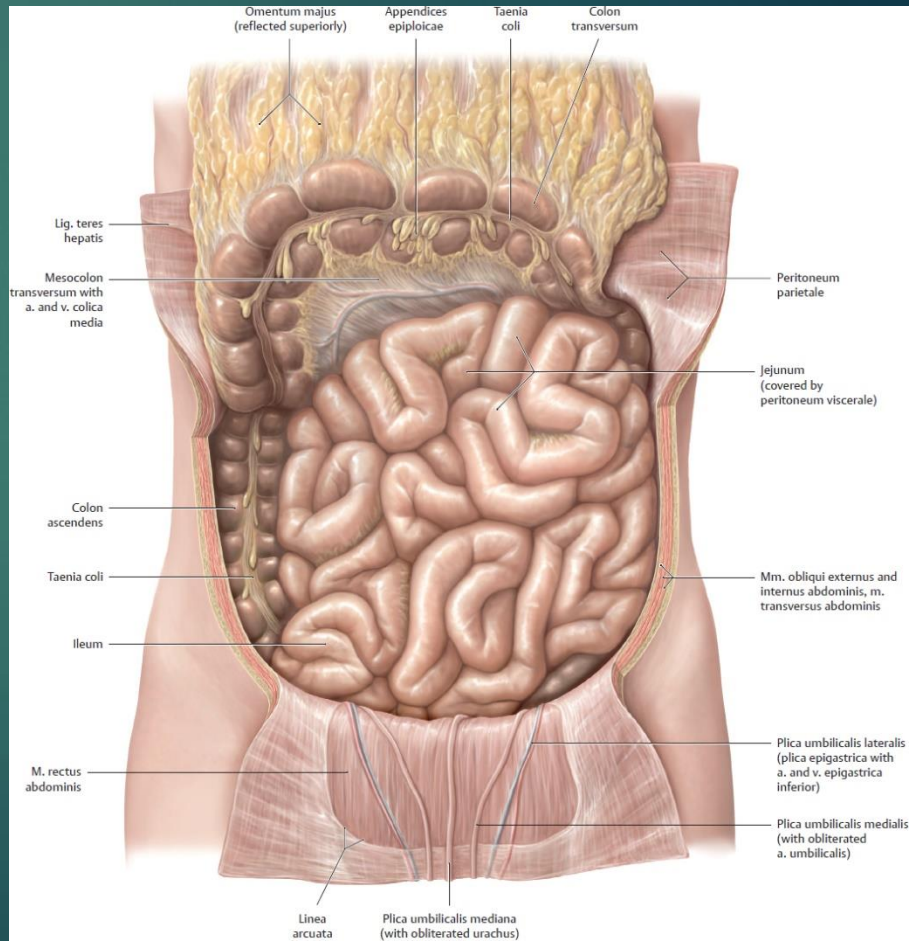
Anterior lamina
(2 layers of peritoneum)
+
Posterior lamina
(2 layers of peritoneum)



Omentum majus - dorsal mesentery of the stomach

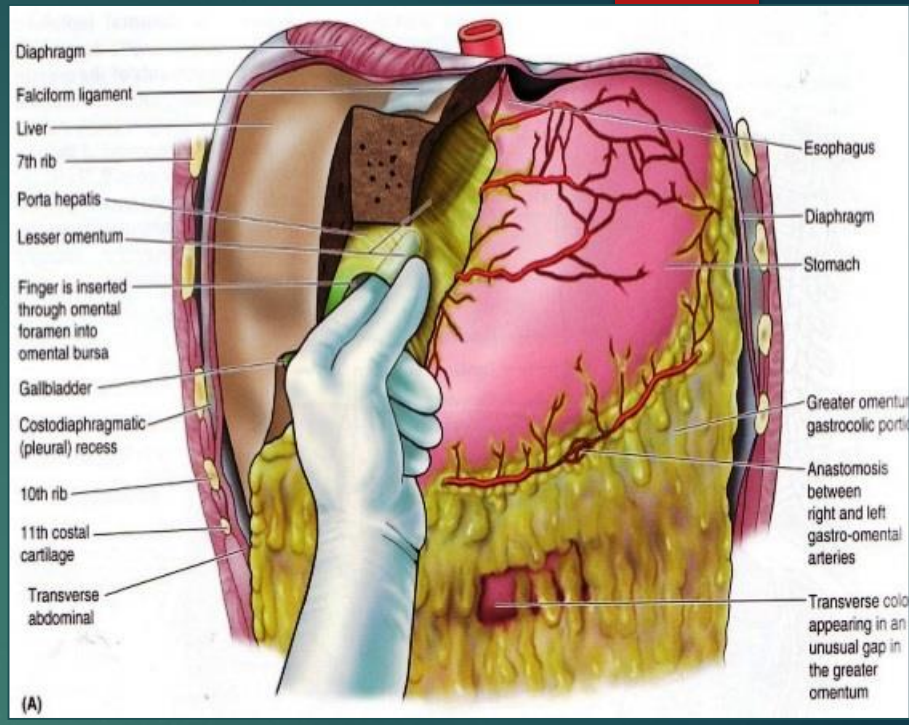
Omentum majus

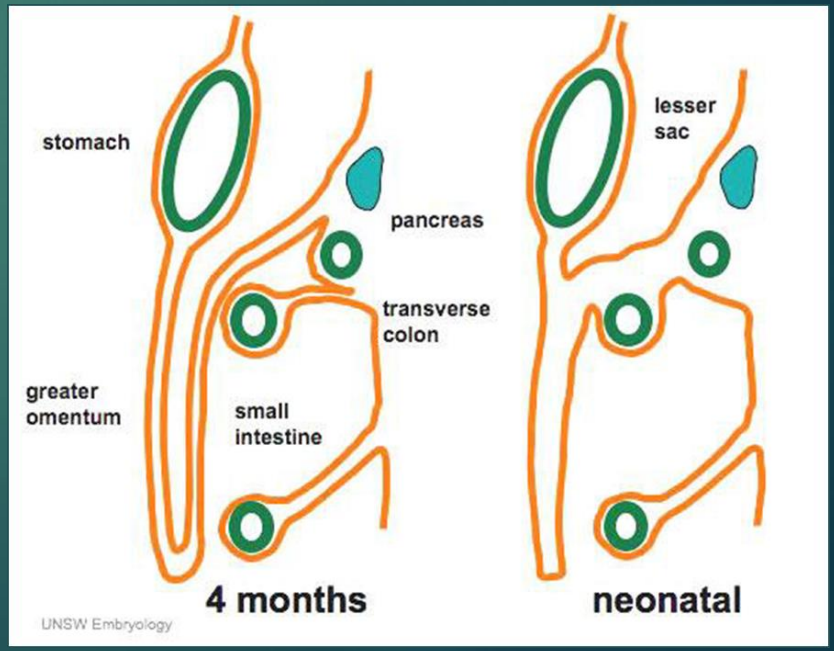




- Lig. gastrocolicum
- Lig. gastrosplenicum
- Lig. gastrophrenicum

Bursa omentalis



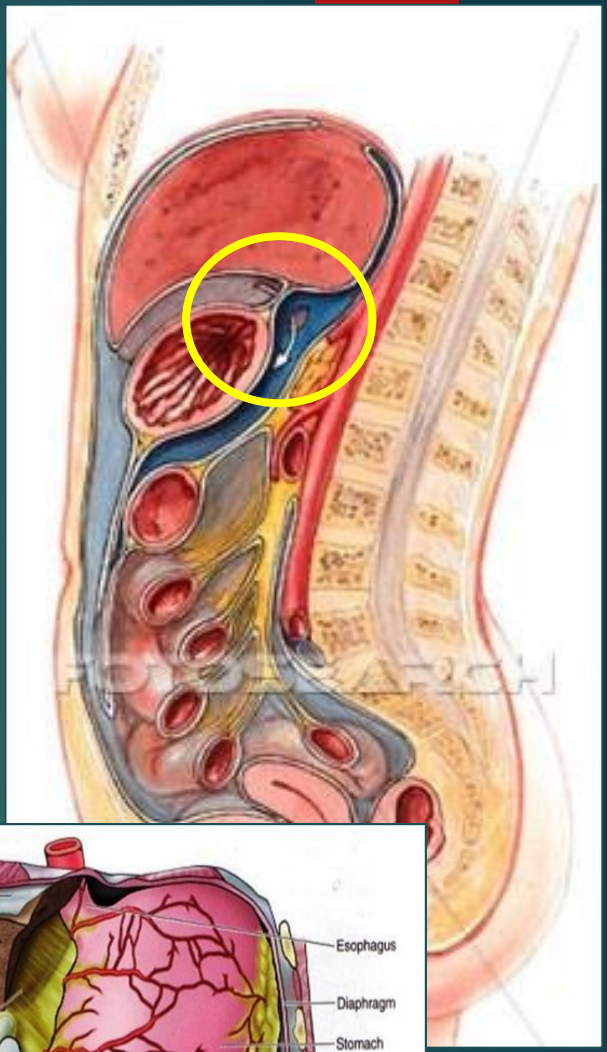


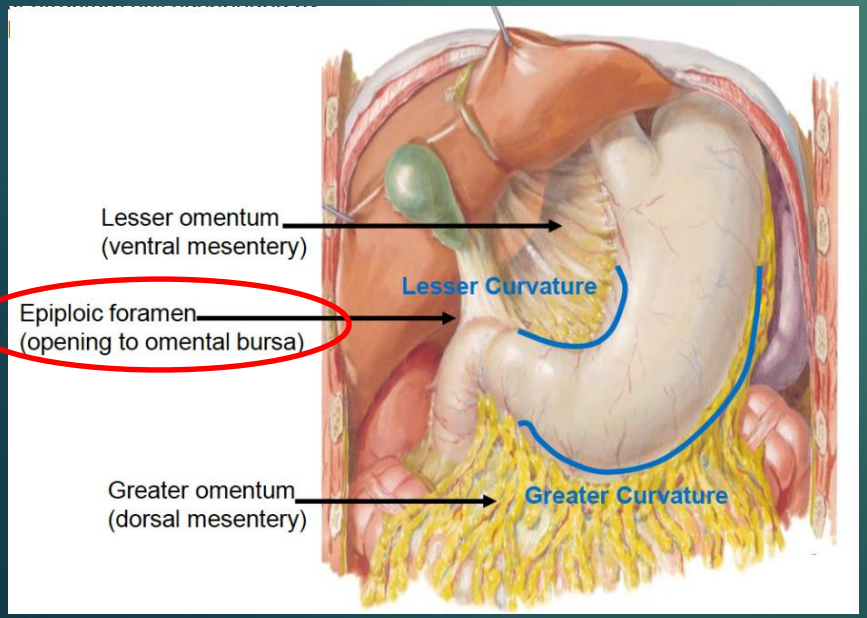
Omental (epiploic) foramen (Winslow`s foramen)

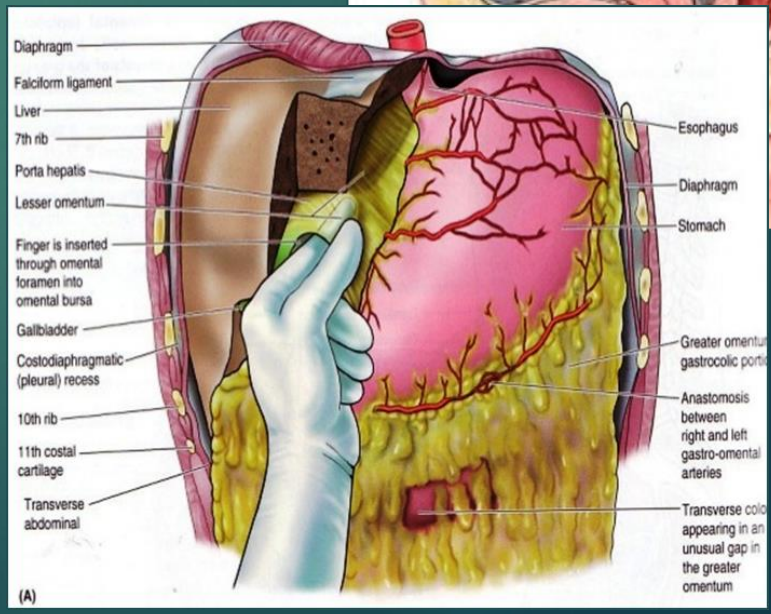
- Connects bursa omentalis with the whole peritoneal cavity

Walls:

- Superior – lobus caudatus hepatis
- Anterior – lig. hepatoduodenum
- Inferior – duodenum
- Posterior – parietal peritoneum



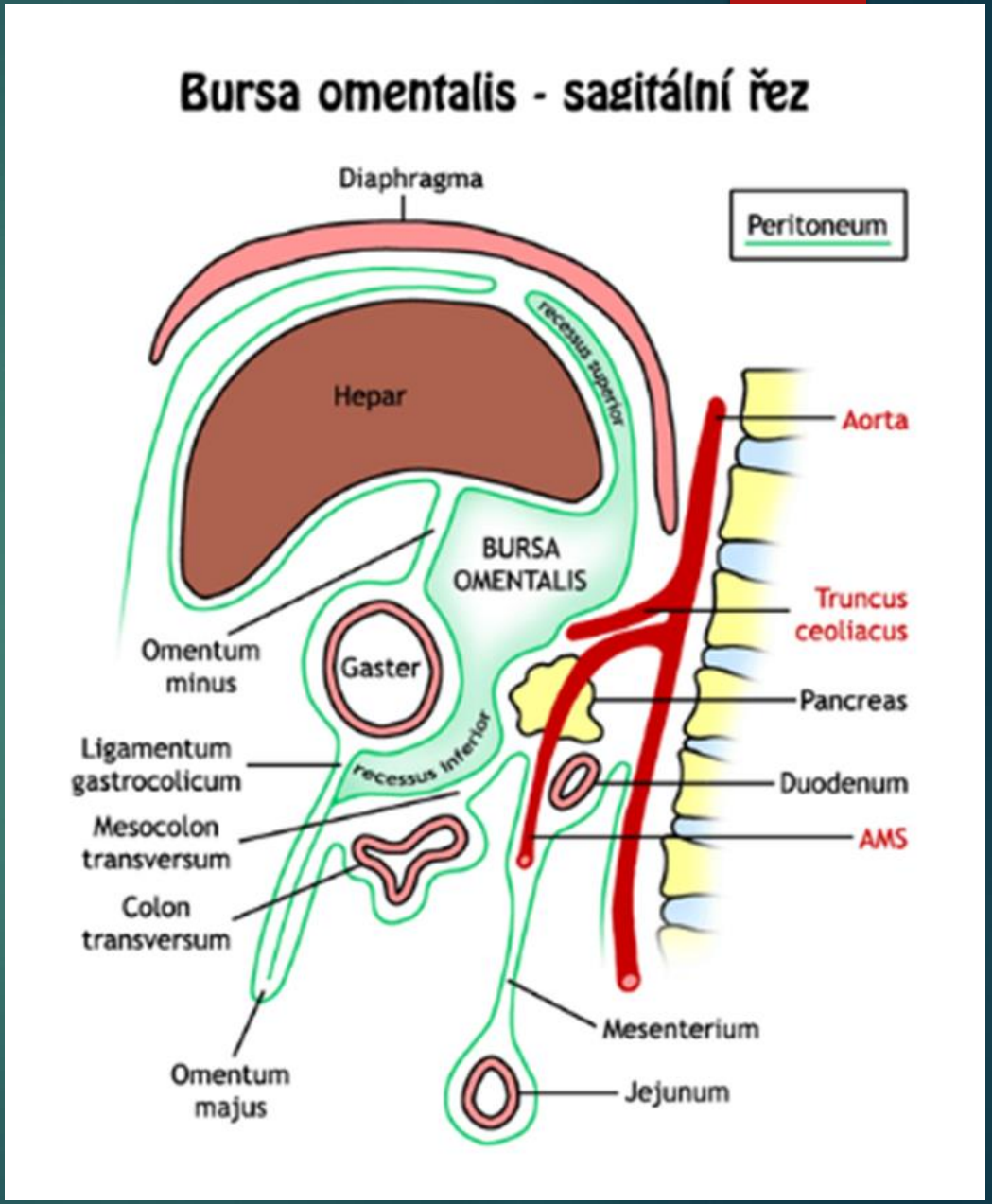




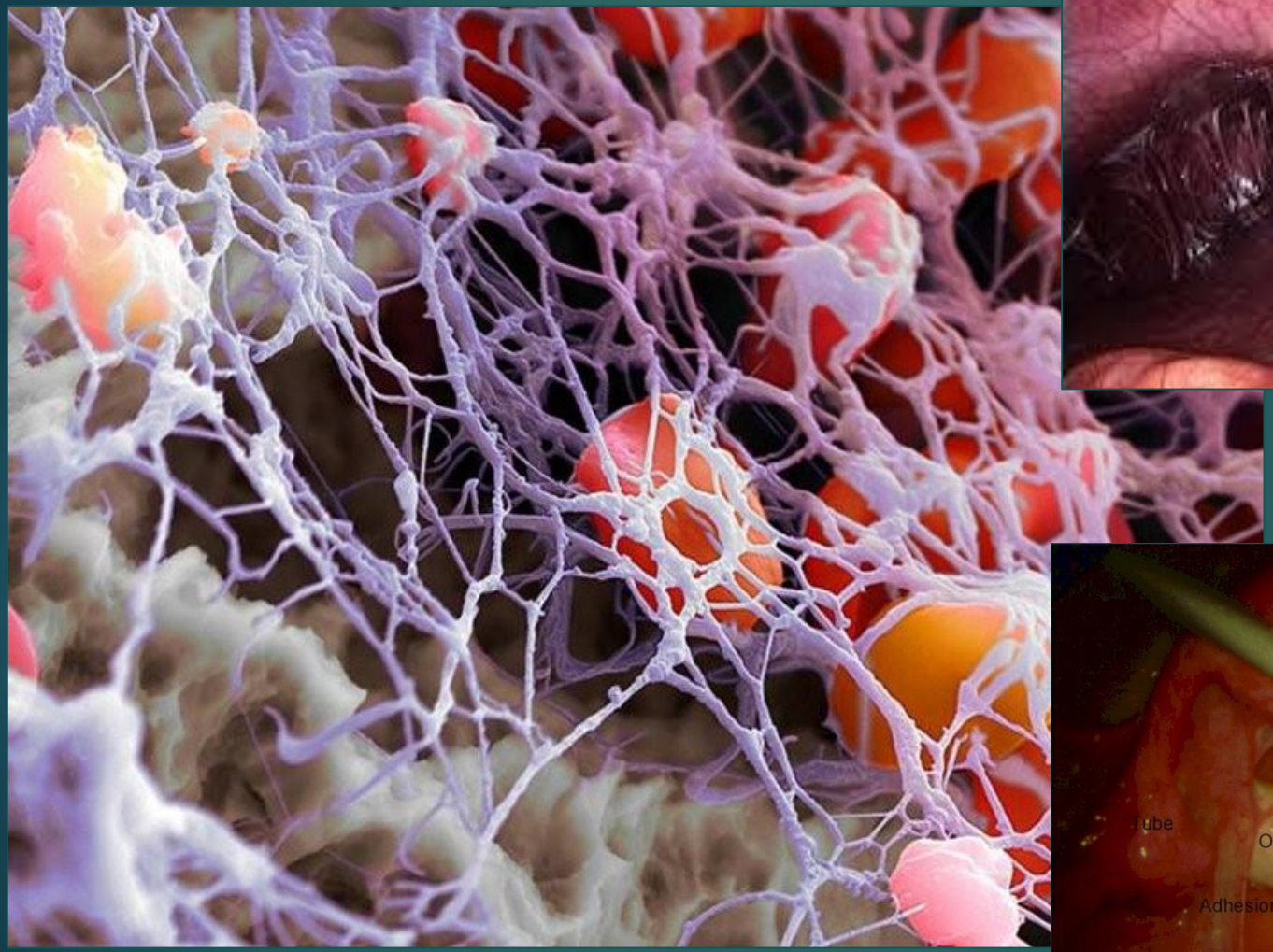
The vestibule of the omental bursa

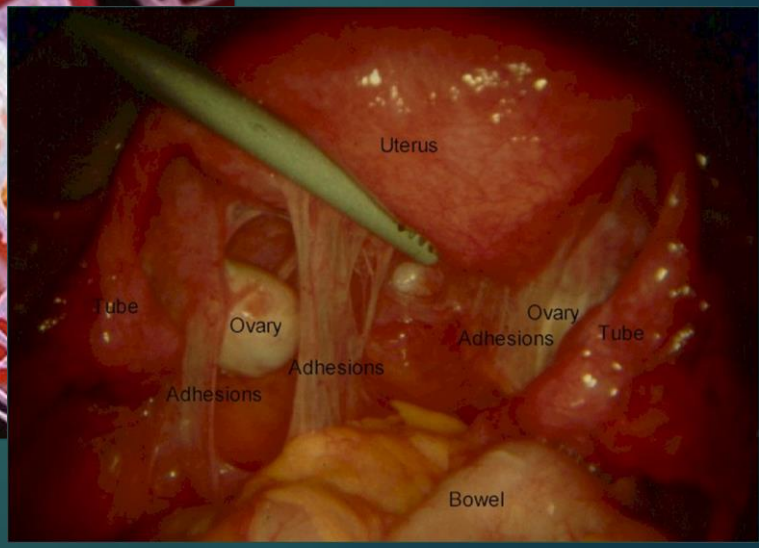
Walls:

- Superior – liver's caudate lobe and by the area of the diaphragm near the oesophagus
- Anterior – lesser omentum and partially by the posterior gastric wall
- Posterior – by the parietal layer of the peritoneum



Fibrin




Uterus
Tube
Ovary
Adhesions
Adhesions
Ovary
Adhesions
Tube
Bowel

Anatomical and Topographical Features of Peritoneal Cavity

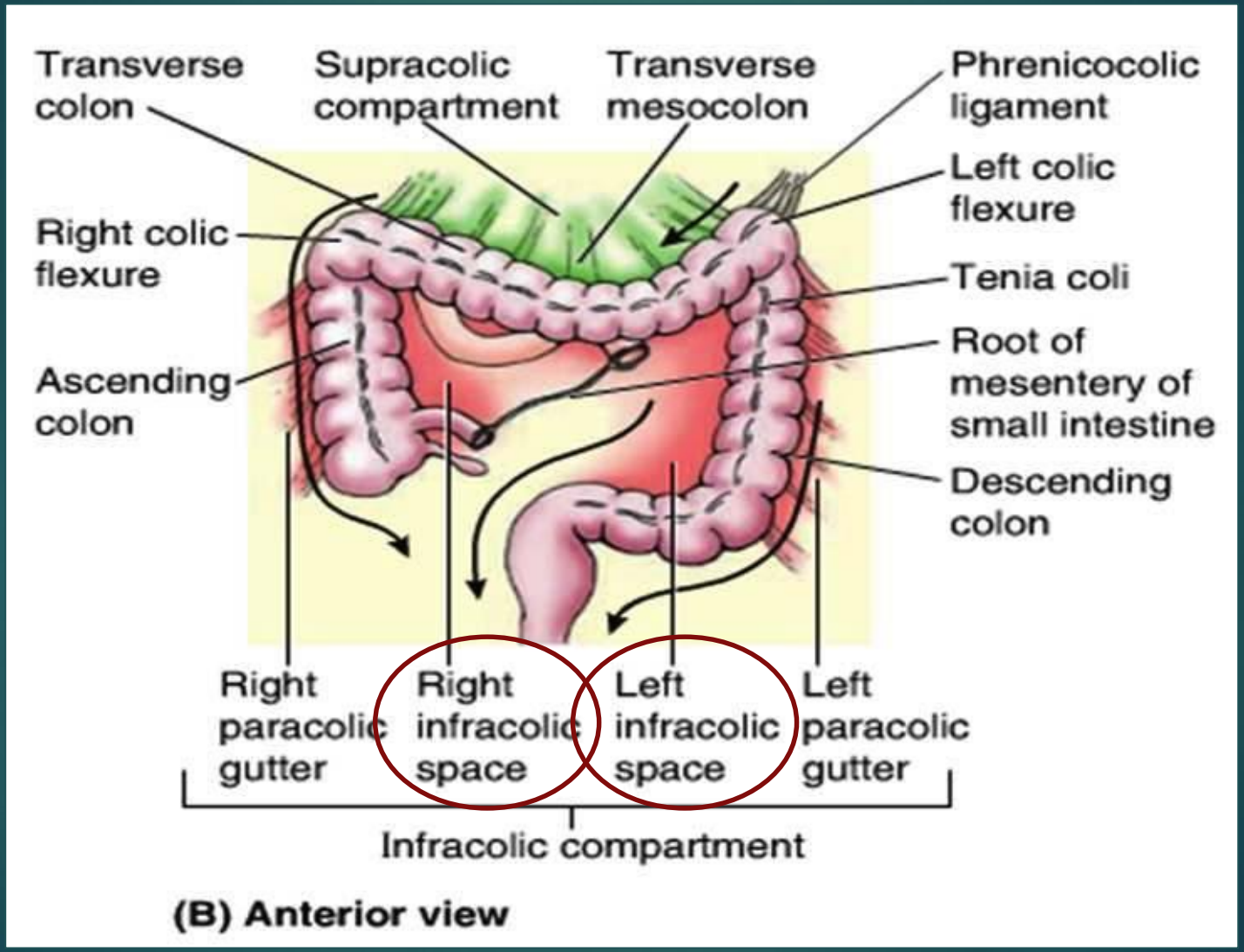
1. The upper storey

- Right subphrenic recess
- Left subphrenic recess
- Splenic recess
- Subhepatic recess
- The vestibule of the omental bursa

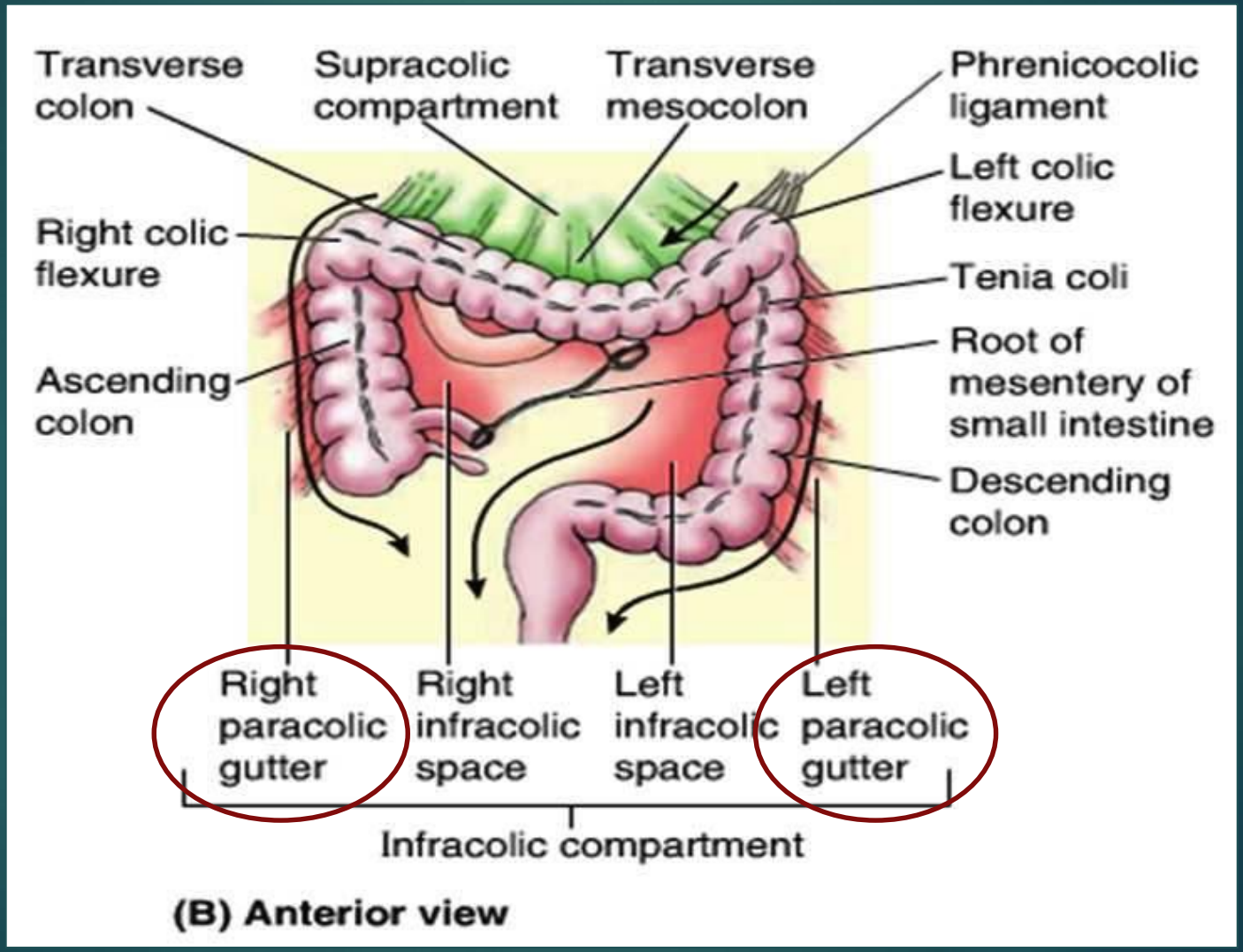
2. Lower storey

- Right mesenteric sinus
- Left mesenteric sinus
- Right paracolic groove
- Left paracolic groove

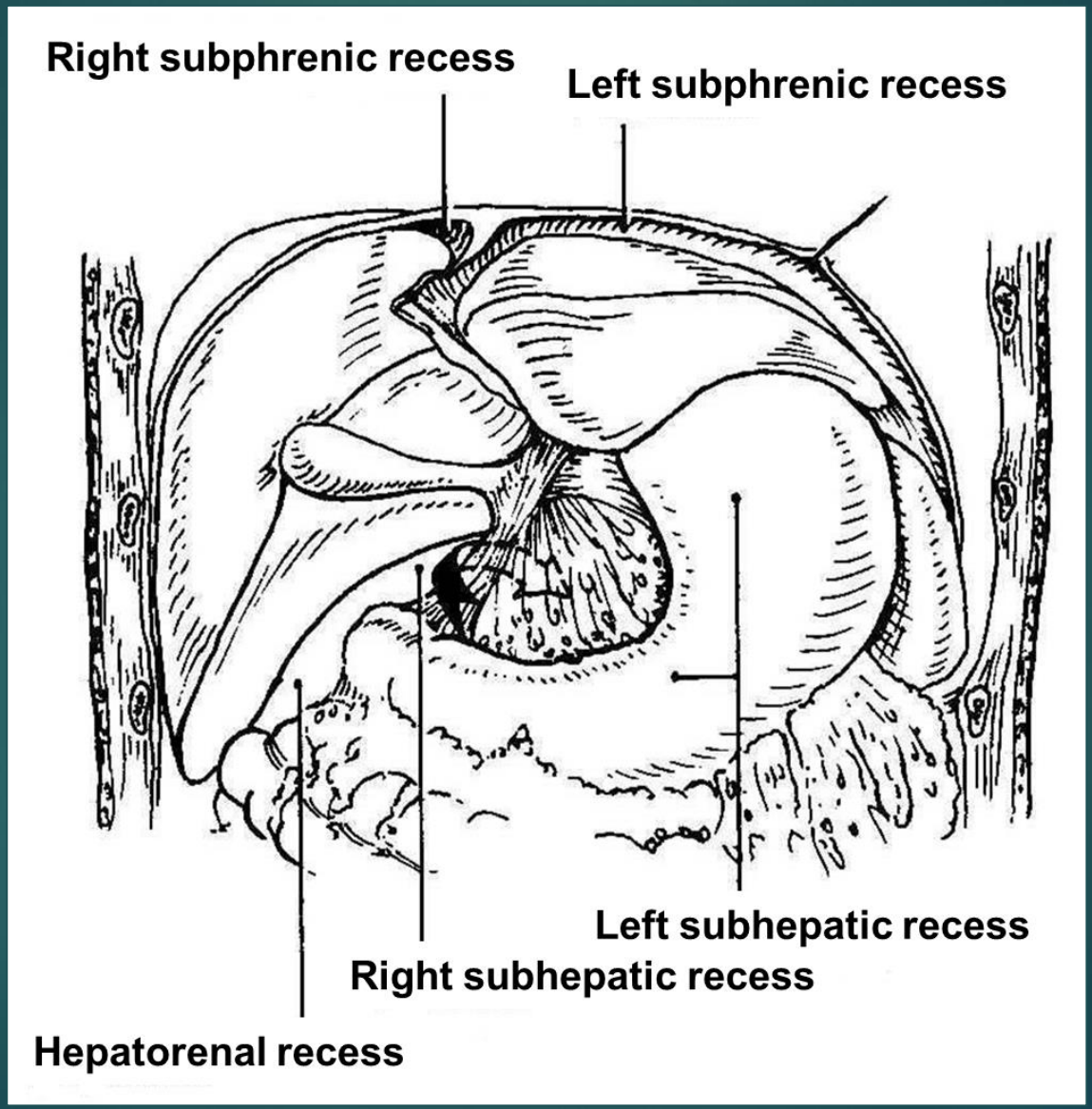
Mesenteric sinuses - right and left (infracolic spaces)



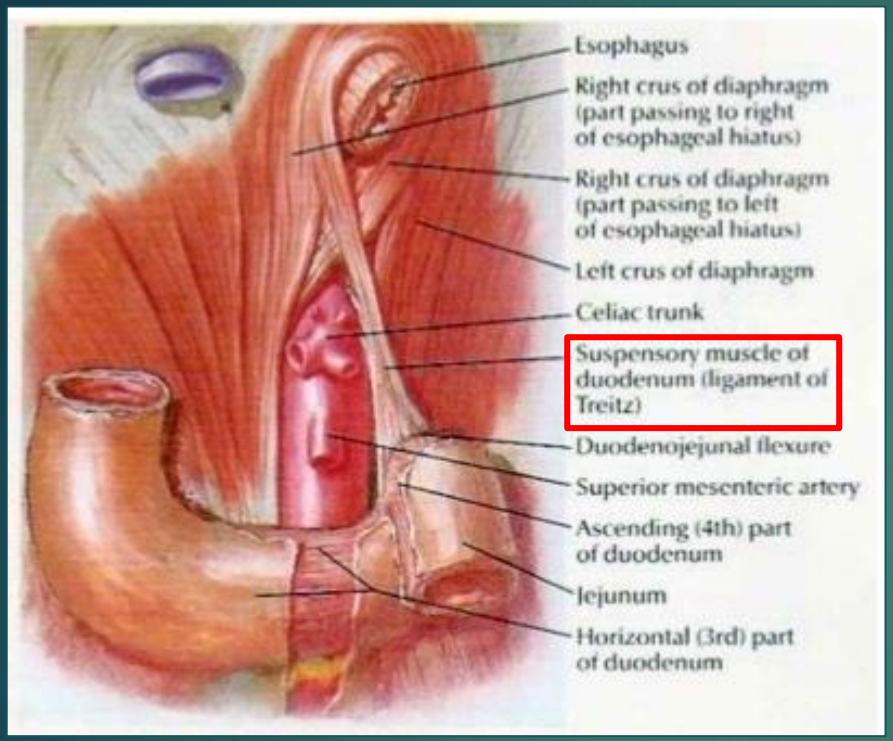
Paracolic groove (gutter), right and left

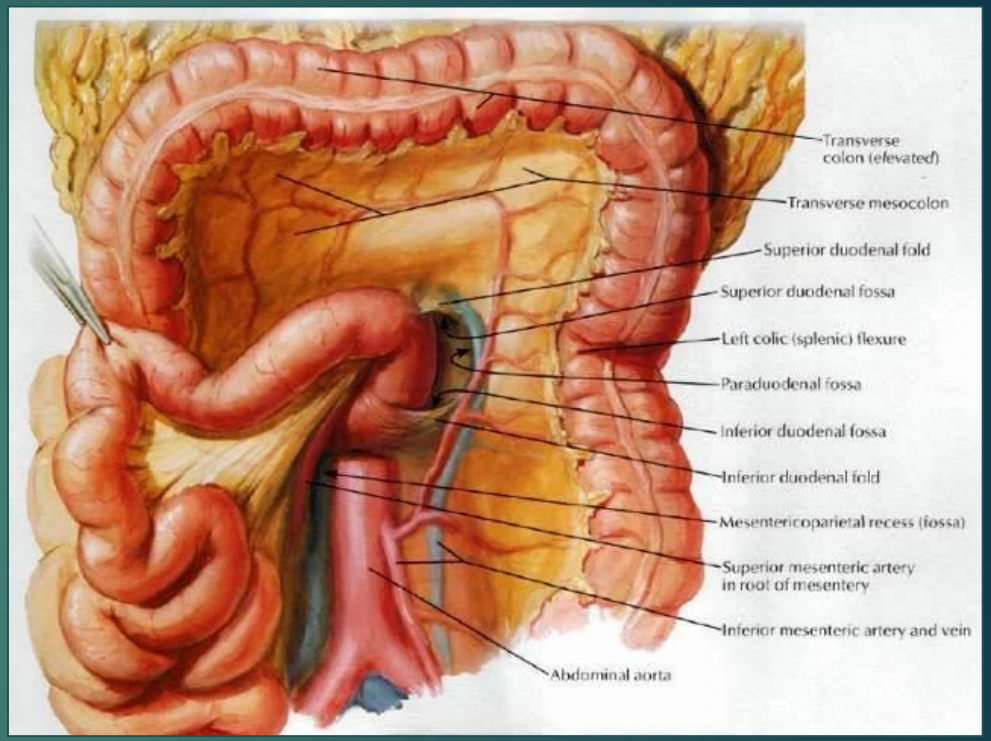


Recesses of peritoneal cavity



Recesses of peritoneal cavity

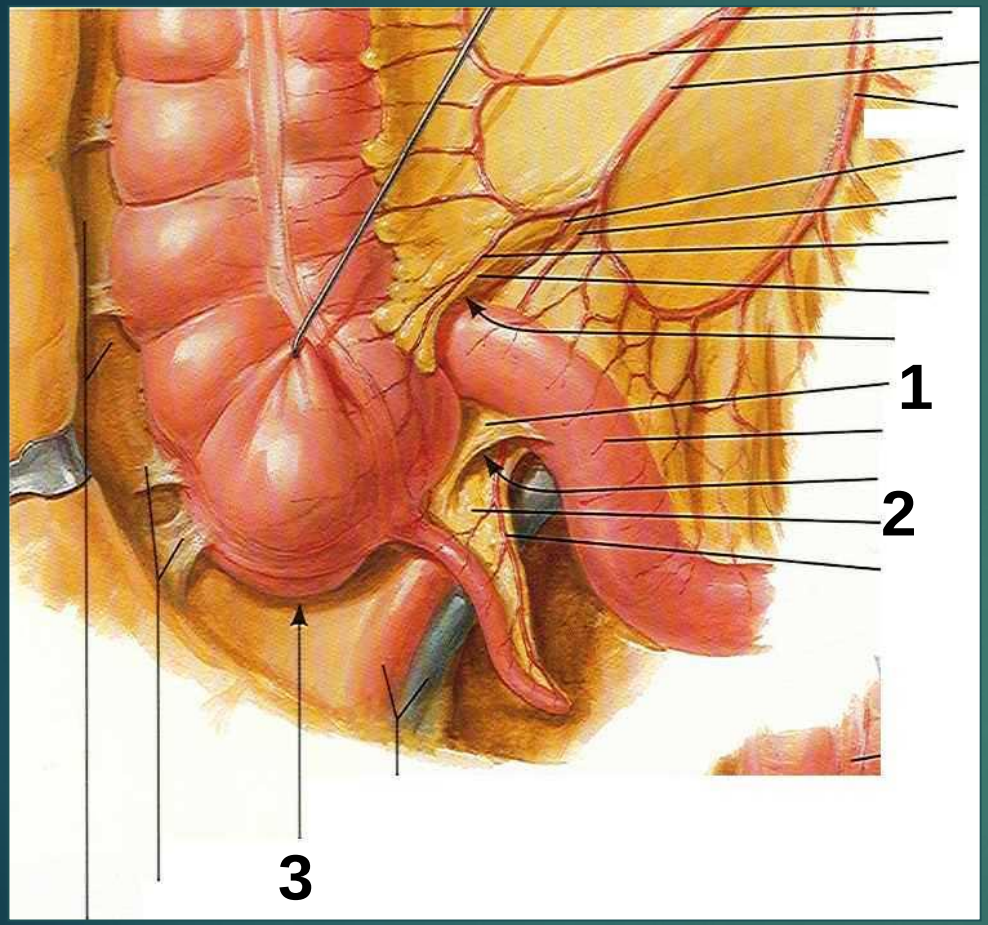




near duodenum

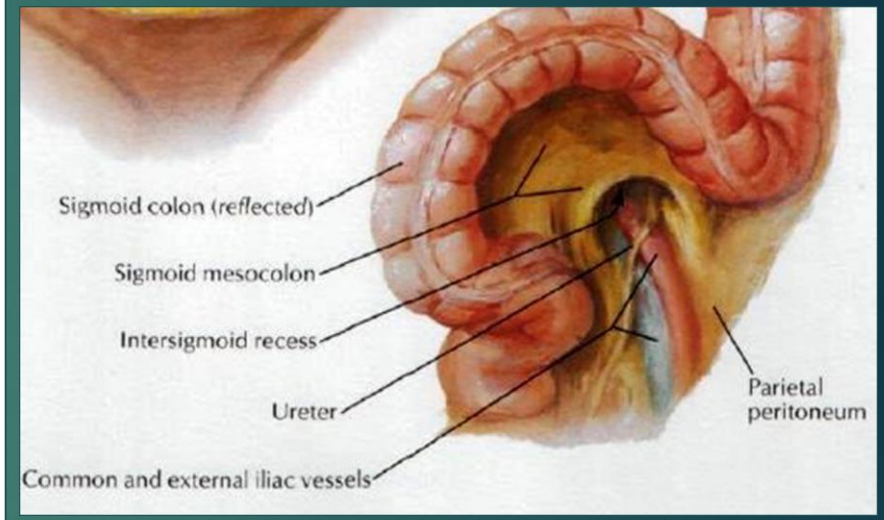
- Recessus duodenalis superior et inferior
- Recessus paraduodenalis
- Recessus supraduodenalis

Recesses of peritoneal cavity



near caecum

1 - Recessus ileocaecalis superior
2 - Recessus ileocaecalis inferior
3 - Recessus retrocaecalis



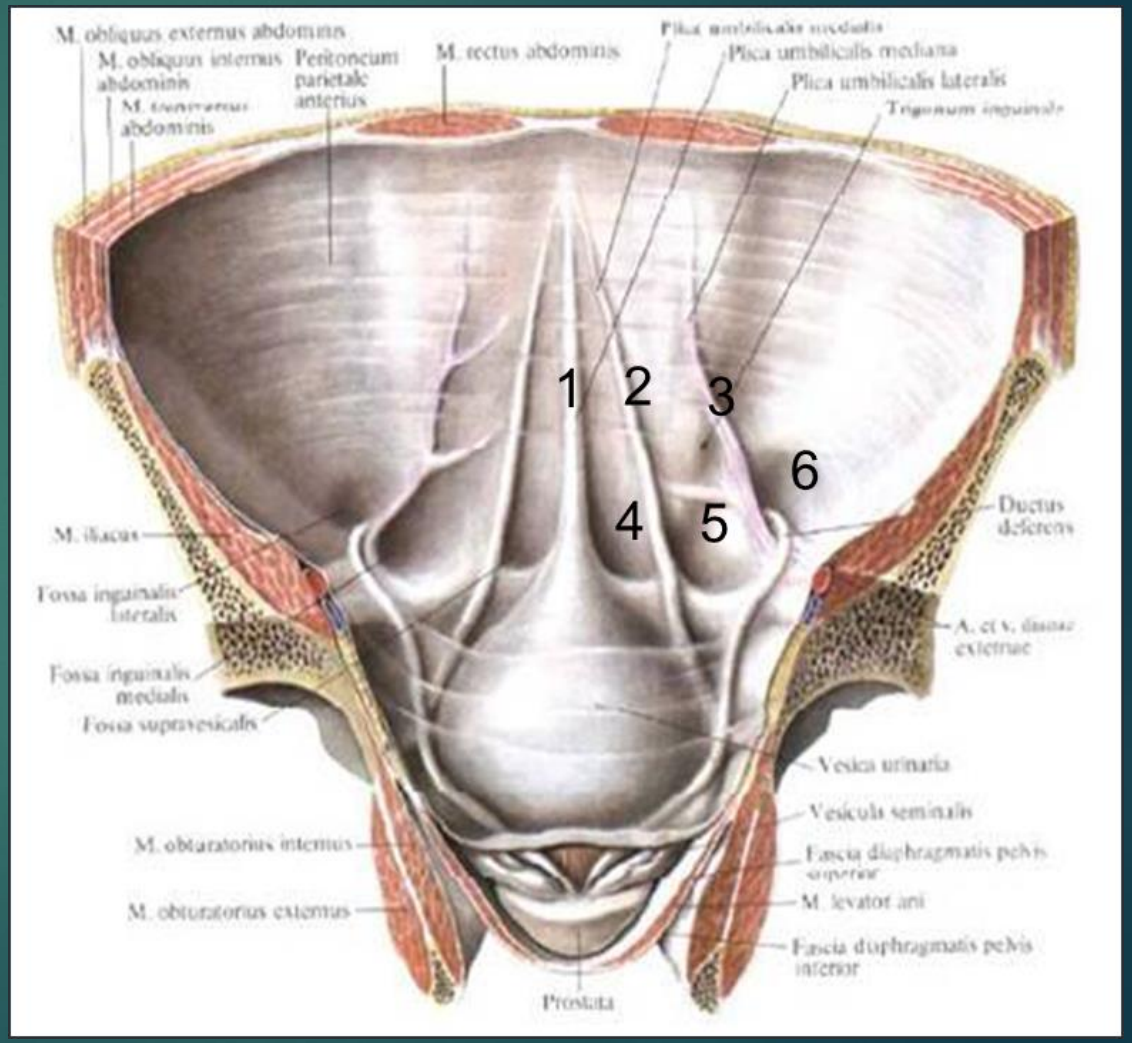
near sigmoid colon

Recessus inteersigmoideus

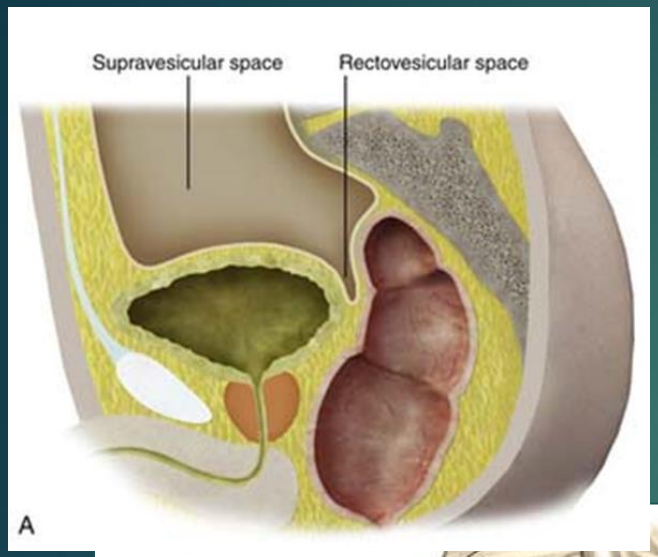
4

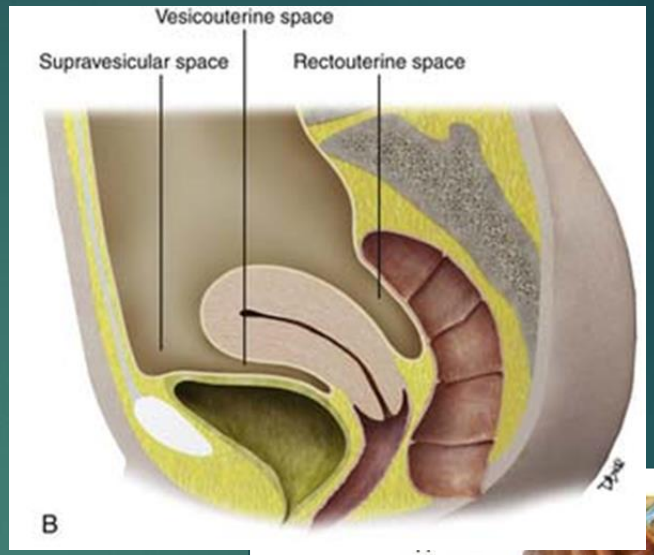
Internal surface, the lower part of the anterior abdominal wall

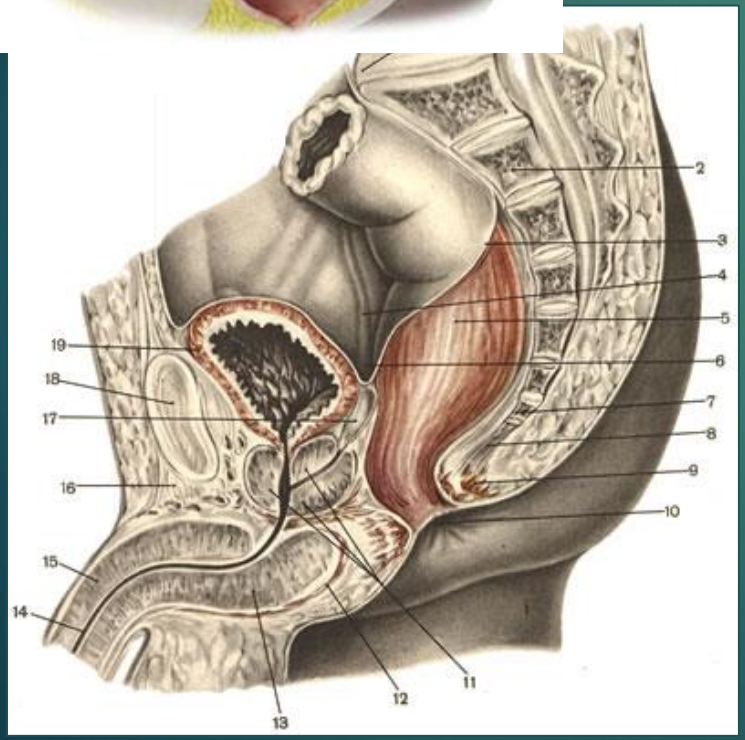
1 – plica umbilicalis mediana (obliterated urachus)
2 – plica umbilicalis medialis
3 – plica umbilicalis lateralis
4 – fossa supravesicalis
5 – fossa inguinalis medialis
6 – fossa inguinalis lateralis



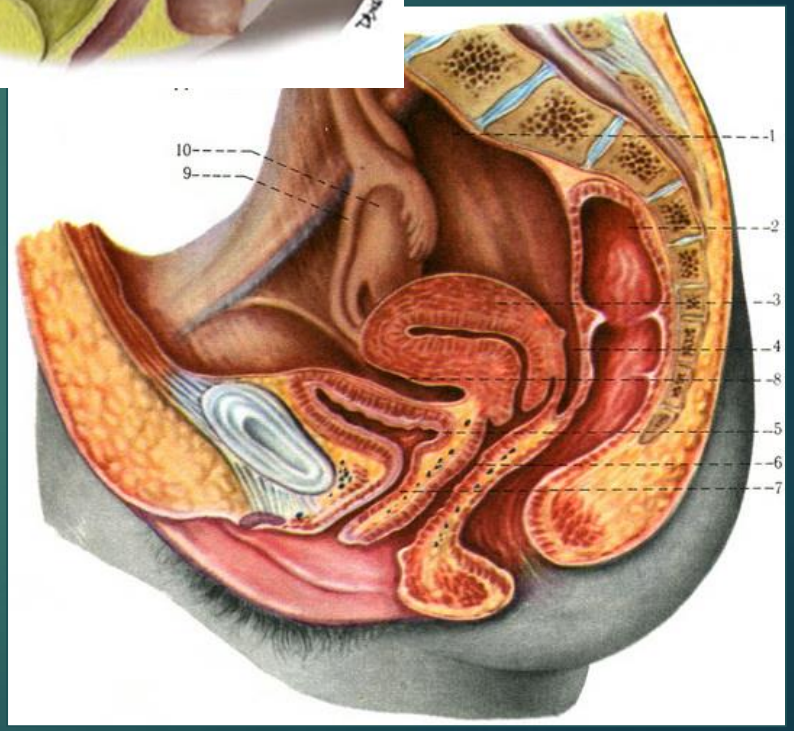
Peritoneum in pelvic cavity







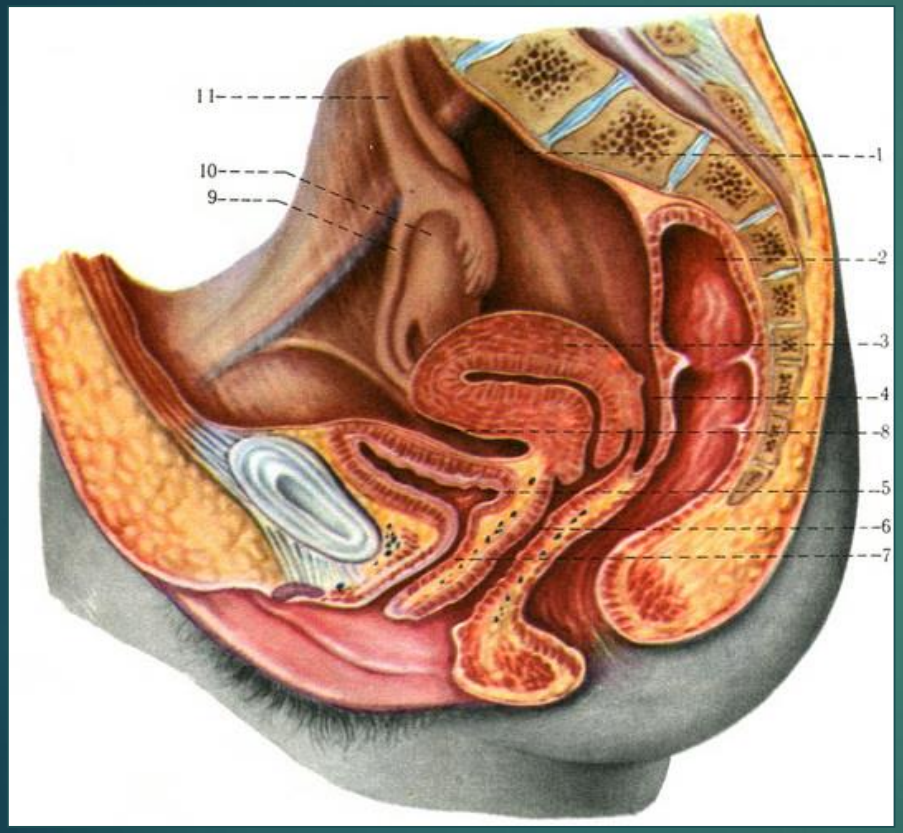
Excavatio rectovesicalis



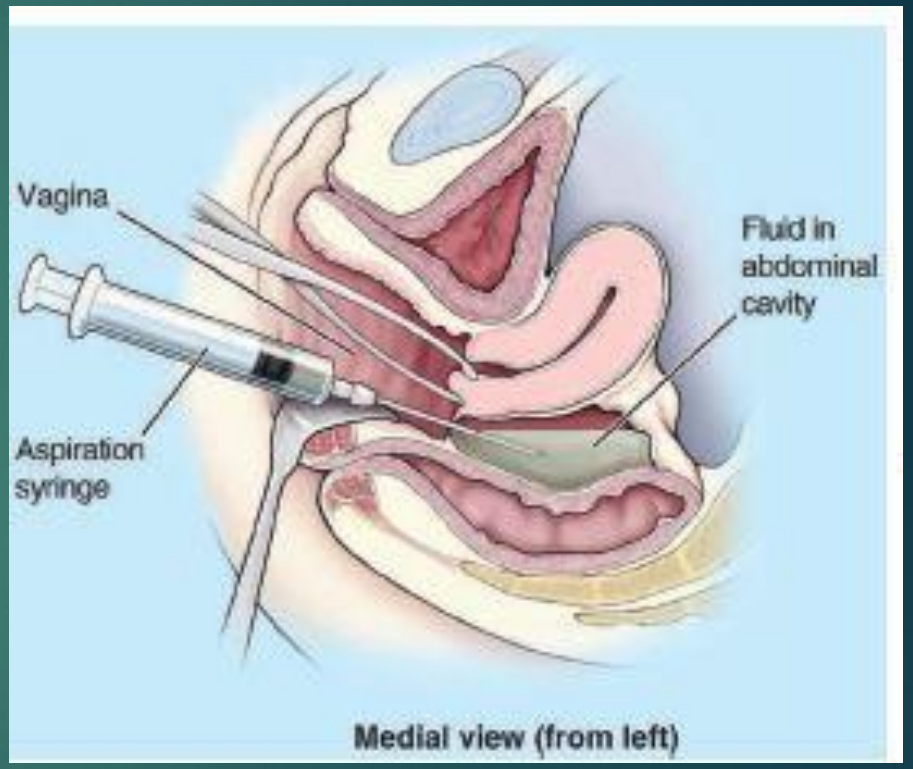
Excavatio rectouterina (Douglas pouch)

Excavatio vesicouterina

Douglas pouch
(Excavatio rectouterina)



Excavatio rectouterina (Douglas pouch)
Excavatio vesicouterina

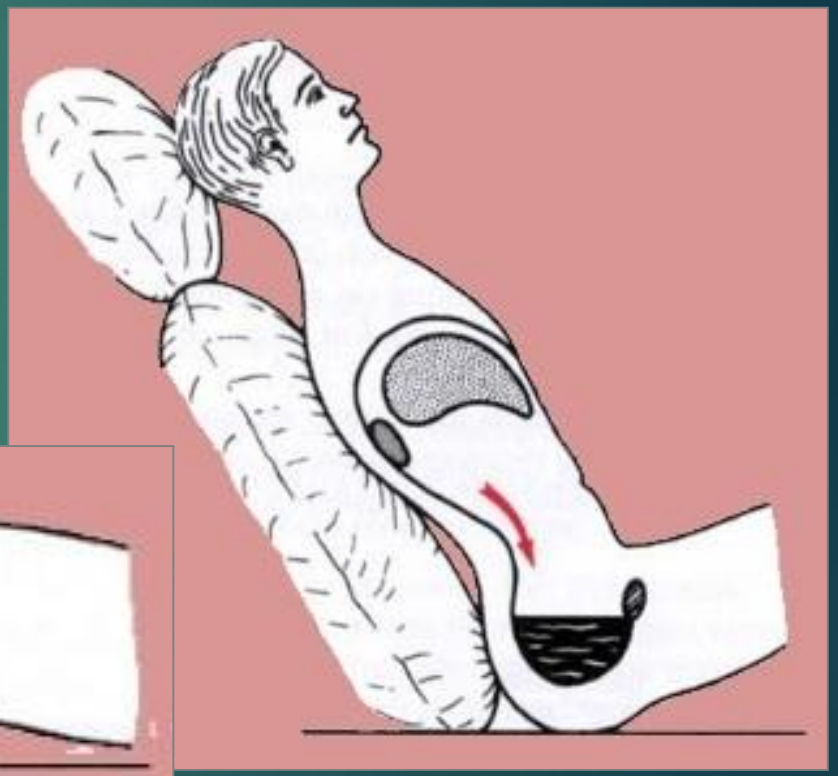


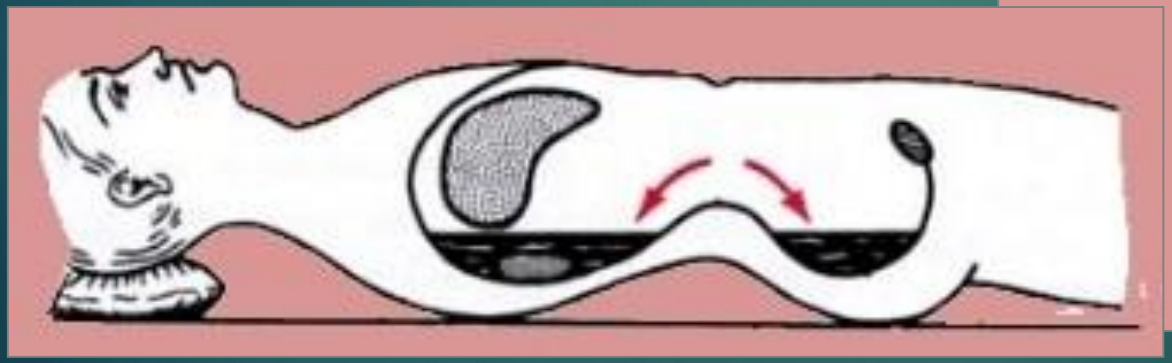
Culdocentesis – aspiration of fluid from cul-de-sac of Douglas

Peritoneal fluid

- serose fluid, 25ml

Functions:
- moistens the peritoneum
- decreases friction between organs





Excavatio hepatorenalis

Excavatio rectovesicalis

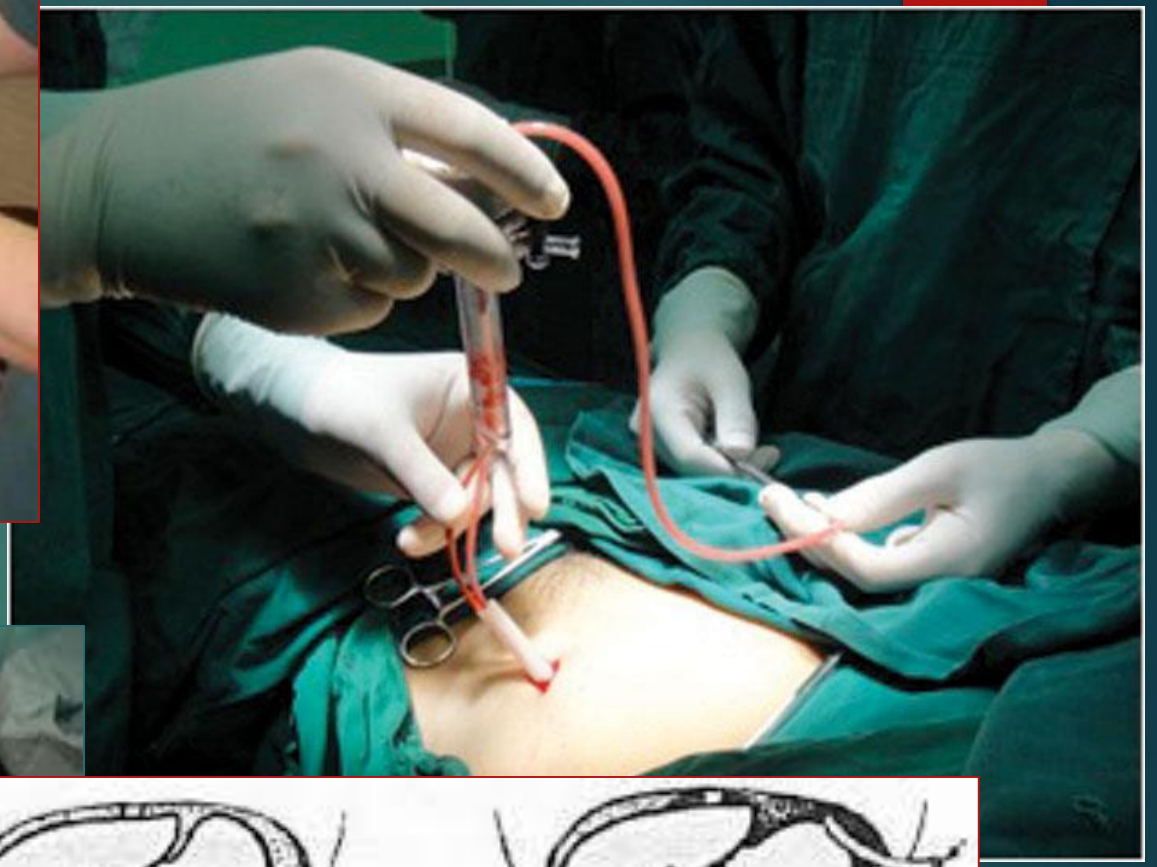
Pelvic cavity

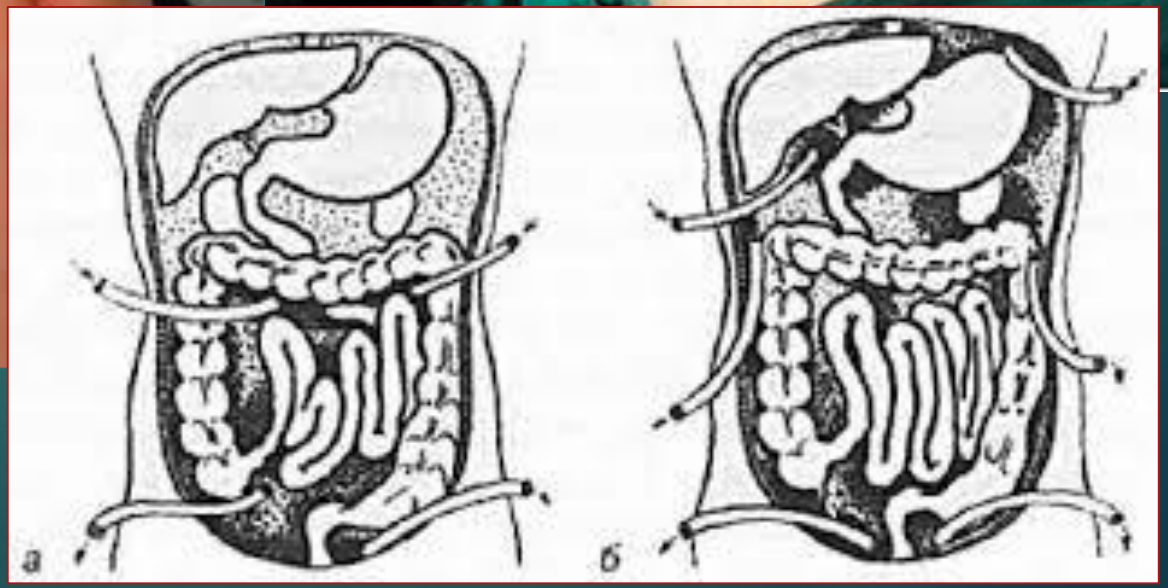
Ascite (abdominal dropsy)

- Accumulation of fluid in peritoneal cavity

(liver cirrhosis, hepatic cancer or heart insufficiency)

Charaf-ed-Din. Surgical puncture of the abdominal cavity of the aspiration of peritoneal fluid with a canula on a patient suffering from dropsy, 1466




а
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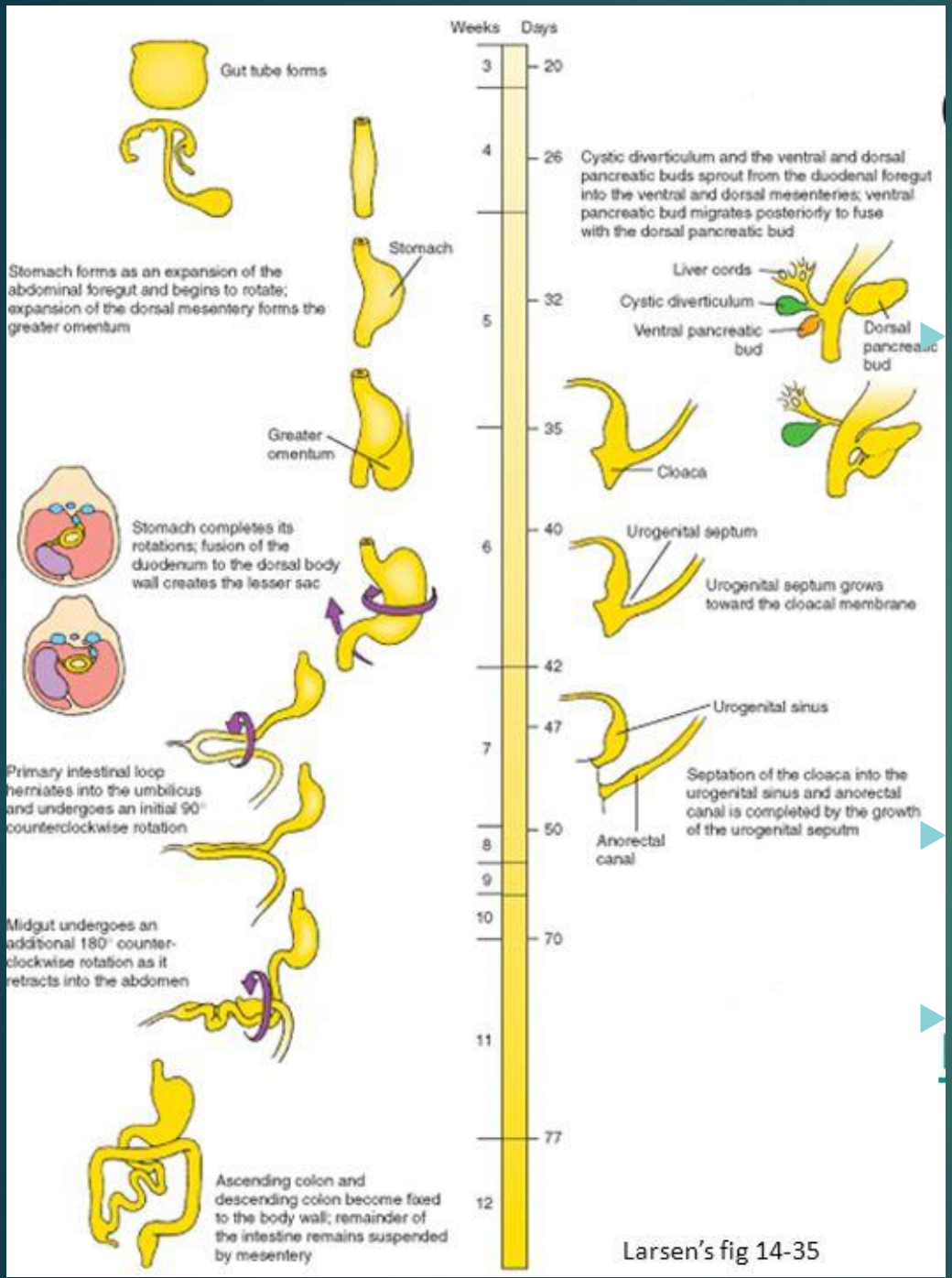
What organs has mesenteries?

1) The esophagus
2) The stomach
3) The duodenum
4) The ileum
5) The caecum
6) The appendix
7) The descending colon
8) The rectum

Development of Gastrointestinal System



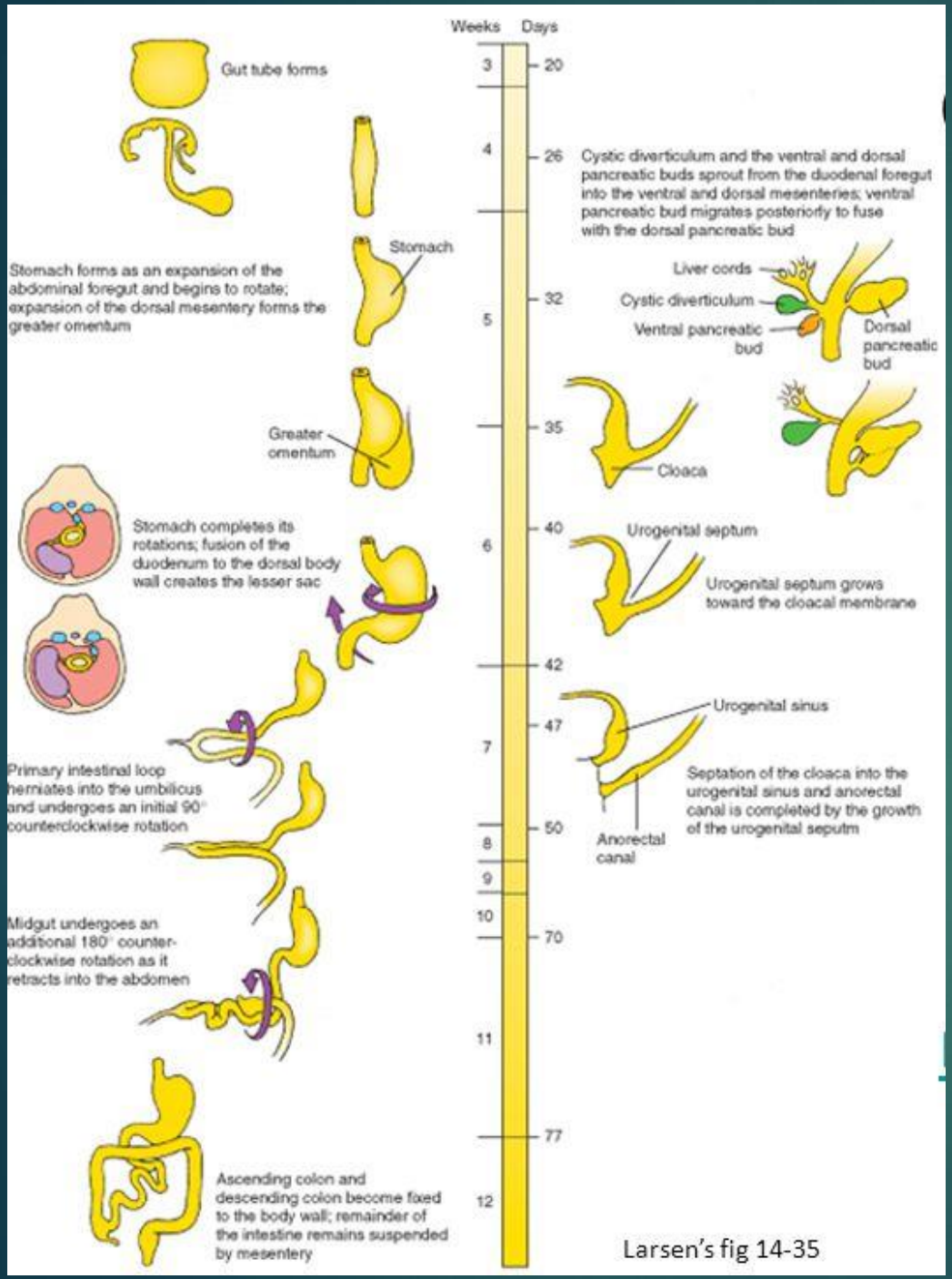
Larsen's fig 14-35

Week 3: the digestive tube starts differentiating. Gastrulation occurs. Initially, the prime gut tube forms as a hollow cylinder of endodermal cells surrounded by mesoderm. The endoderm sheet elongates and folds ventrally at the anterior and posterior ends, meeting near the yolk sac to form a closed tube.

Week 4: resorption of the buccopharyngeal membrane occurs, which closes e tube.

Week 6-10: midgut herniates throughout the umbilical ring, where it develops almost entirely outside the peritoneal cavity, then rotates back around in week ten.

Development of Gastrointestinal System



Larsen's fig 14-35

Week 7: obliteration of the omphalomesenteric duct (vitelline duct), which connects the midgut lumen to the yolk sac

Week 9: Opening of the distal cloacal membrane. Villus formation begins

Week 11: distinctive longitudinal and circular muscle layers are present through the intestines

Week 12: crypt development begins.

Week 14: muscularis mucosae develops

Week 24: fetal intestinal absorption function develops

Week 32: fetal intestinal absorption reaches adult level.

THANK YOU FOR YOUR ATTENTION!