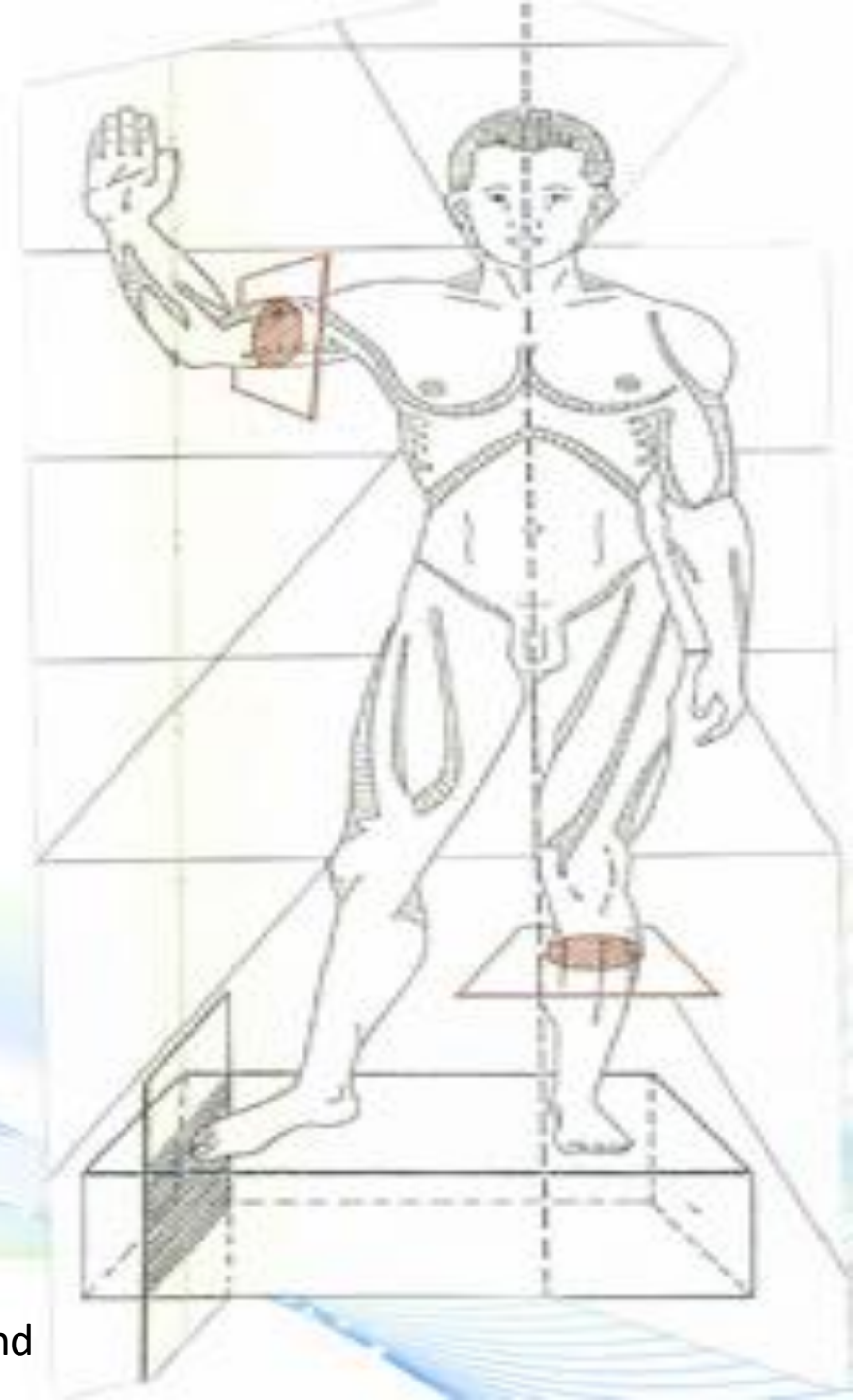


LARGE INTESTINE



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I. INTRODUCTION

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III. STRUCTURE

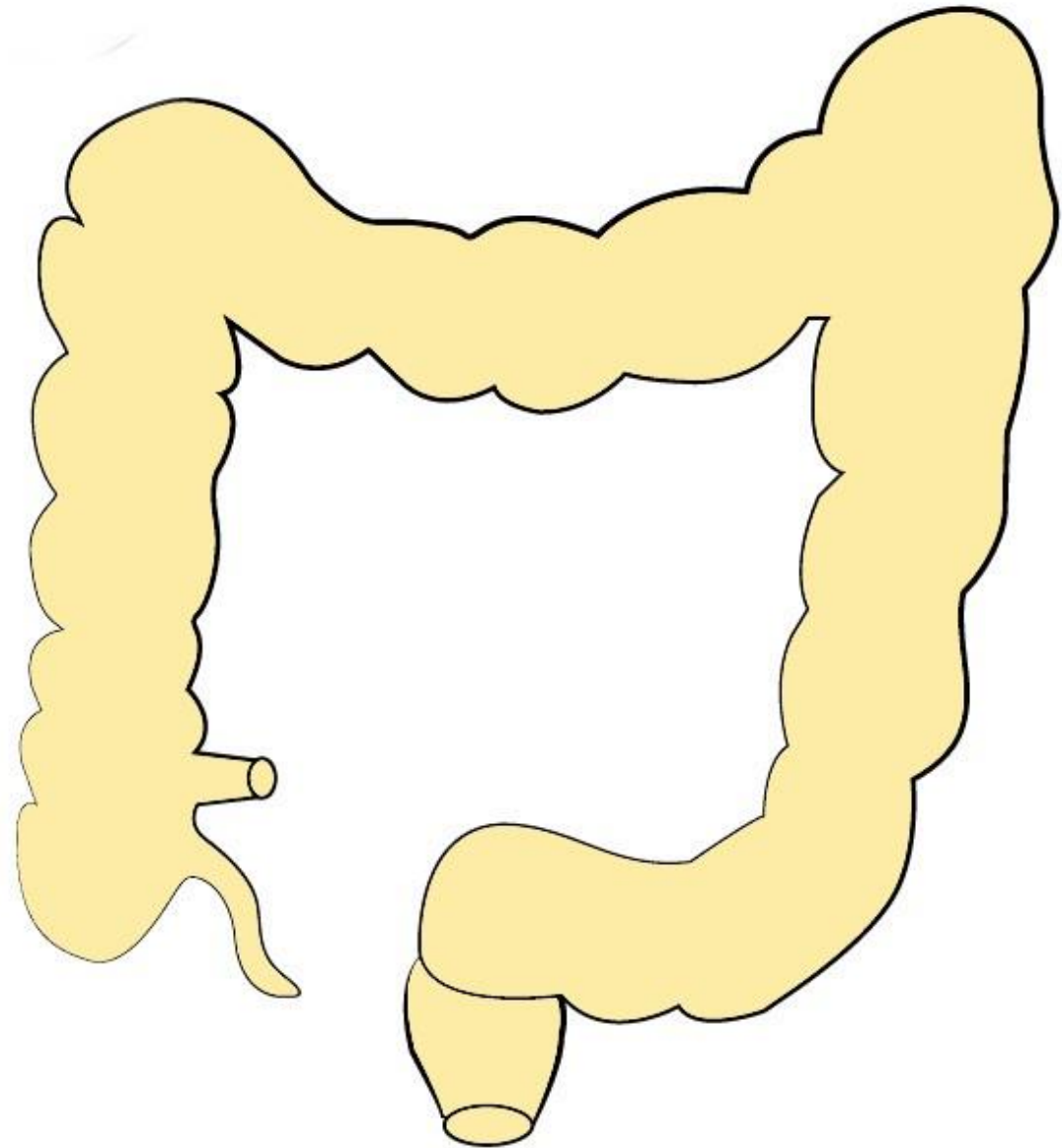
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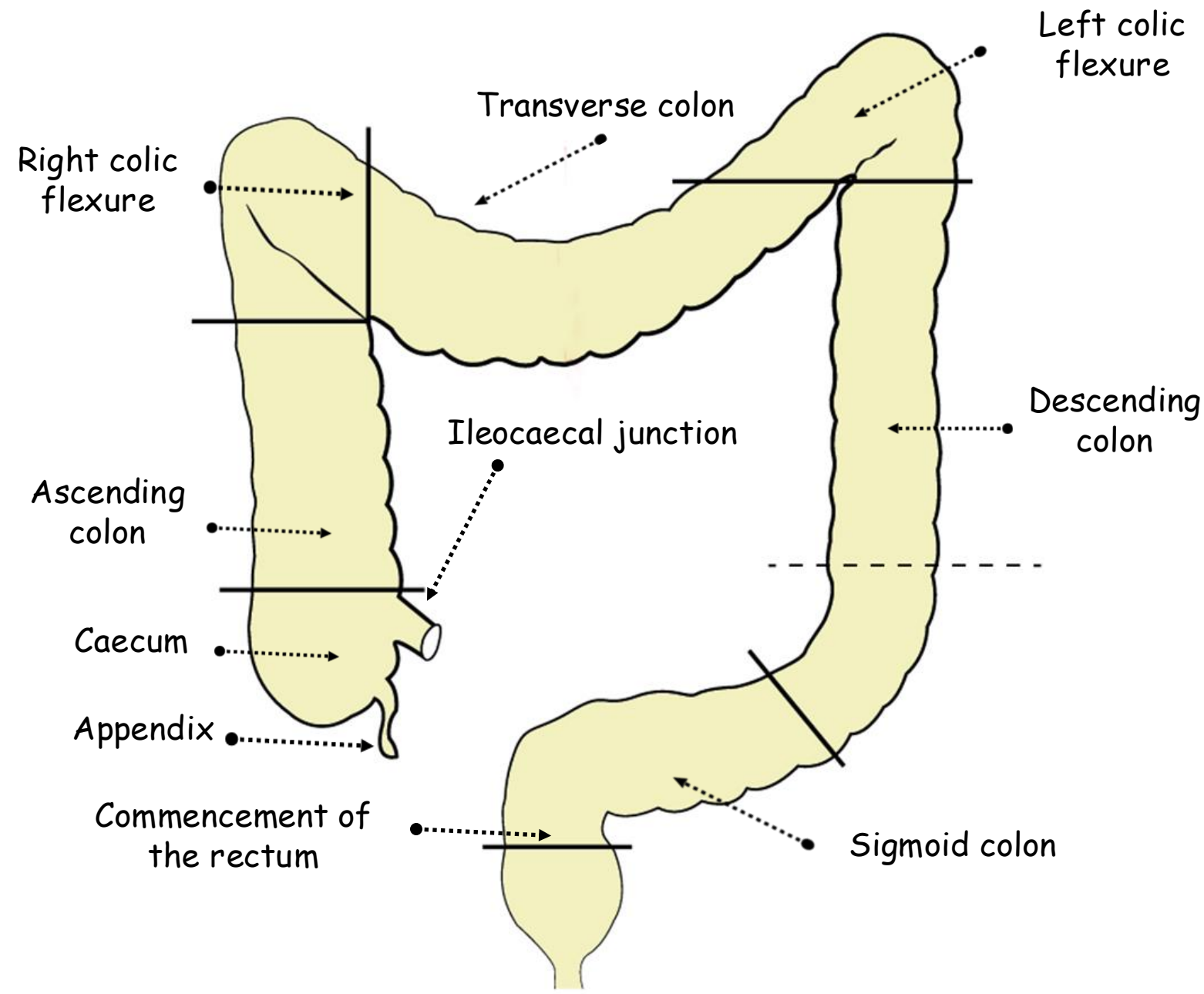
VII. SURGICAL APPROACH

VIII. CONCLUSION



I. INTRODUCTION

- The large intestine extends from the distal end of the ileum to the anus
- It absorbs fluids and salts from the gut contents, thus forming feces
- Consists of the caecum, appendix, ascending colon, right colic flexure, transverse colon, left colic flexure, descending colon, sigmoid colon, rectum, and anal canal

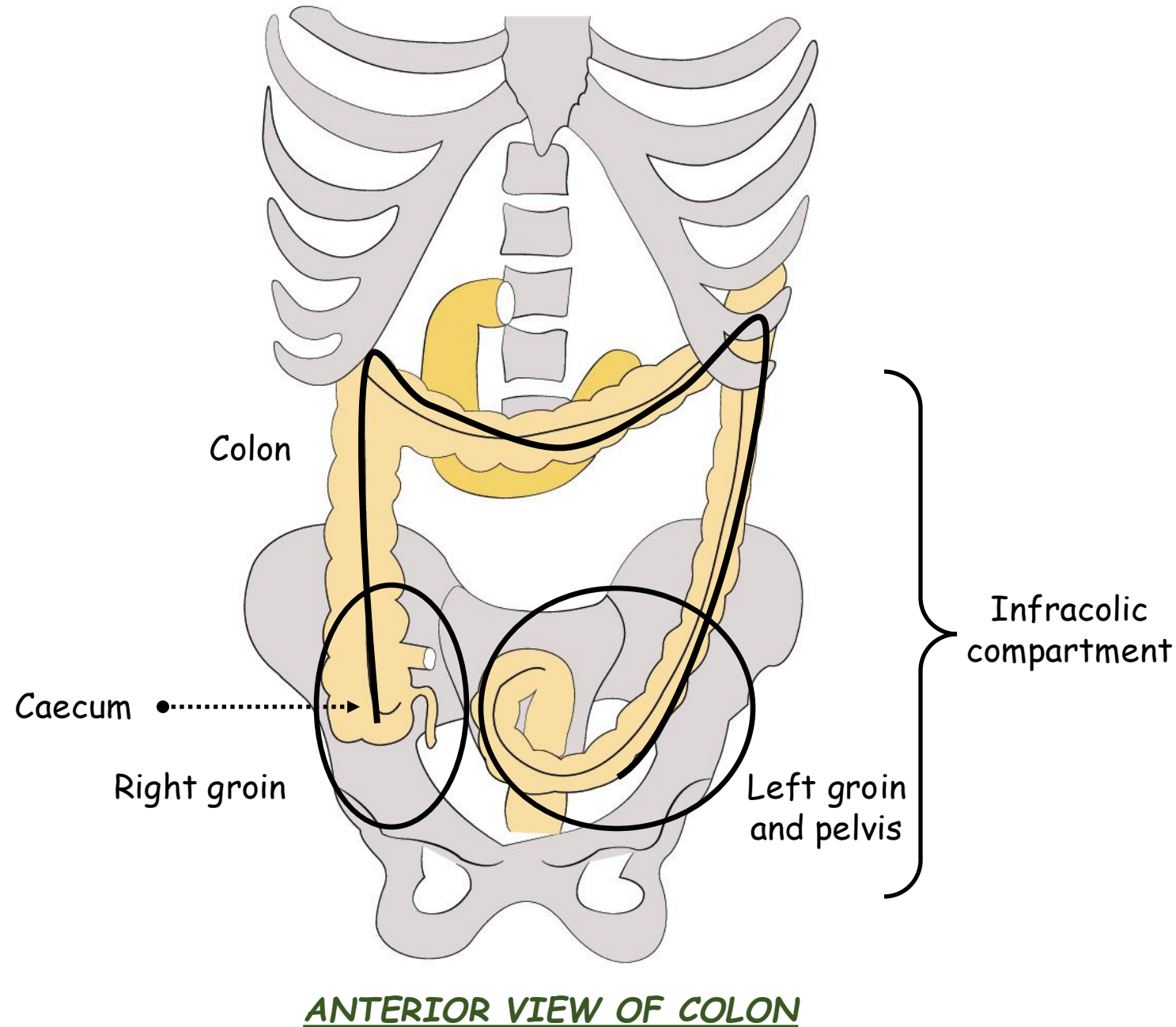


ANTERIOR VIEW OF COLON

II. DESCRIPTIVE ANATOMY

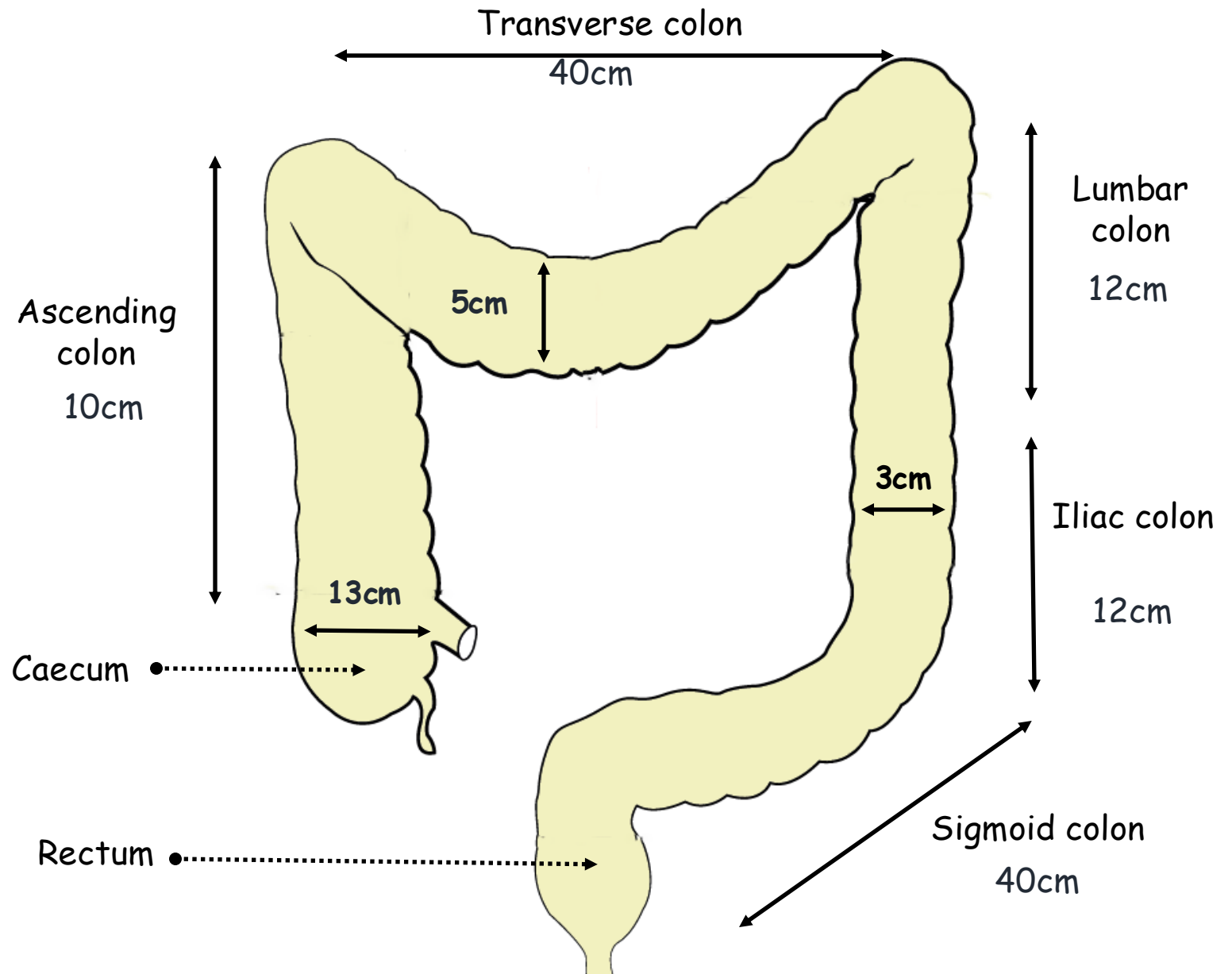
A. SITUATION

- Beginning in the **right groin** as the cecum, with its associated appendix
- Continues upward as the ascending colon through the **right flank** and into the **right hypochondrium**
- Just **below the liver**, it bends to the left, forming the right colic flexure and crosses the abdomen as the transverse colon to the **left hypochondrium** subdividing the peritoneal cavity to **supracolic** and **infracolic compartment**
- Just **below the spleen**, the large intestine bends downward, forming the left colic flexure and continues as the descending colon through the **left flank** and into the **left groin**
- Enters the upper part of the **pelvic cavity** as the sigmoid colon



B. DIMENSIONS

- **Length:** 1,5m
 - 6cm : cecum
 - 10cm: ascending colon
 - 40 cm: transverse colon
 - 12 cm: lumbar colon
 - 12 cm: iliac colon
 - 40cm: sigmoid colon (pelvic)
- **Internal diameter:** narrows from caecum to rectum
 - 13 cm : caecum
 - 5cm : transverse colon
 - 3cm : descending colon



ANTERIOR VIEW OF LARGE INTESTINE

C. SHAPE

1. Taeniae coli:

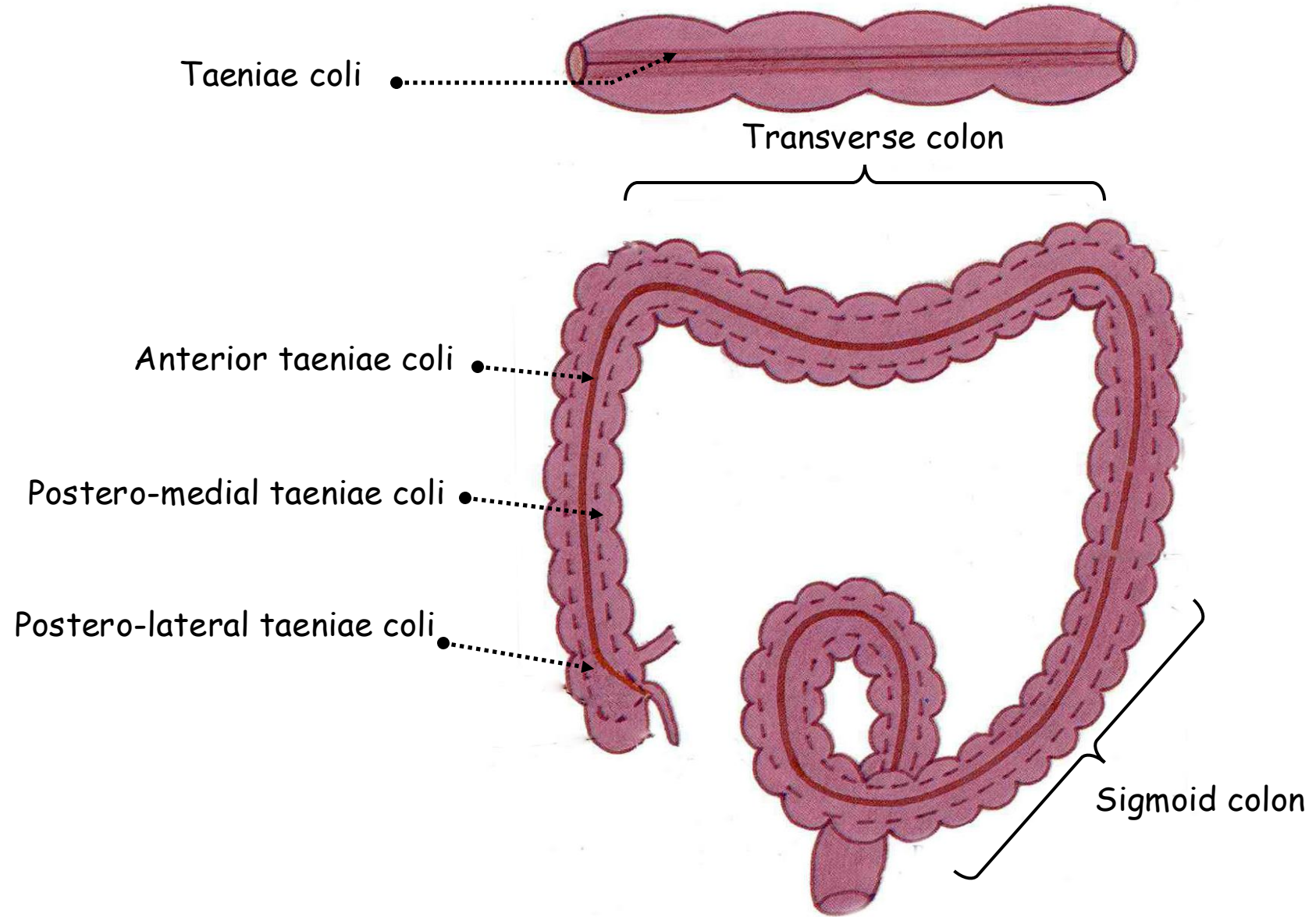
- Segregation of **longitudinal muscle** in its wall into three narrow bands :

- **Anterior:** inferior in transverse colon

- **Posteromedial:** posterior in transverse colon

- **Posterolateral:** superior in transverse colon

- **Less visible in the rectum**



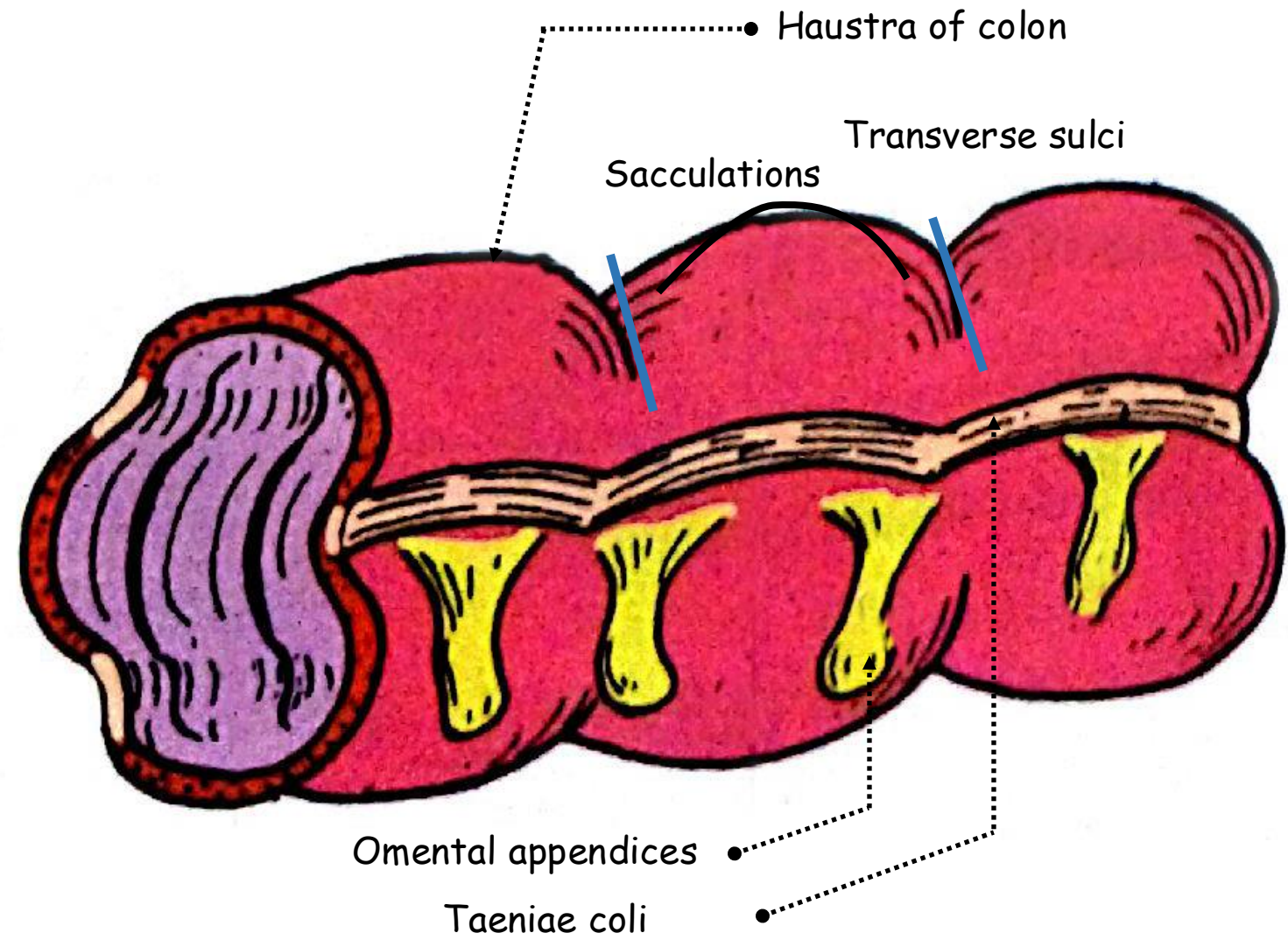
ANTERIOR VIEW OF LARGE INTESTINE

2. Haustra of colon:

- Sacculations of the colon
- Separated by **transverse sulci**
- Constituted by the **circular muscle** of its wall
- **Less visible in the rectum**

3. Omental appendices:

- **Peritoneal-covered** accumulations of fat
- **Blood vessels** supplying them from the mucosa **perforate** the muscle wall
- **Absent in caecum and appendix**
- **Larger and more numerous** in sigmoid colon



SCHEMATIC VIEW OF THE SHAPE OF COLON

III. STRUCTURE

A. LARGE INTESTINE WALL

1. Serous coat:

- Covers anterior face of fixed parts
- Continues up behind and is reflected downwards to the floor of posterior abdominal wall in mobile parts

2. Two layers of muscle:

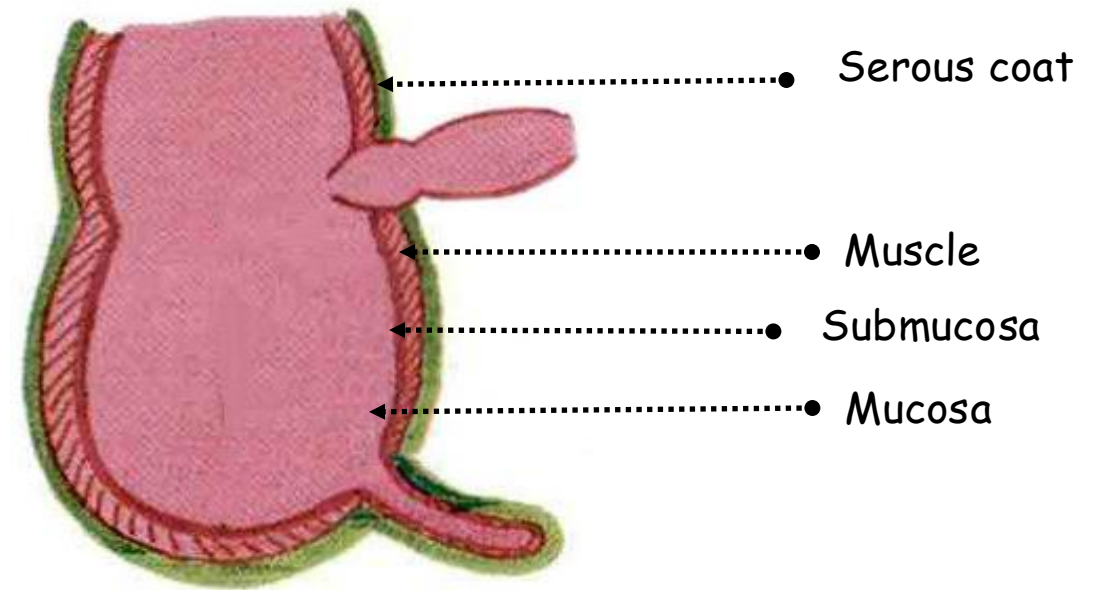
- Outer: longitudinal
- Inner: circular

3. Submucosa:

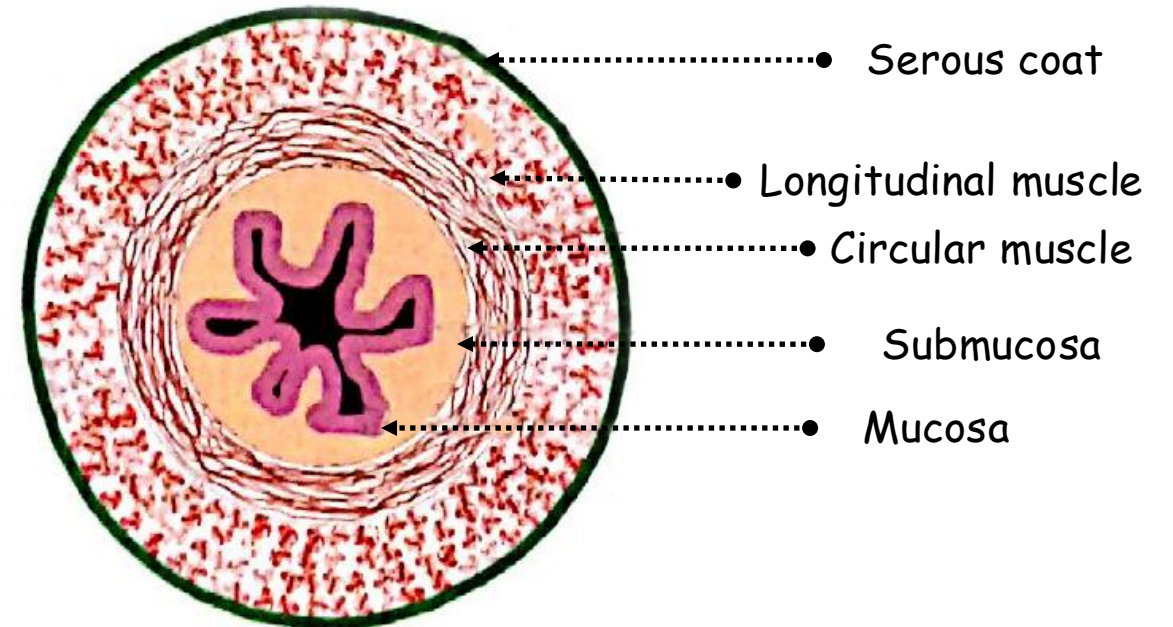
- Loose areolar connective tissue

4. Mucosa:

- Epithelium : simple columnar
- Lacks villi and contains crypts
- Secretory, absorptive and protective



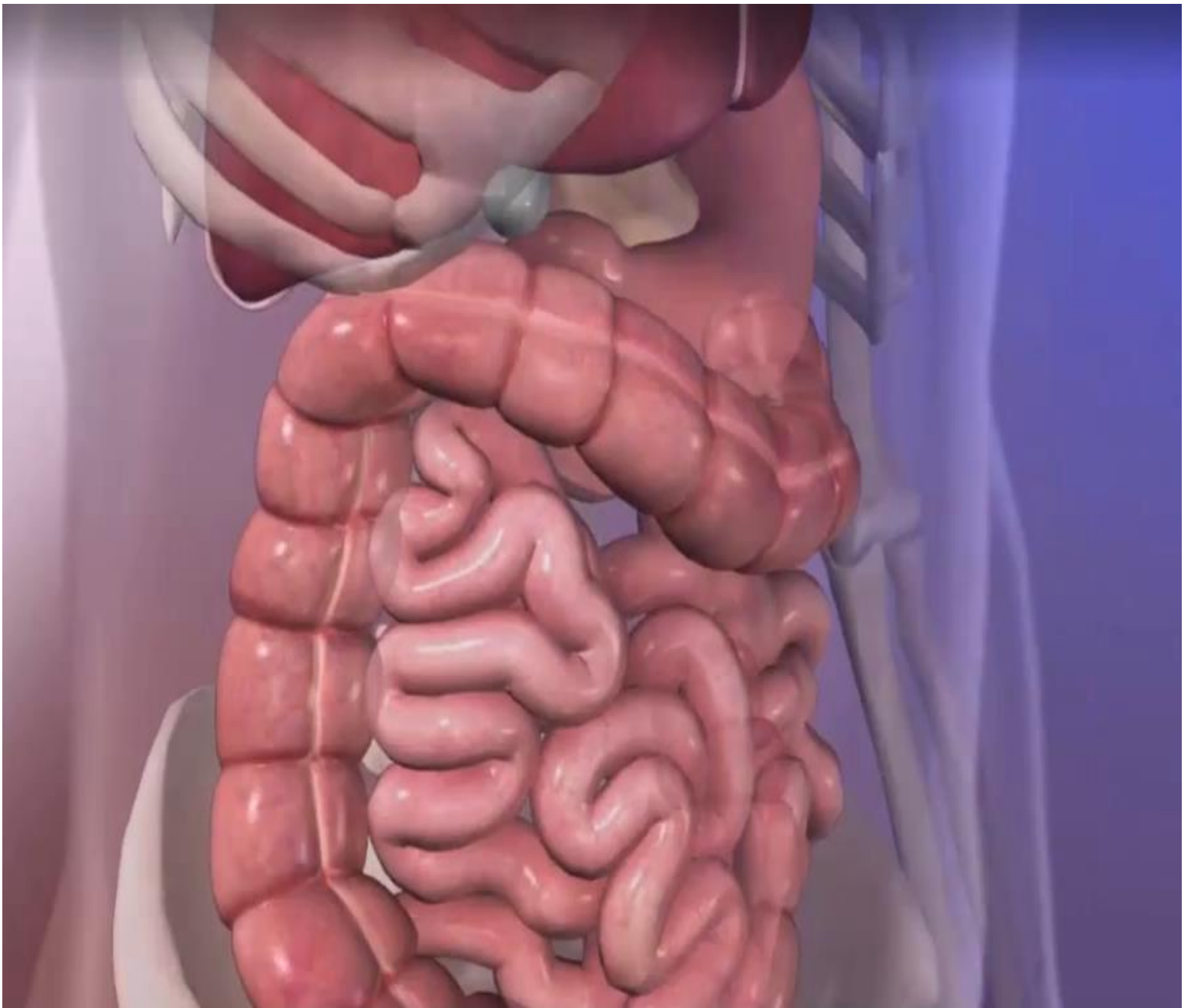
CORONAL SECTION THROUGH CAECUM



HORIZONTAL SECTION OF LARGE INTESTINE

B. LARGE INTESTINE LUMEN

- Macroscopic aspect:
 - **Longitudinal protrusions:** formed by taeniae coli
 - **Semilunar folds:** form transverse sulci on the external surface
 - **Depressions:** between semilunar folds matching with haustra of colon

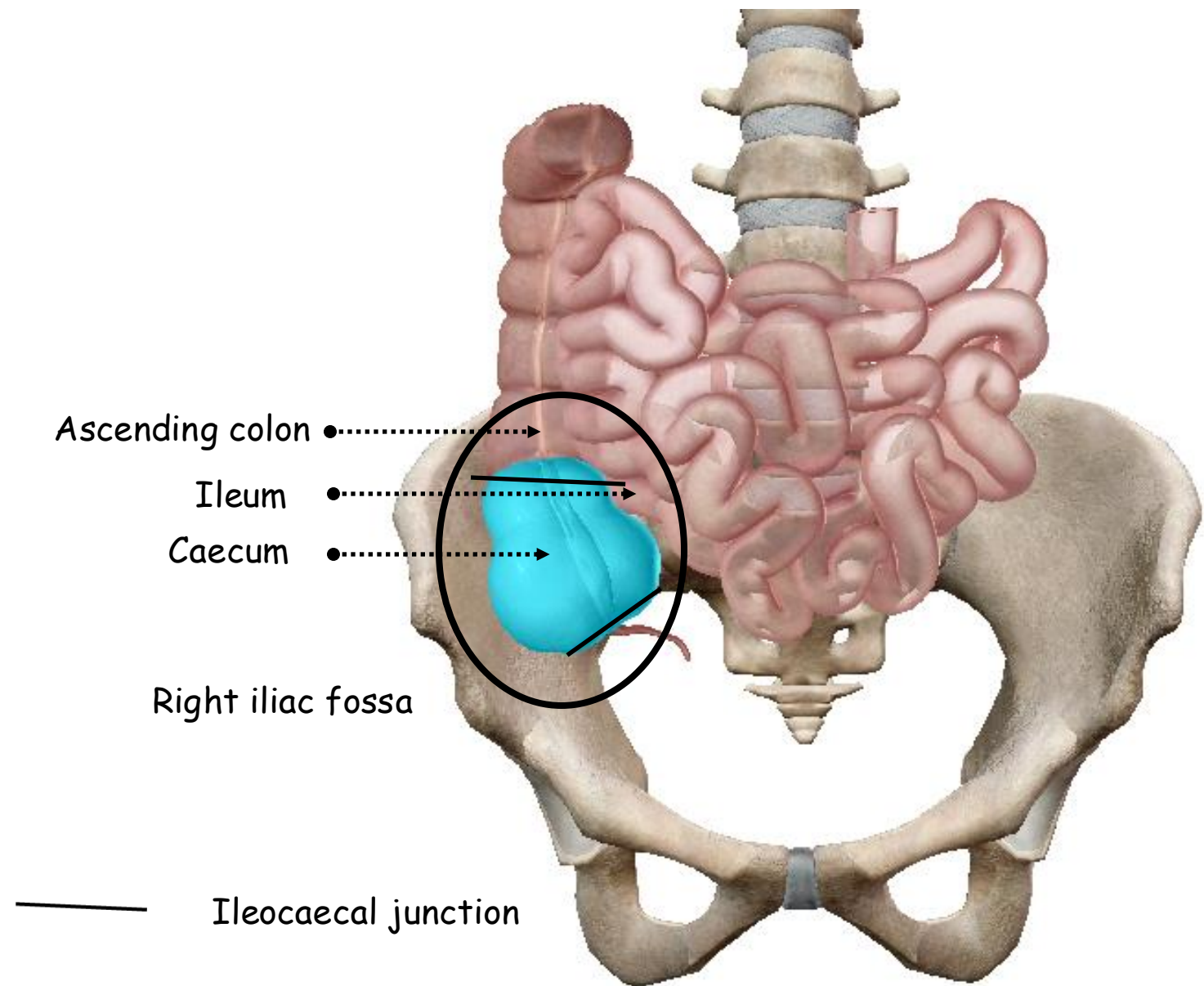


IV. PARTS OF COLON

A. CAECUM AND APPENDIX

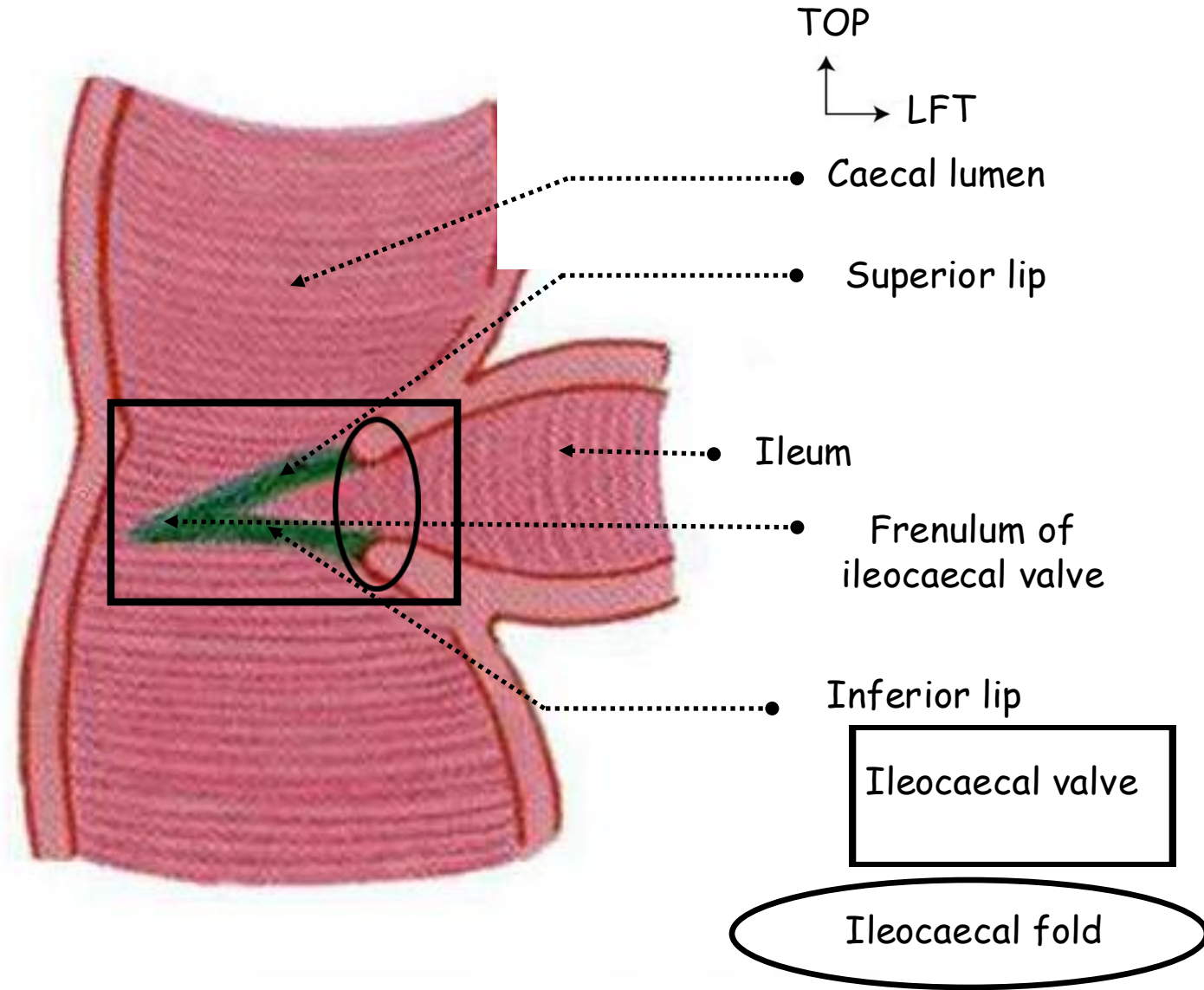
1. Caecum:

- Blind pouch of the large intestine projects downwards from the commencement of the ascending colon below the ileocaecal junction



ANTERIOR VIEW OF CAECUM

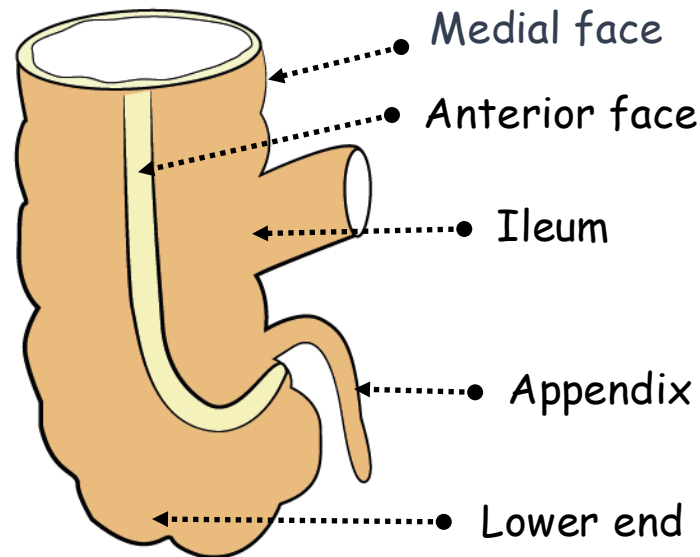
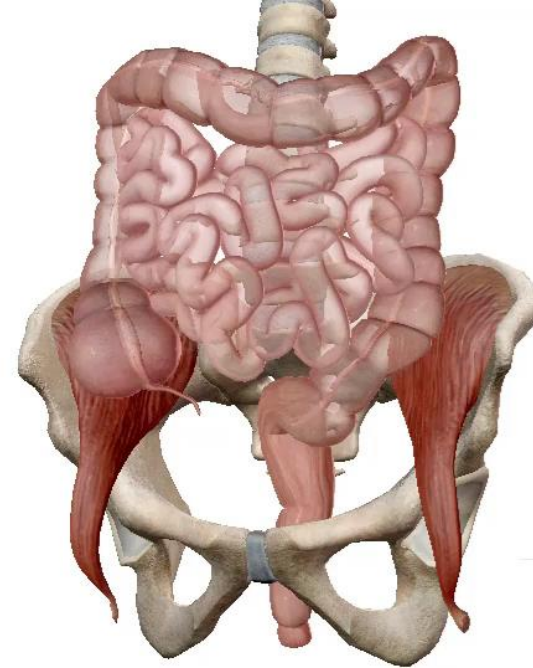
- Two muscular flaps projecting into the lumen of the large intestine (the **ileocecal fold**) surround the opening of ileum in caecum
- Internally the **ileoocaecal junction** is guarded by the **ileoocaecal valve** whose almost **transverse lips** may help to prevent some reflux into the ileum
- A **protrusive fold** continues the ileocaecal valve **laterally** : **frenulum** of ileocaecal valve



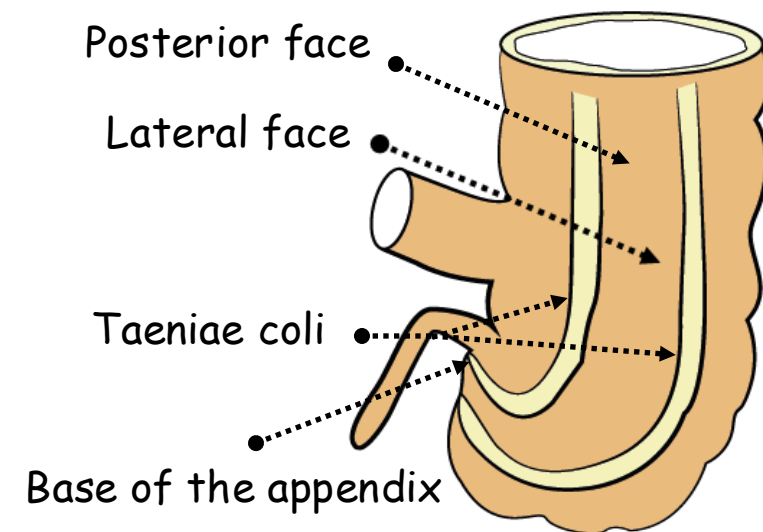
CORONAL SECTION OF ILEOCAECAECAL JUNCTION

• It presents four faces:

- **Anterior:** touches the parietal peritoneum of the anterior abdominal wall
- **Posterior:** lies on the floor of the iliac fossa
- **Medial:** the base of the appendix lies in the posteromedial wall where the three taeniae coli converge
- **Lateral:** outgrows the medial wall and bulges down below the base of the appendix in the adult



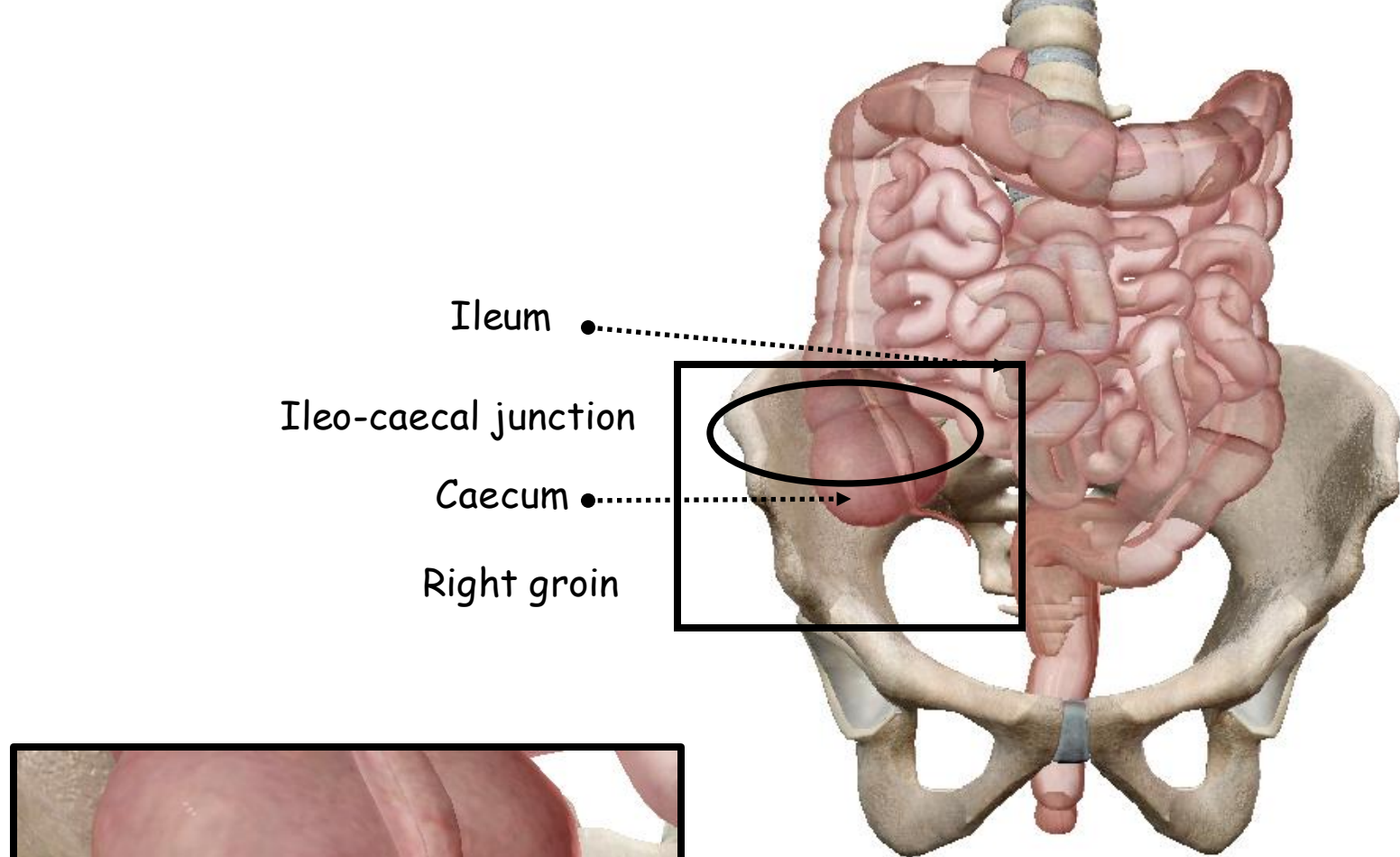
ANTERIOR VIEW OF CAECUM



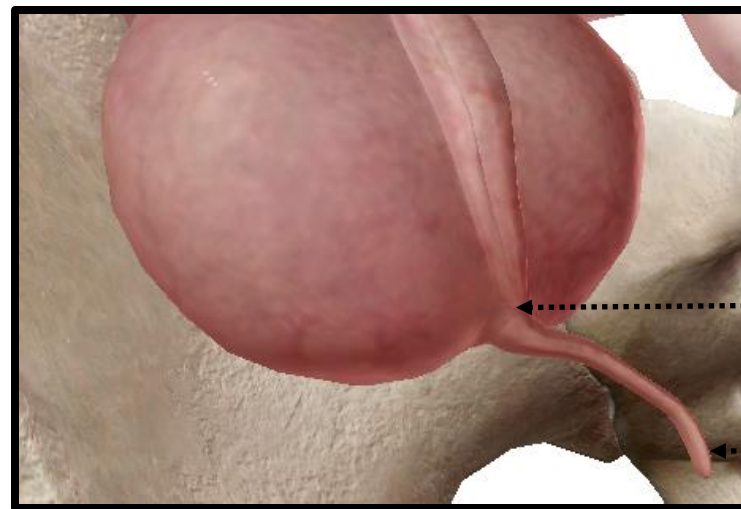
POSTERIOR VIEW OF CAECUM

2. Appendix:

- Worm-shaped, blind-ending tube
- Opens into the posteromedial wall of the caecum 2 cm below the ileocaecal valve
- Externally the base of the appendix is at the point of convergence of the three taeniae coli on the posteromedial wall of the caecum
- On the surface of the abdomen this point (McBurney's) lies one-third of the way up the oblique line that joins the right anterior superior iliac spine to the umbilicus
- While the position of the base of the appendix is constant in relation to the caecum, the tip may lie in a variety of positions
- Length: 6 to 9 cm
- Internal diameter: 7mm



ANTERIOR VIEW OF ABDOMEN



ANTERIOR VIEW OF RIGHT GROIN

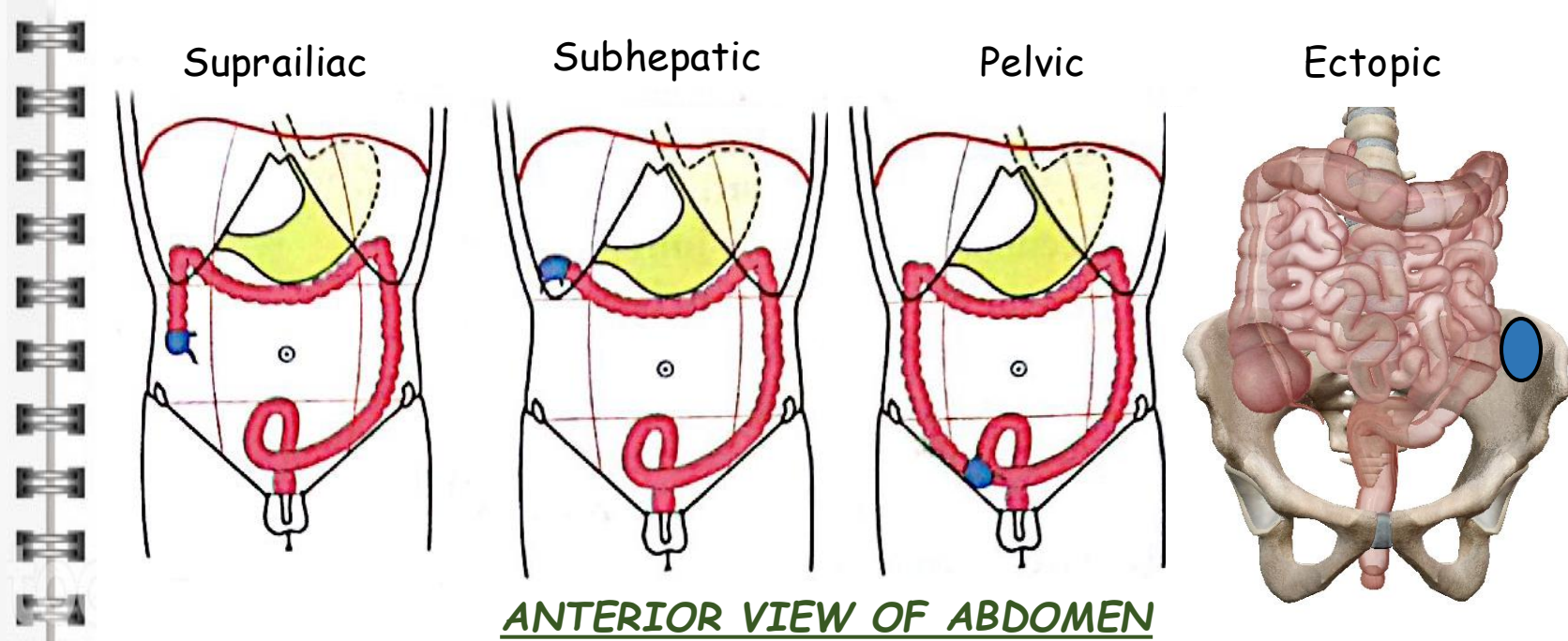
3. Various positions:

- **Of caecum:**

- Suprailiac
- Subhepatic
- Pelvic
- Ectopic: in the **left** groin

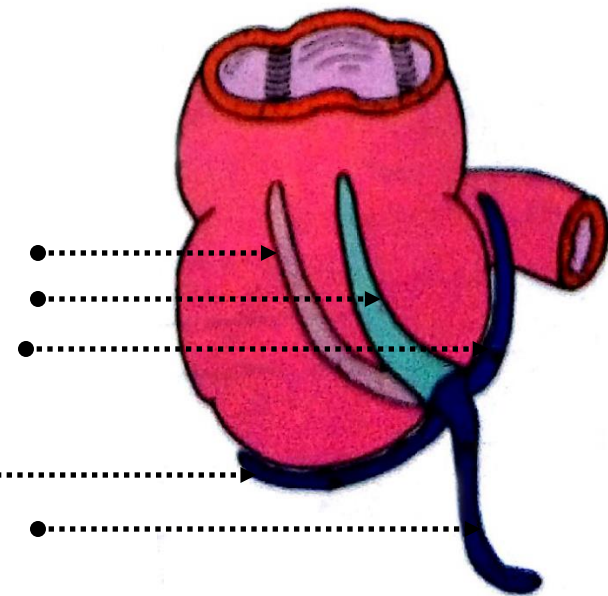
- **Of appendix:**

- Medial descending (most frequent)
- Medial ascending
- Ascending precaecal
- Ascending retrocaecal
- Subcaecal



Ascending retrocaecal
Ascending precaecal
Medial ascending

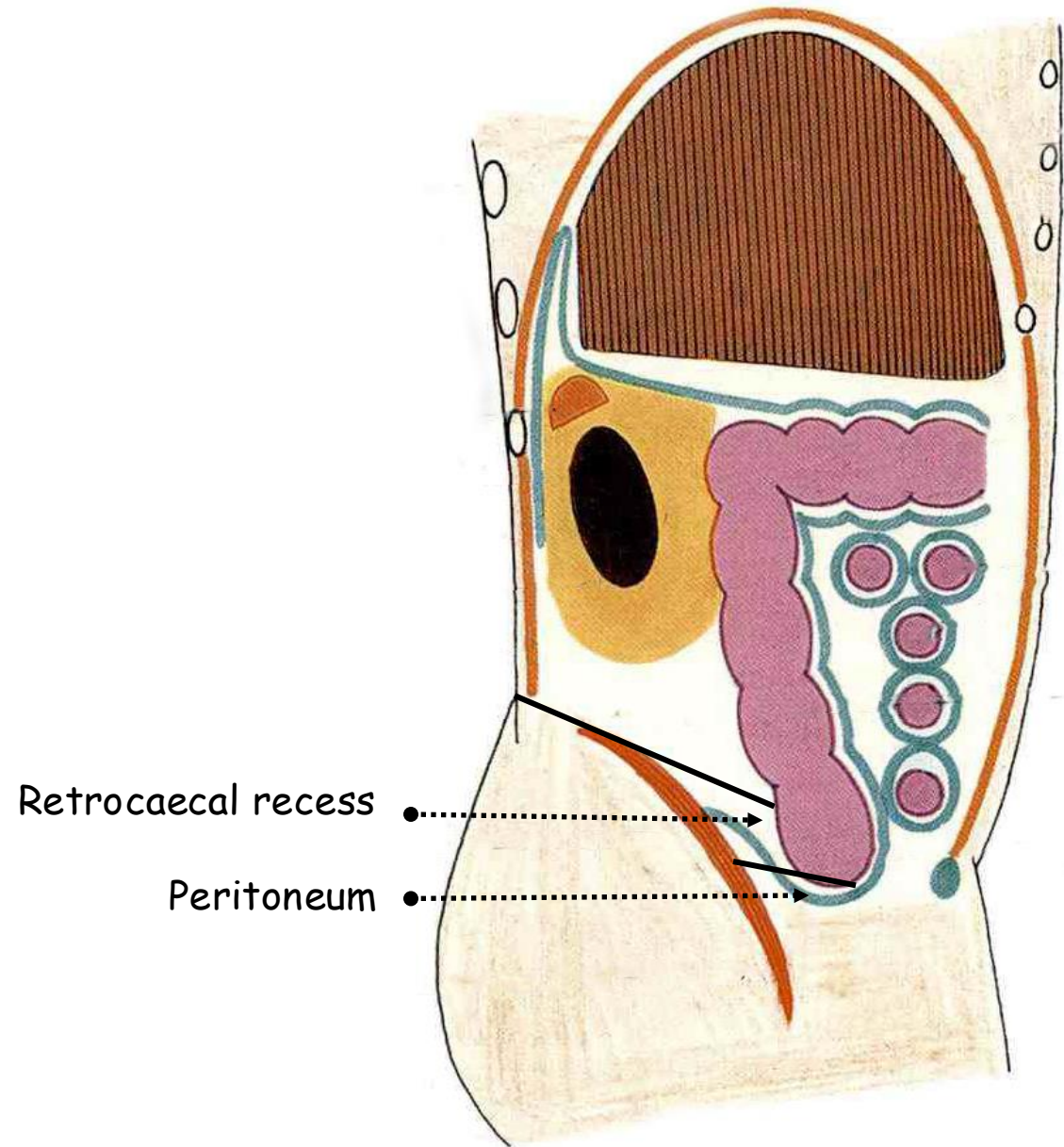
Subcaecal
Medial descending
(most frequent)



ANTERIOR VIEW OF CAECUM

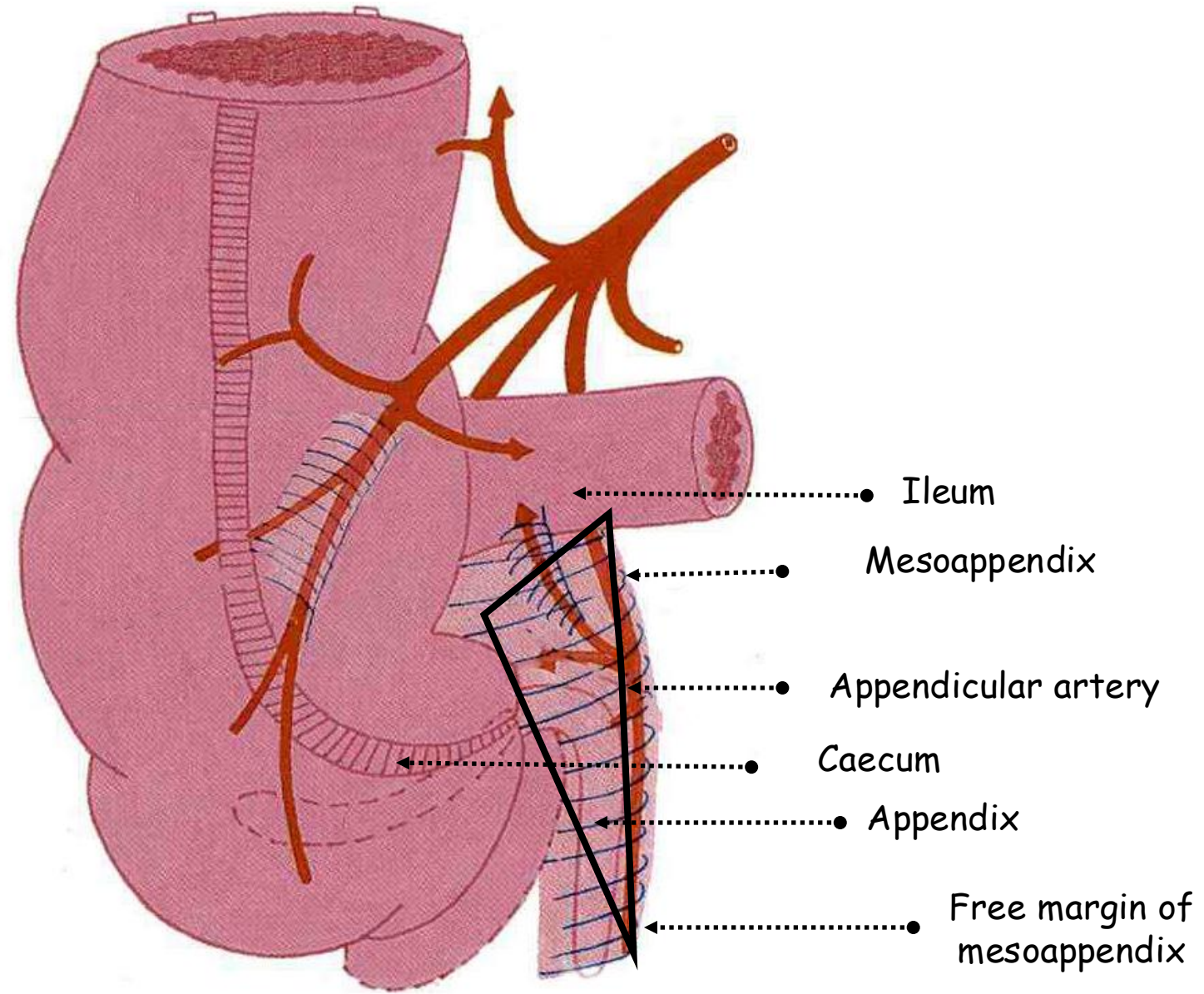
4. Serous coat:

- Over the front and on both sides it is covered with peritoneum
- The serous coat continues up behind it and is reflected downwards to the floor of the right iliac fossa
- The retrocaecal peritoneal space may be shallow or deep according to the distance of the retrocaecal fold from the lower end of the caecum (even continuous across the iliac fossa)
- Often there are two caecal folds, forming between them the retrocaecal recess in which the appendix may lie



RIGHT SAGITTAL SECTION OF ABDOMEN

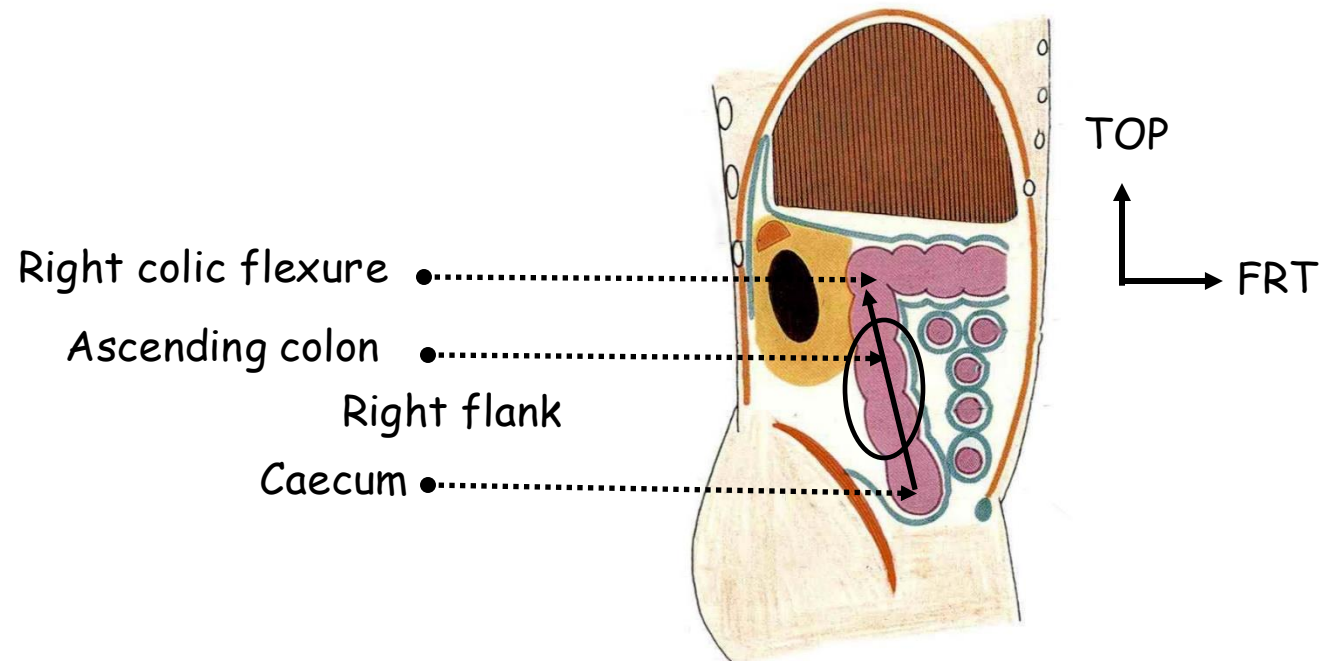
- The appendix has its own short mesentery, the **mesoappendix**
- **Triangular fold** of peritoneum
- **Prolongation** of the left (inferior) layer of the mesentery of the terminal ileum
- The **appendicular artery** runs first in the free margin of the mesoappendix



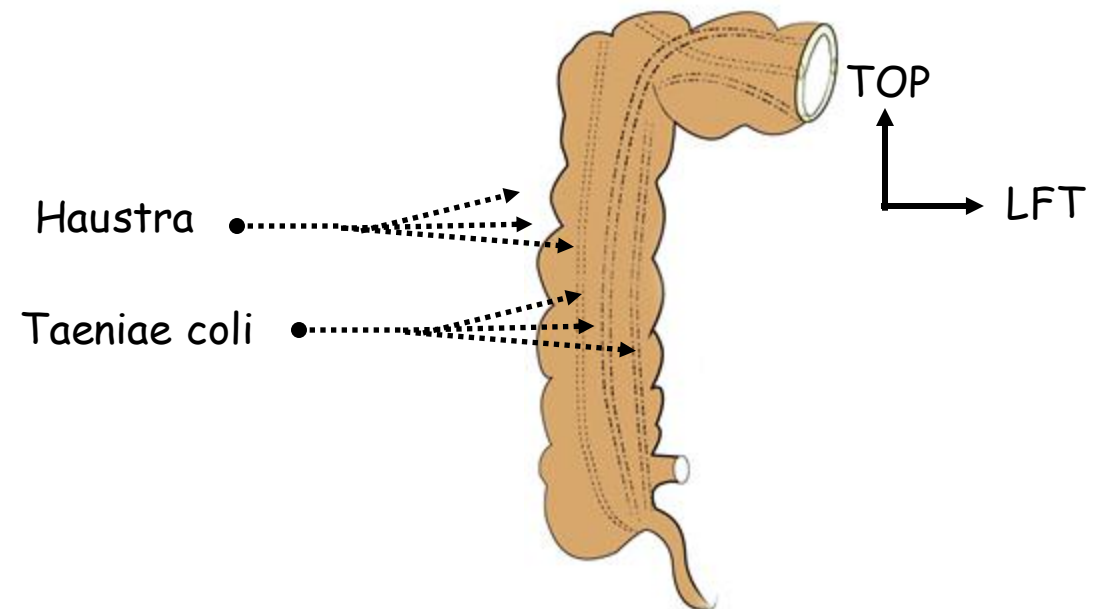
ANTERIOR VIEW OF CAECUM

B. ASCENDING COLON

- Extends upwards from the ileocaecal junction to the right colic (hepatic) flexure
- Lies vertically on the iliac fascia and the anterior layer of the lumbar fascia
- Sacculated surface containing 7 to 8 haustra

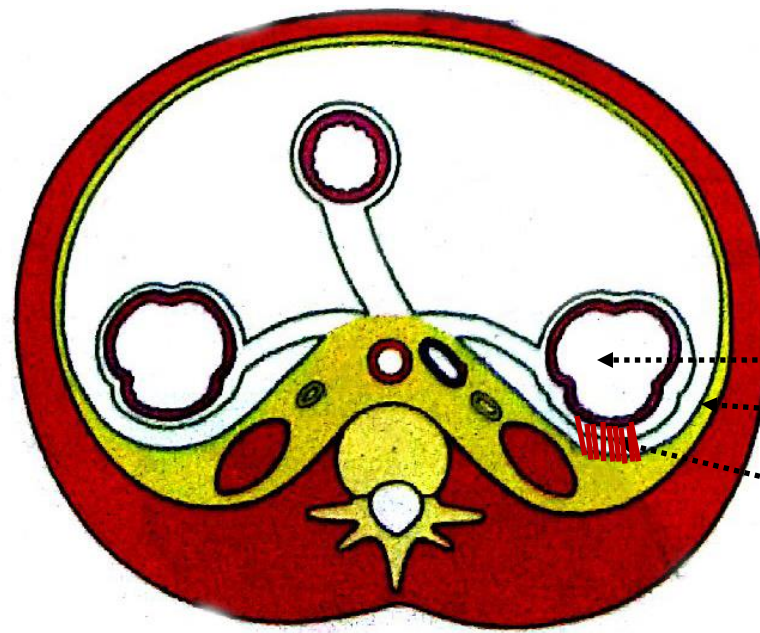


RIGHT SAGITTAL SECTION OF ABDOMEN



ANTERIOR VIEW OF RIGHT COLON

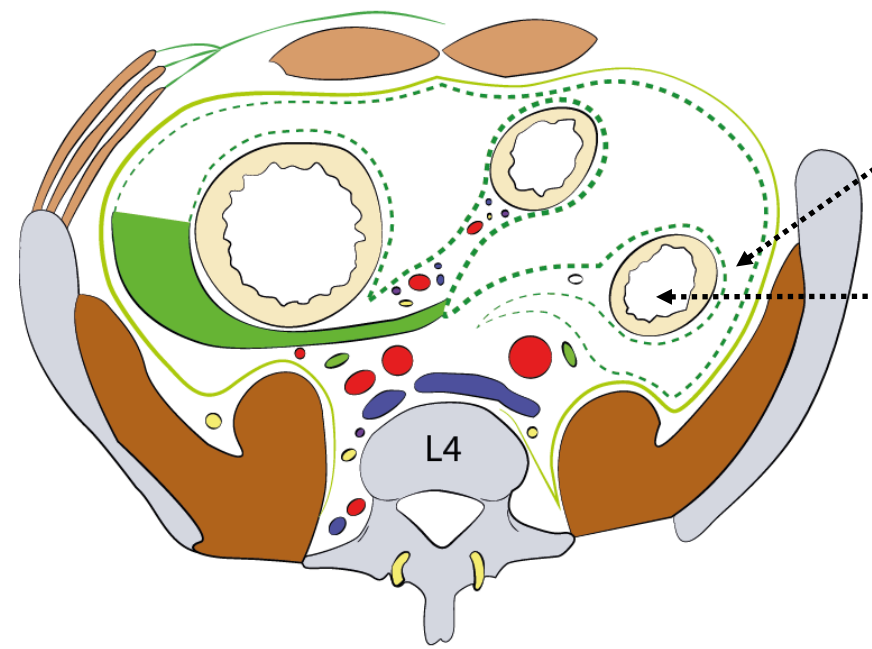
- Connected and fixed to the peritoneal floor of the iliac and lumbar fascia by extraperitoneal fibrous tissue (Toldt's fascia)
- Its front and both sides possess a serous coat, which runs laterally into the paracolic gutter and medially into the right infracolic compartment



FRT
 ↑
 └─→ RGHT

- Ascending colon
- Posterior parietal peritoneum
- Right Toldt's fascia

HORIZONTAL SECTION OF ABDOMEN

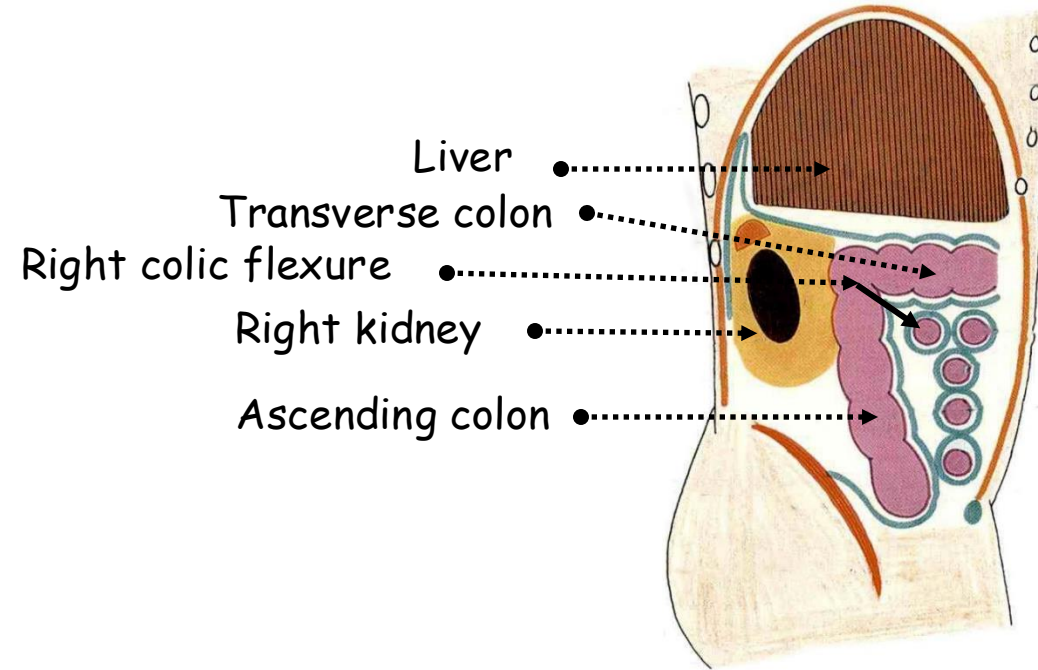


- Right paracolic gutter
- Ascending colon

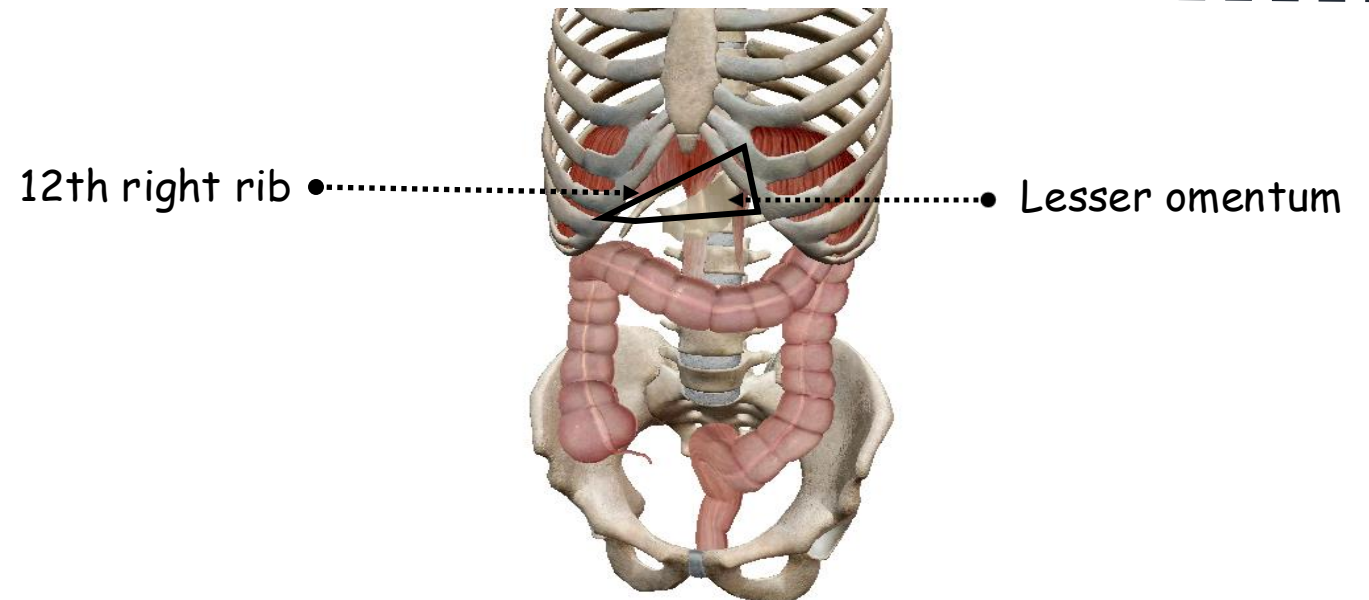
HORIZONTAL SECTION OF ABDOMEN

C. RIGHT COLIC FLEXURE

- Lies on the lateral surface of the inferior pole of the right kidney, in contact with the inferior surface of the liver
- Fixed :
 - Back: Toldt's fascia
 - Top: lesser omentum
 - Front: phrenicocolic ligament



RIGHT SAGITTAL SECTION OF ABDOMEN

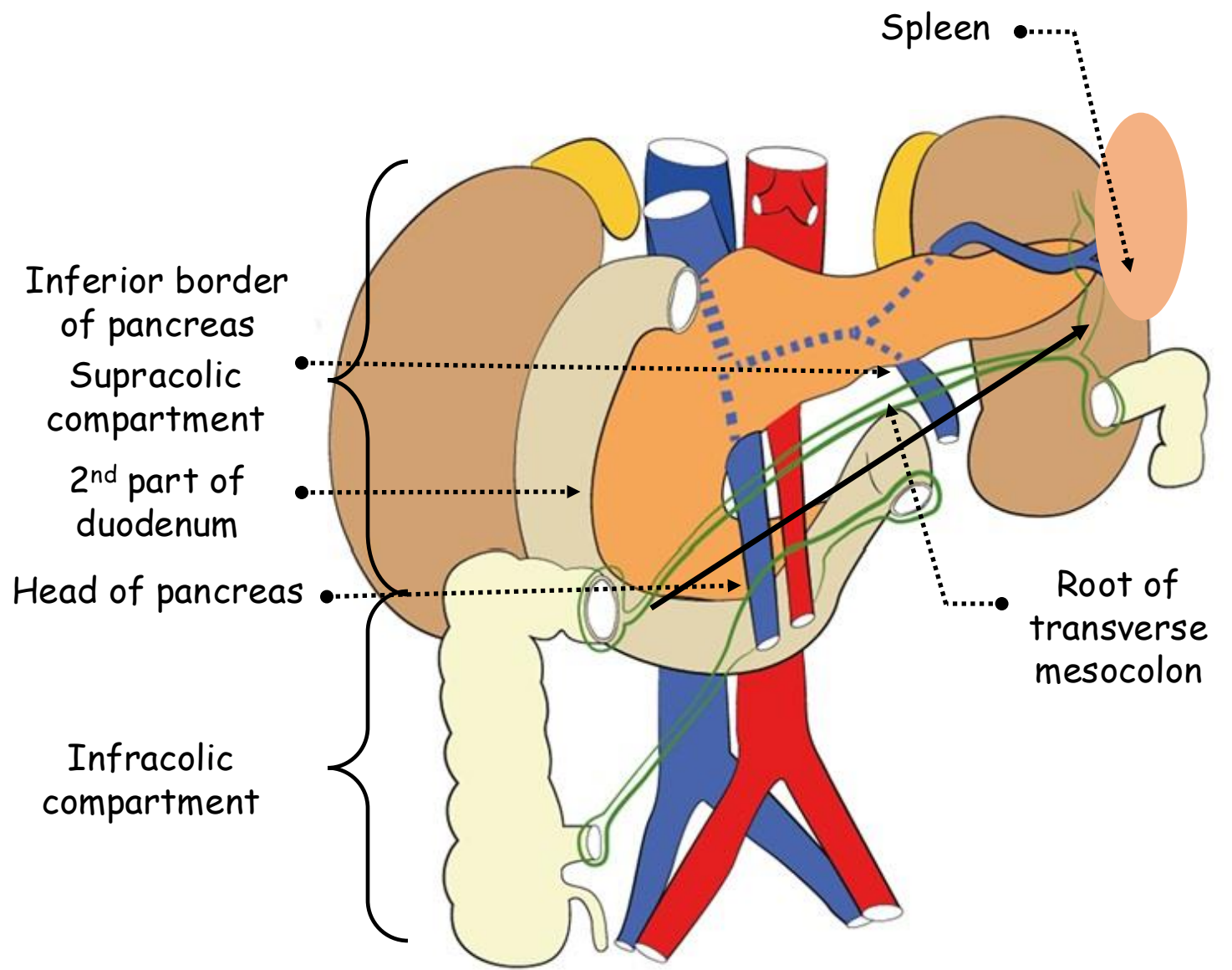


ANTEROLATERAL VIEW OF THE TRUNK

- Fixed by:

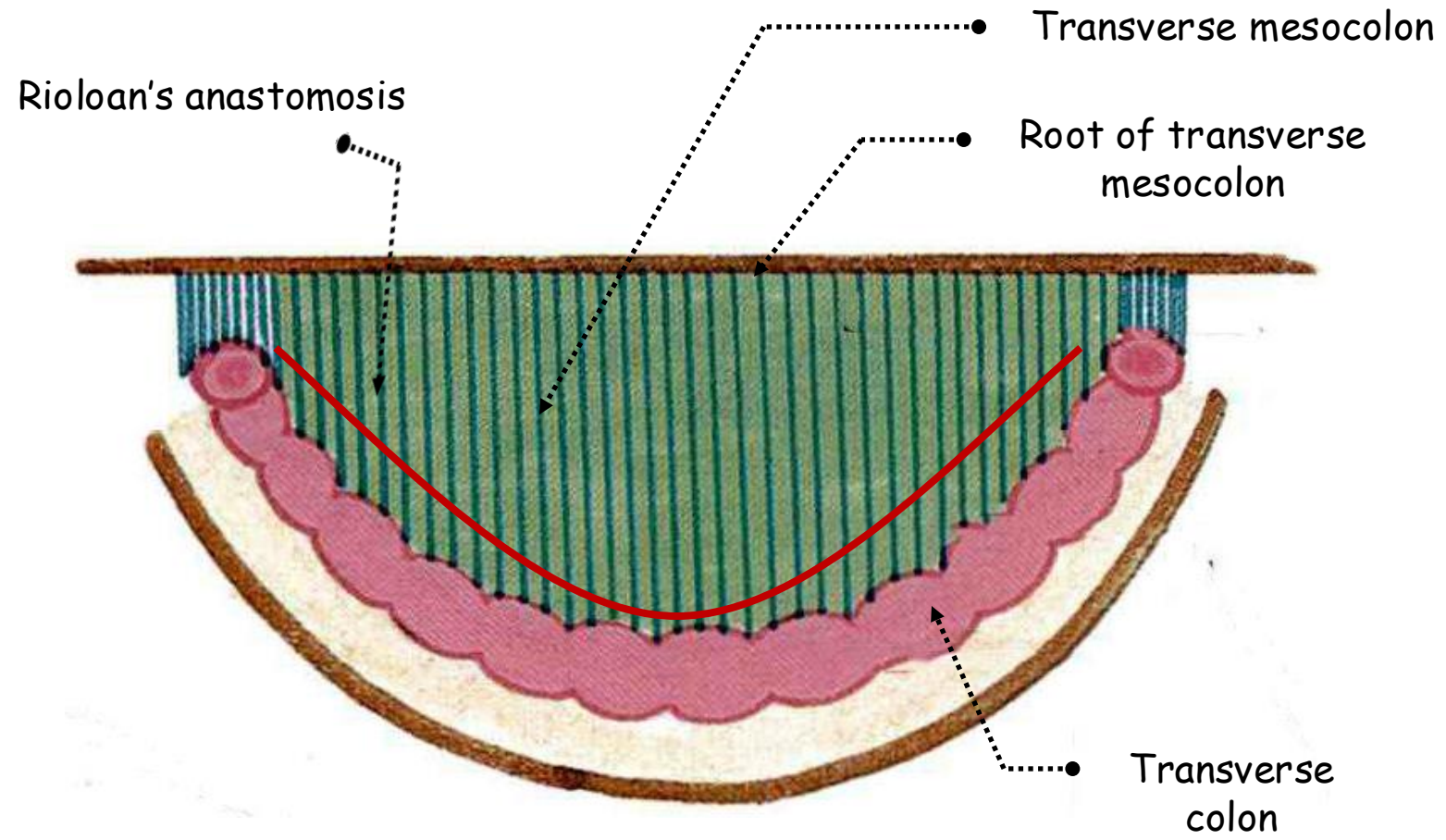
1. Transverse mesocolon:

- Subdivides the peritoneal cavity to **supracolic** and **infracolic** compartments
- Transverse colon hangs free on the transverse mesocolon, which is attached from the inferior pole of the right kidney across the descending (second) part of the duodenum and the pancreas to the inferior pole of the left kidney



ANTERIOR VIEW SHOWING THE ROOT OF TRANSVERSE MESOCOLON

- **Double fold:** superior limits at the bottom the lesser sac and inferior
- **Root:** posterior parietal peritoneum
- **Ending:** posterior face of the transverse colon covering the front
- Contains **Riolan's anastomosis**



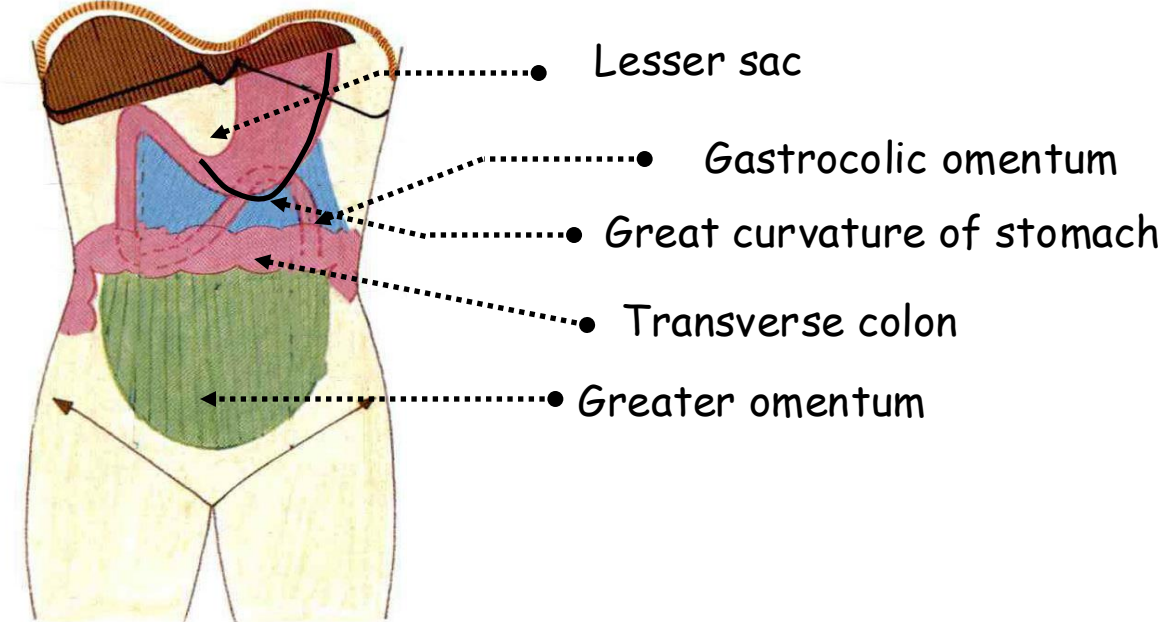
HORIZONTAL SECTION SHOWING TRANSVERSE MESOCOLON

2. Gastrocolic omentum:

- Connected to the great curvature of the stomach and to the transverse mesocolon
- Form the anterior wall of lesser sac

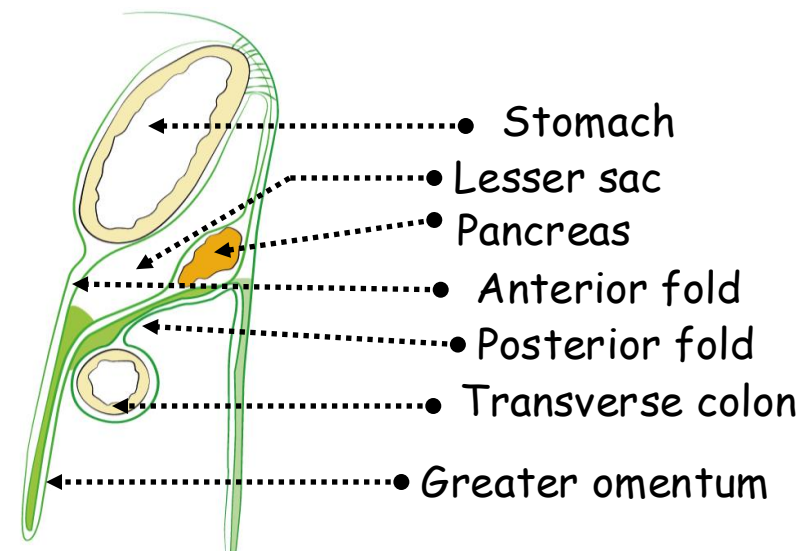
3. Greater omentum:

- Double fold in front of the transverse mesocolon :
 - Posterior (pancreatic):** limits at the front the lesser sac
 - Anterior:** from the gastrocolic omentum



ANTERIOR VIEW OF ABDOMEN

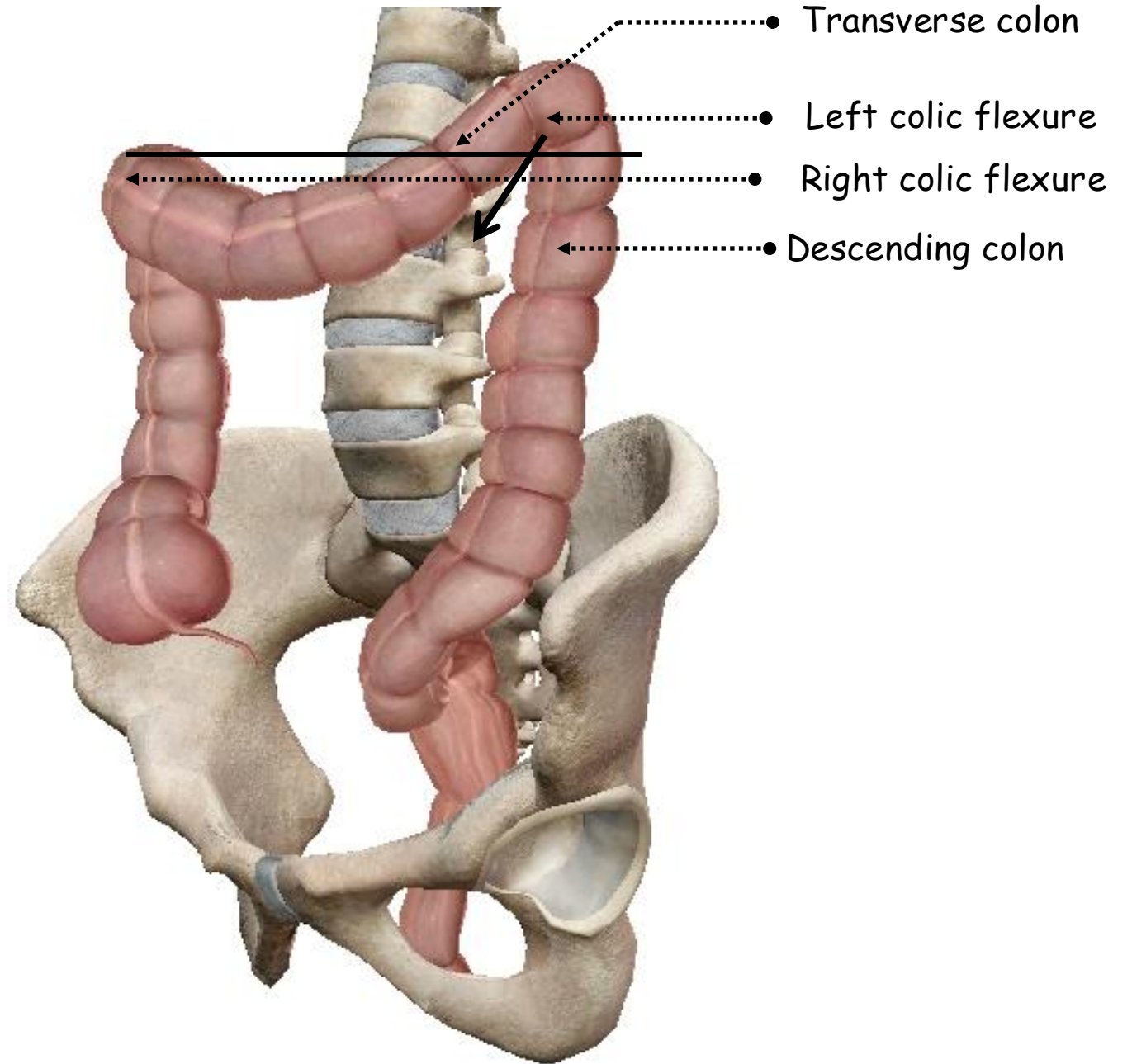
TOP
BCK



LEFT SAGITTAL SECTION OF ABDOMEN

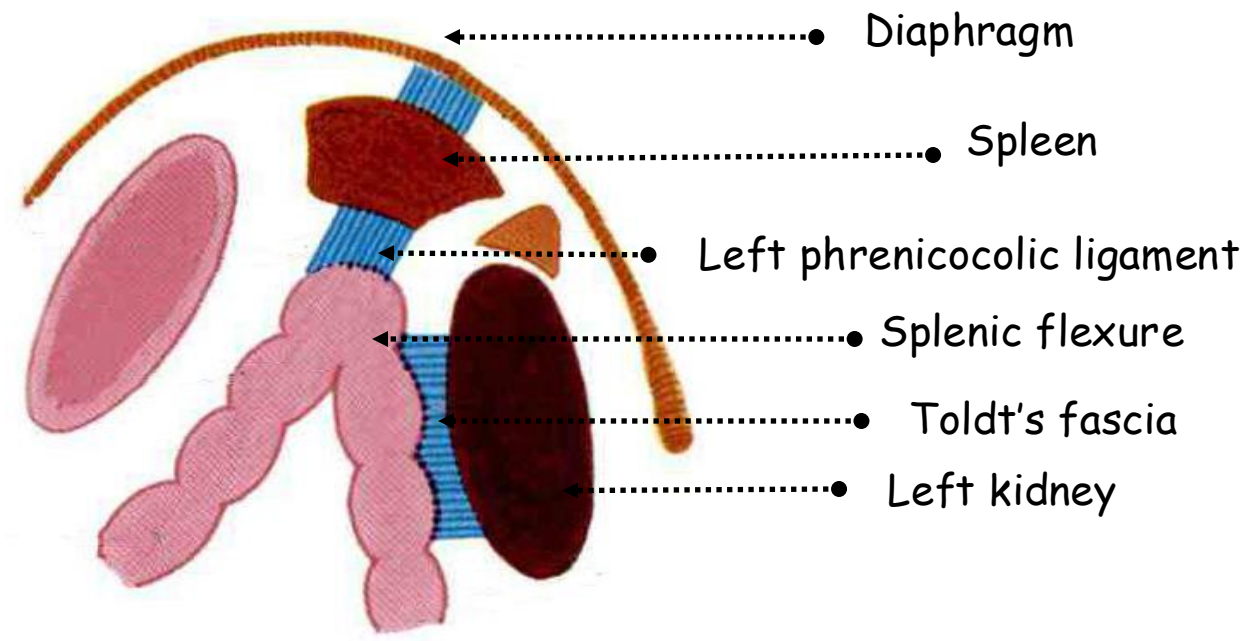
E. LEFT COLIC FLEXURE (SPLENIC)

- More acute bend at the junction of the transverse and descending colon
- Higher and more posterior and fixed than the right colic flexure
- Opens in front, bottom and medially

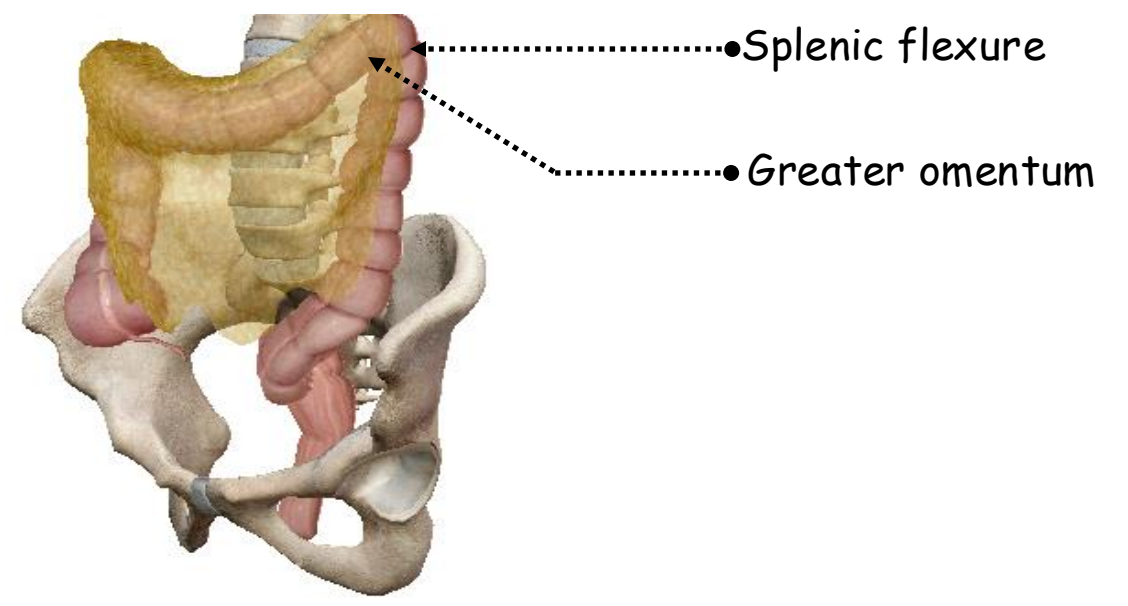


ANTEROLATERAL VIEW OF ABDOMEN AND PELVIS

- Just inferior to the spleen
- Fixed:
 - Phrenicocolic ligament
 - Toldt's fascia
 - Greater omentum



LEFT SAGITTAL SECTION SHOWING THE LEFT COLIC FLEXURE

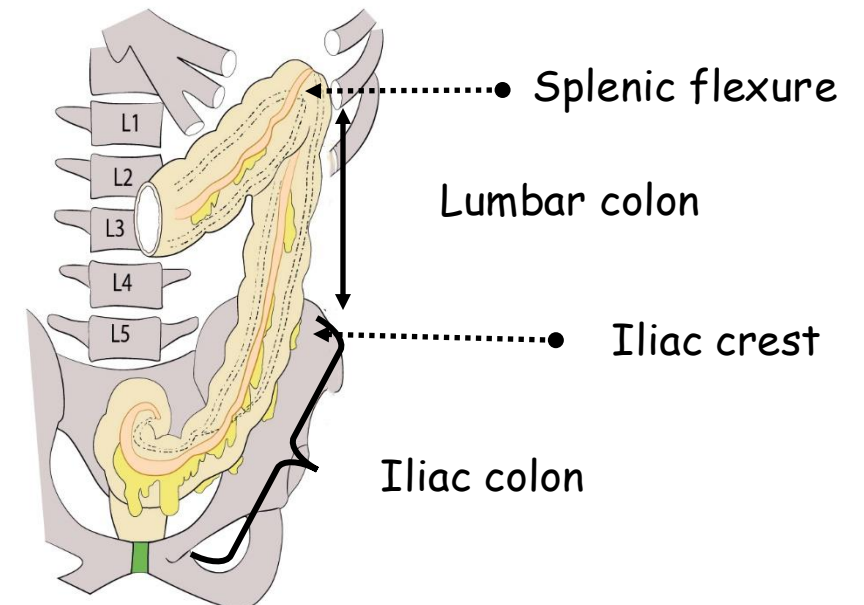
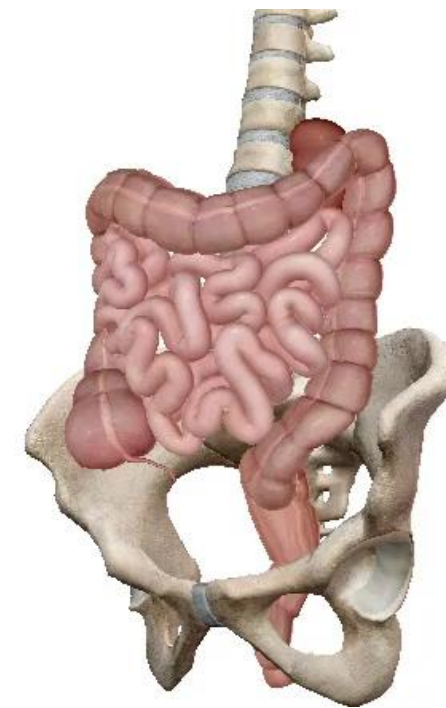


ANTEROLATERAL VIEW OF ABDOMEN AND PELVIS

F. DESCENDING COLON

1. Lumbar colon:

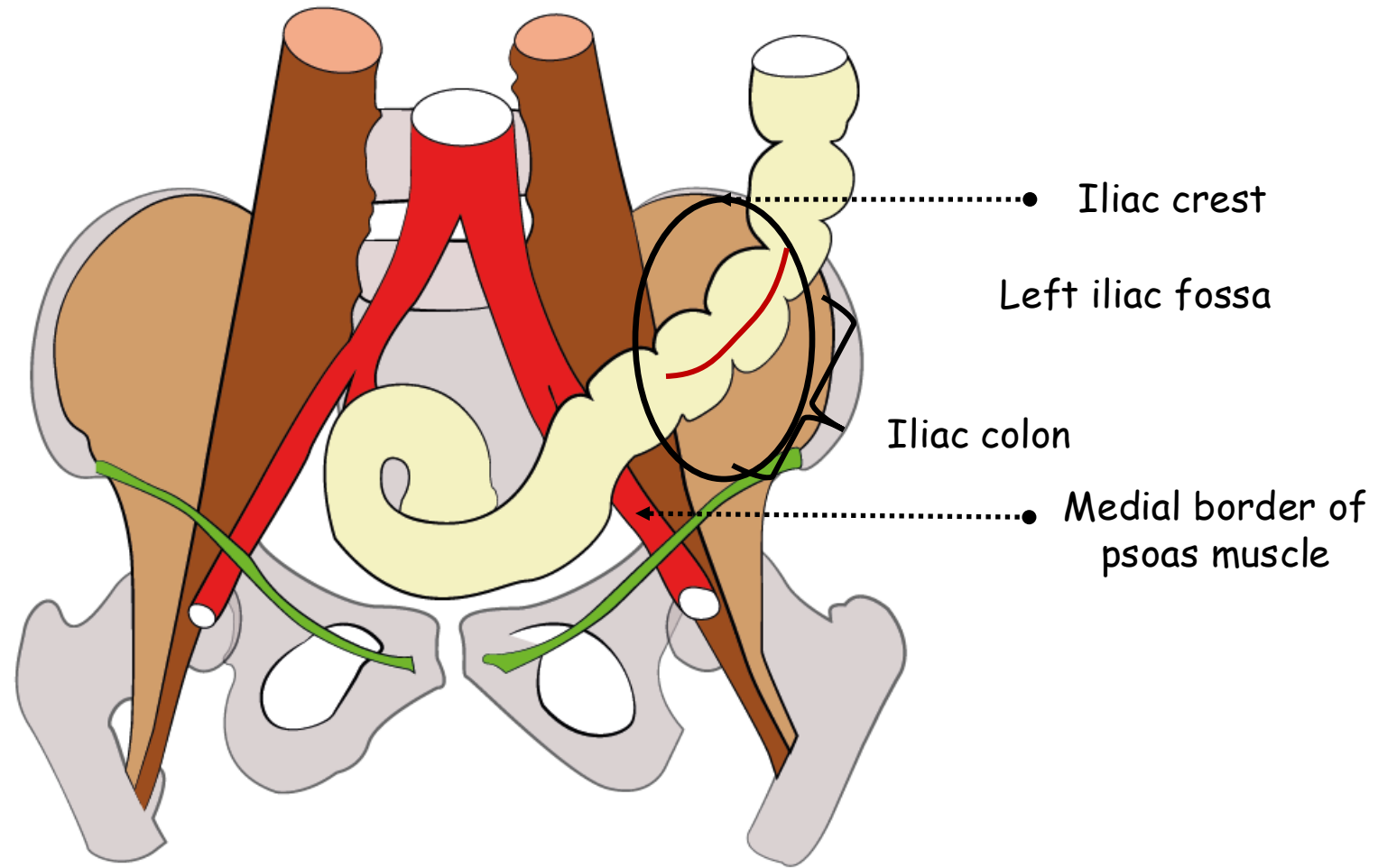
- Extends vertically from the splenic flexure to the iliac crest
- Plastered to the posterior abdominal wall lying on the lumbar fascia and the iliac fascia like ascending colon
- Connected to the posterior wall by left Toldt's fascia (extraperitoneal fibrous tissue)



ANTERIOR VIEW OF LEFT COLON

2. Iliac colon:

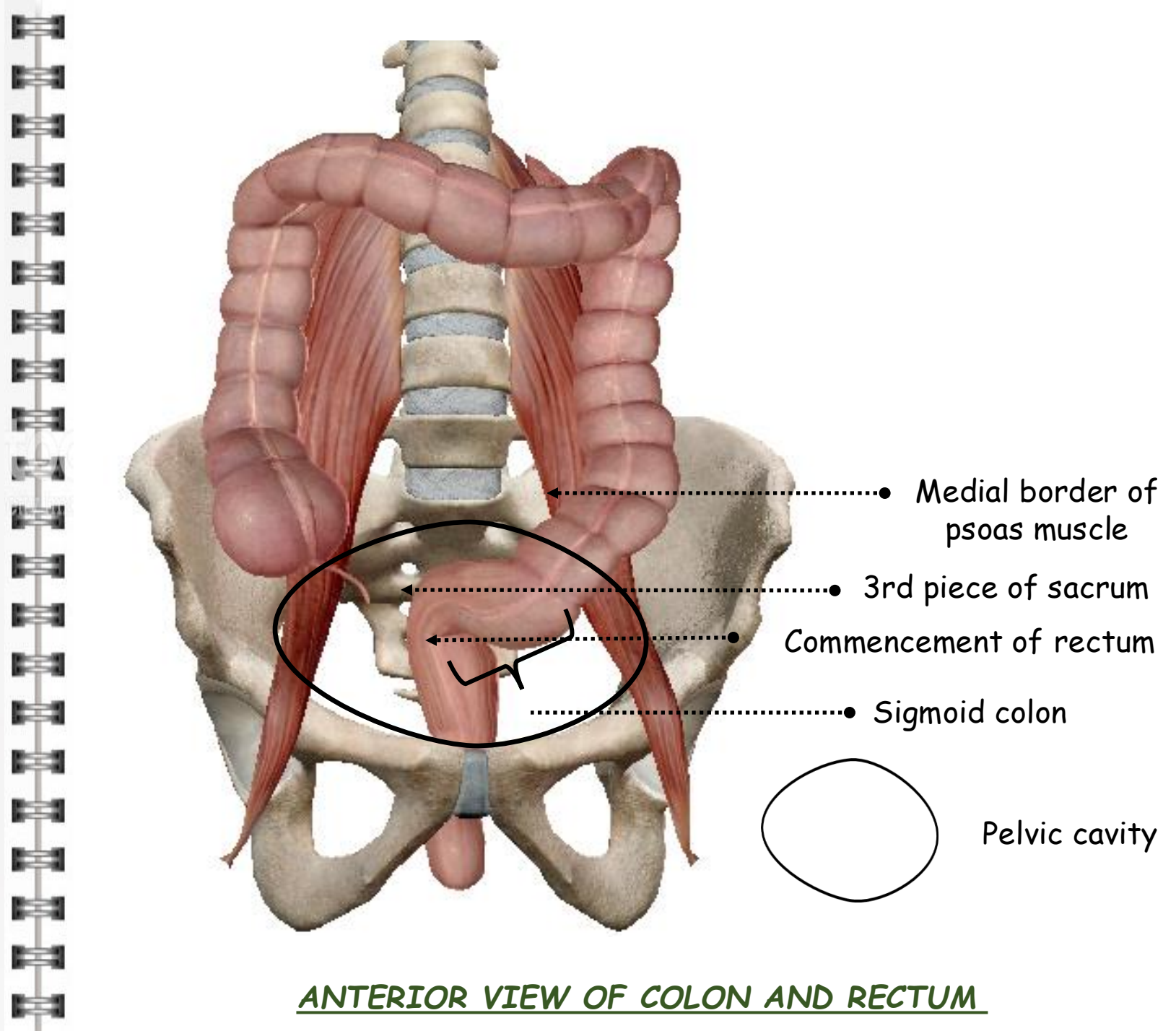
- Extends from the iliac crest to the pelvic brim about 5 cm above the inguinal ligament near the medial border of psoas muscle
- Occupies the left iliac fossa
- Concave inside
- Fixed by left Toldt's fascia



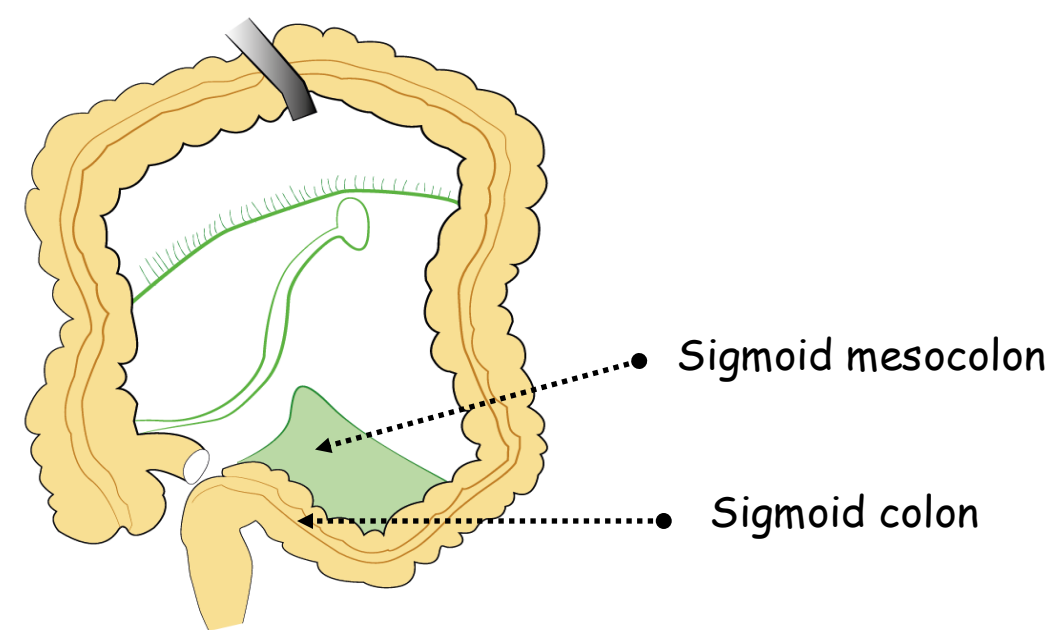
ANTERIOR VIEW OF ILIAC COLON

G. SIGMOID COLON

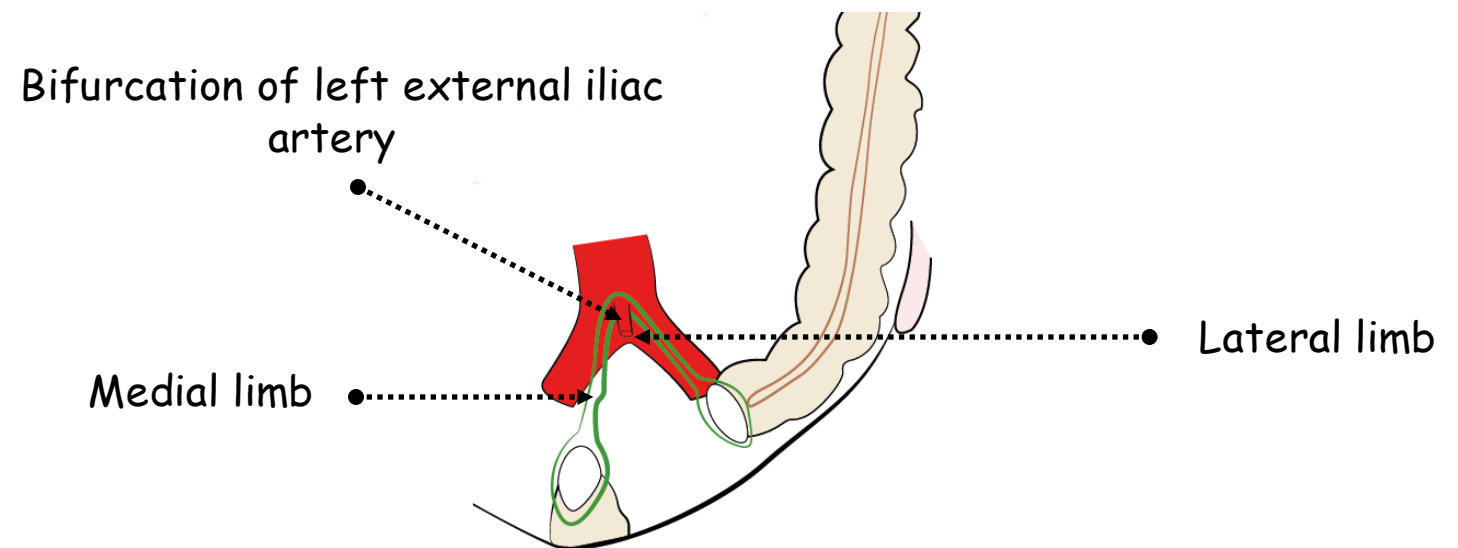
- Terminal mobile S-shaped (concave outside) part of colon
- Extends from the iliac colon to the commencement of the rectum in front of the third piece of the sacrum
- Lies, usually, in the pelvic cavity, coiled in front of the rectum, lying on the peritoneal surface of the bladder (and uterus)
- Completely invested in the peritoneum and hangs free on a mesentery, the sigmoid mesocolon



- Sigmoid mesocolon suspenses sigmoid colon to posterior wall
- **Root:** A-shaped
- The limbs of the A diverge from the bifurcation of the common iliac artery, over the sacroiliac joint at the pelvic brim
- The lateral limb is attached to the external iliac artery along the pelvic brim from this point halfway to the inguinal ligament
- The medial limb extends from the bifurcation of the common iliac artery to the midline of the posterior pelvic wall at the level of the third piece of the sacrum
- Measures about 10 cm in its intestinal border and therefore the length of the sigmoid colon is four times as long
- The sigmoid vessels lie between the layers of the mesocolon



ANTERIOR VIEW OF COLON



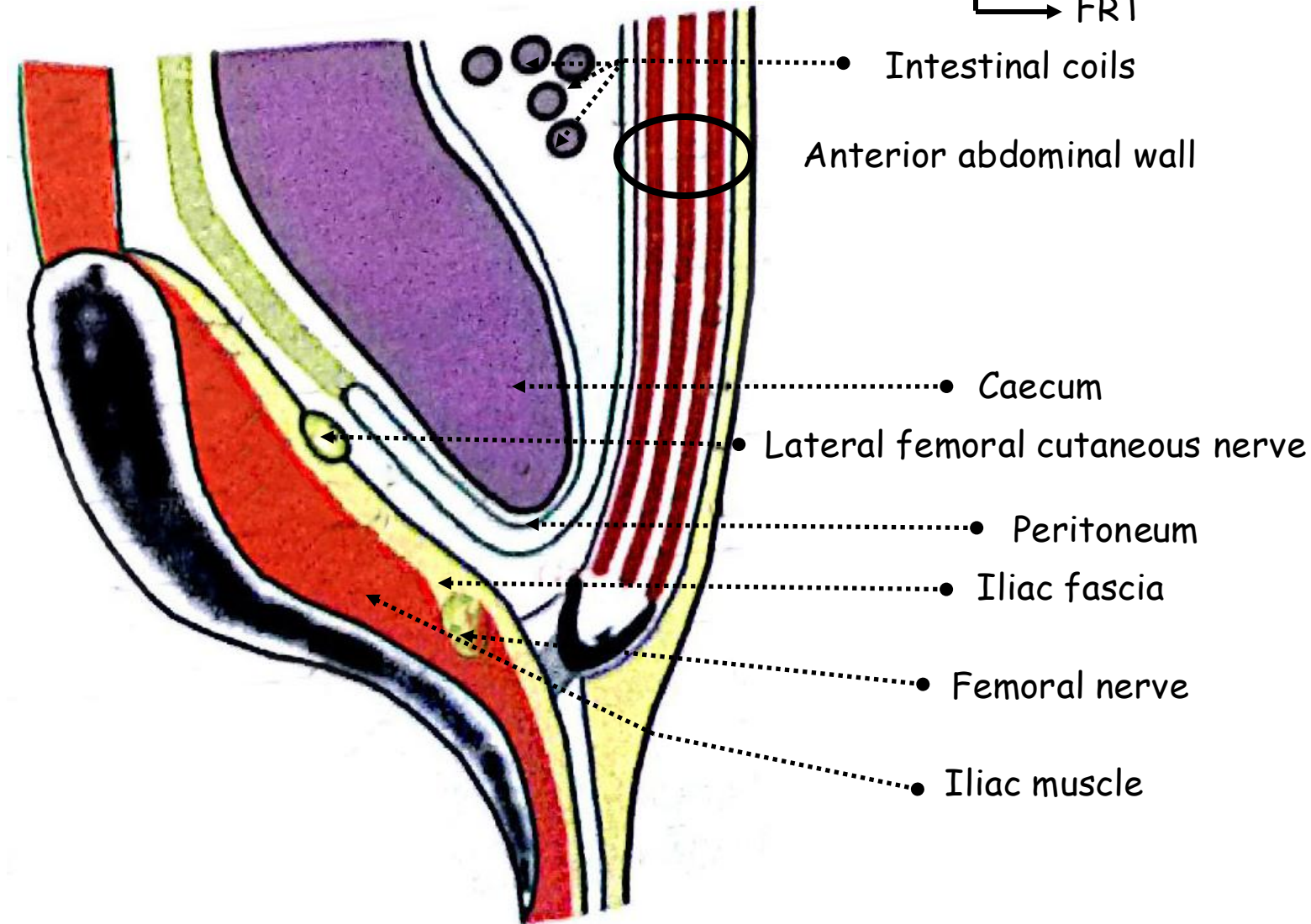
ANTERIOR VIEW OF THE SIGMOID COLON SHOWING THE ROOT OF SIGMOID MESOCOLON

V. ANATOMICAL RELATIONS

A. CAECUM AND APPENDIX

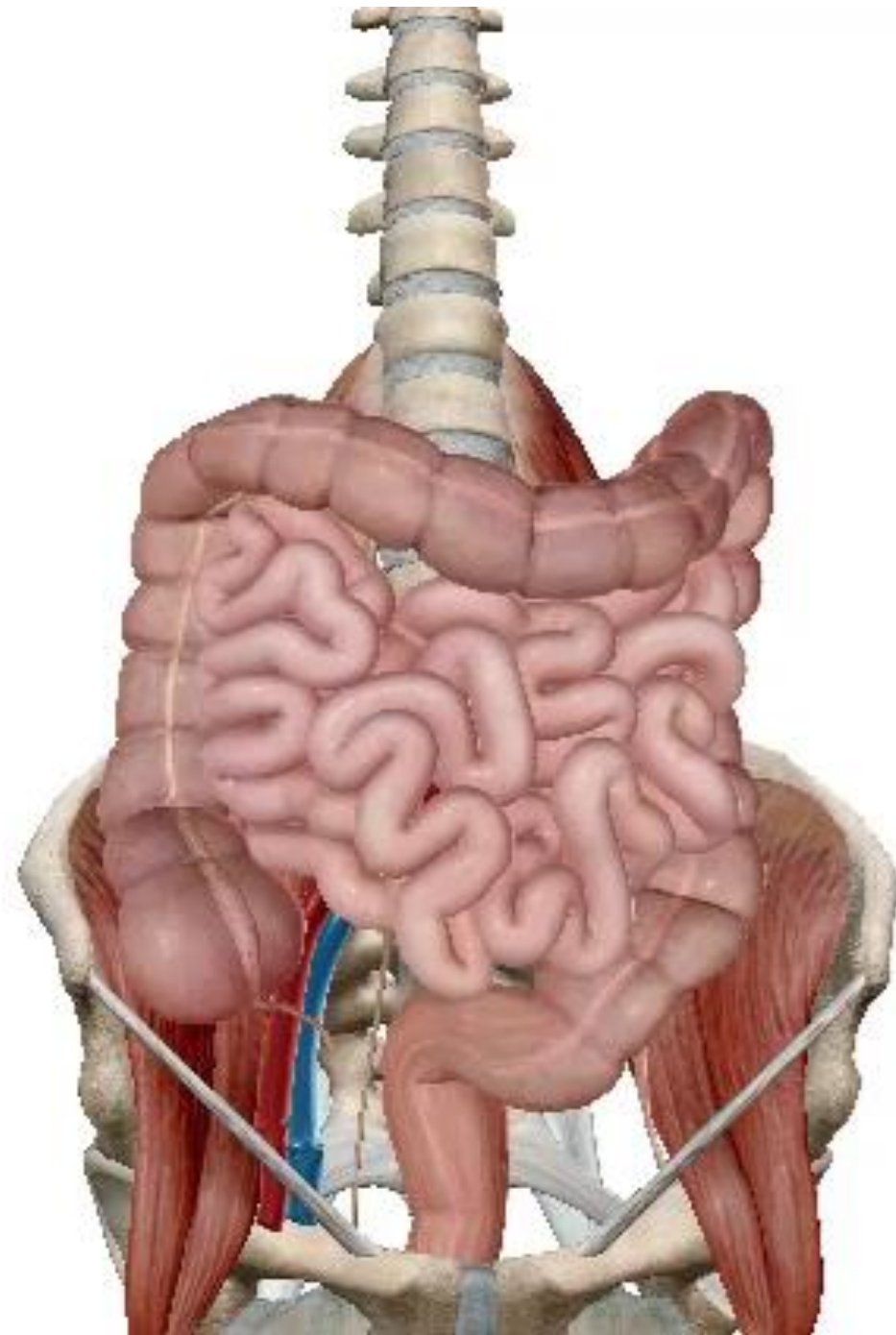
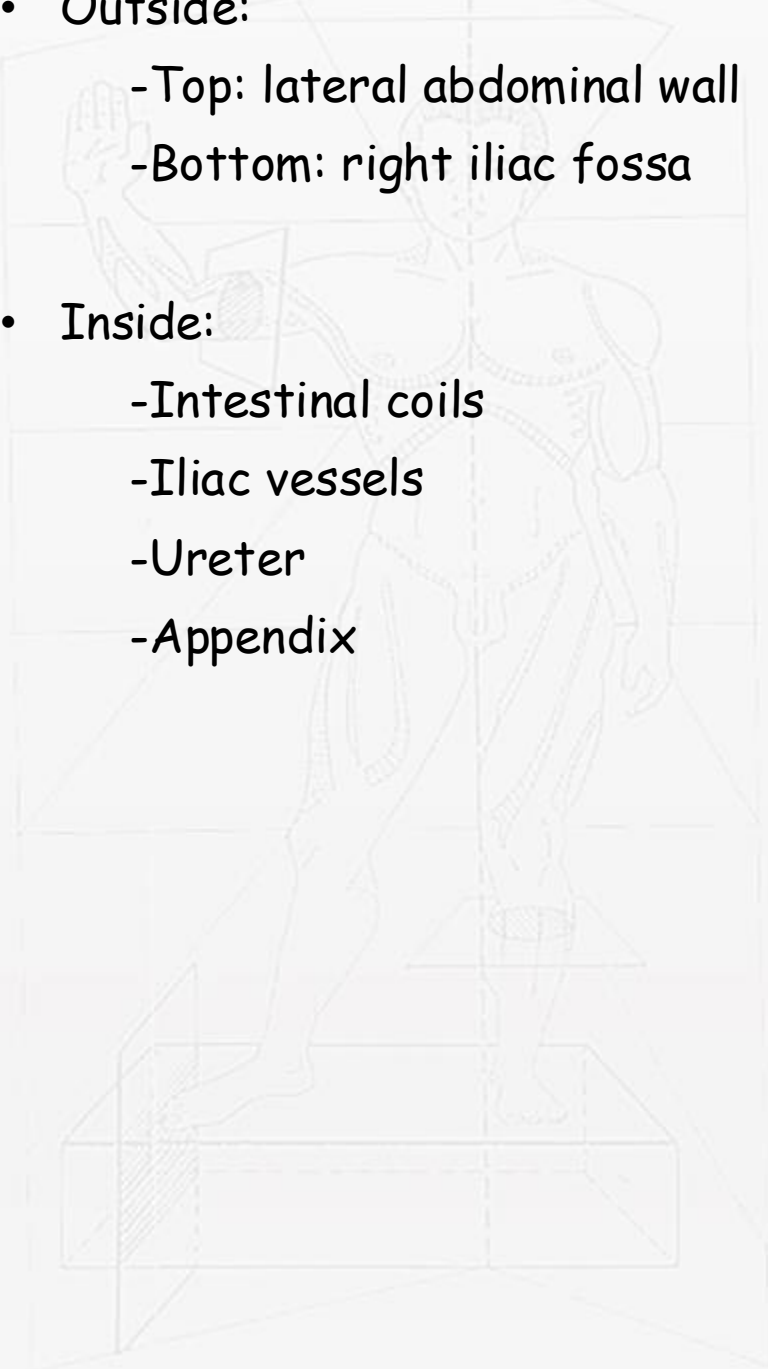
1. Caecum:

- Front:
 - Anterior abdomibal wall
 - Intestinal coils
- Back:
 - Posterior parietal peritoneum
 - Iliac fascia
 - Iliac muscle
 - Genitofemoral nerve
 - Femoral nerve



SAGITTAL SECTION OF RIGHT ILIAC FOSSA AND CAECUM

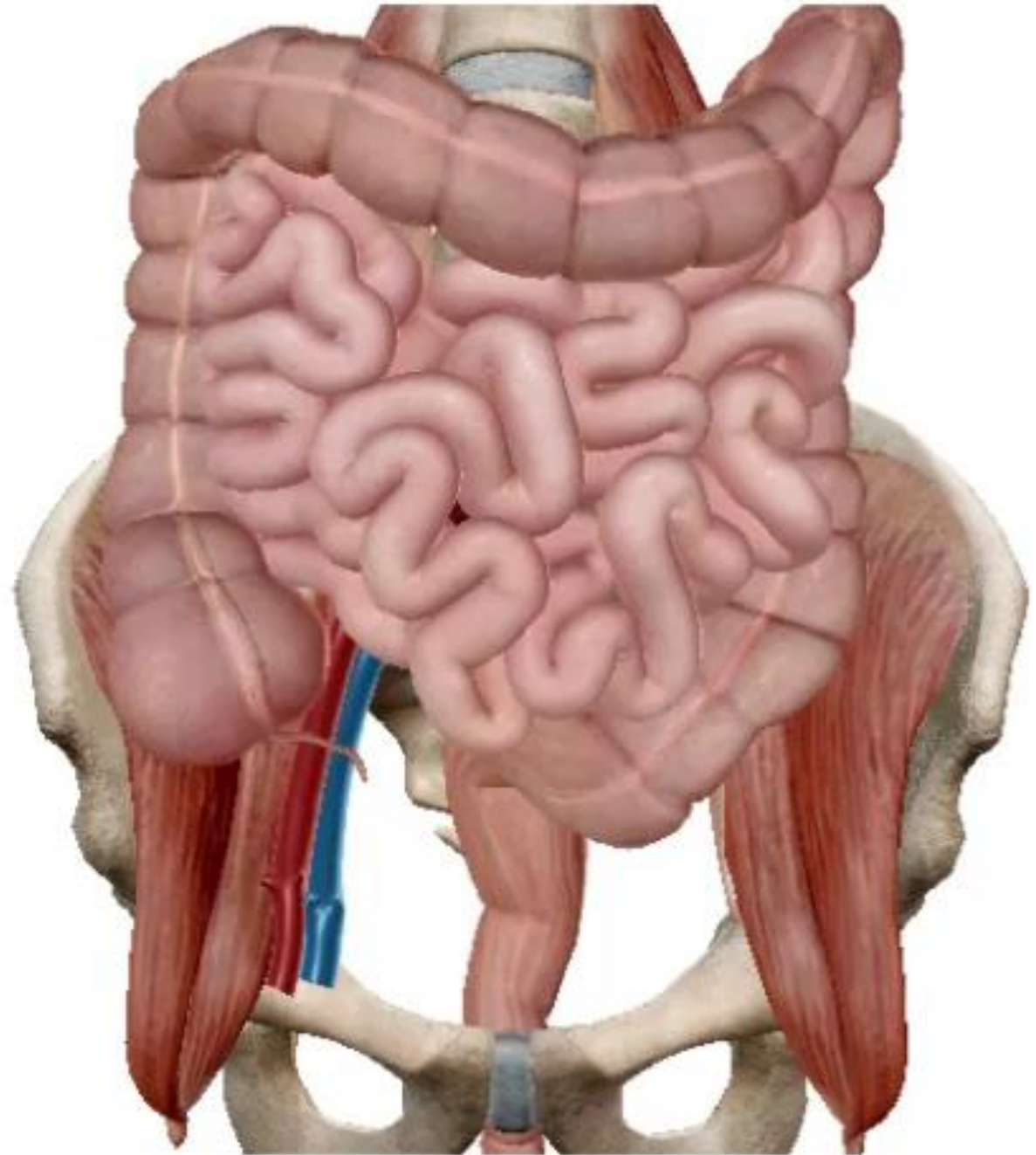
- Outside:
 - Top: lateral abdominal wall
 - Bottom: right iliac fossa
- Inside:
 - Intestinal coils
 - Iliac vessels
 - Ureter
 - Appendix



2. Appendix:

Medial descending:

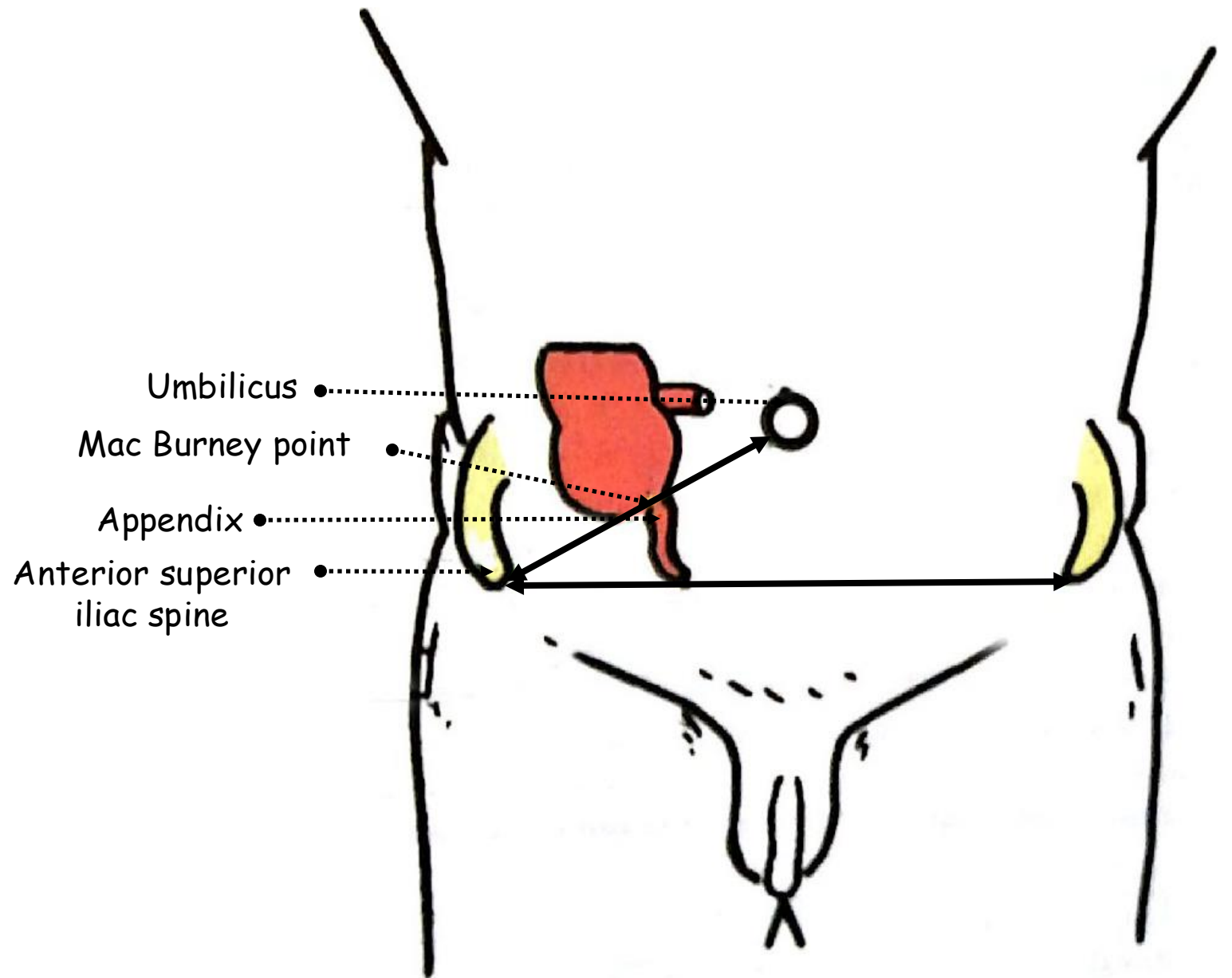
- Outside: medial face of caecum
- Inside: intestinal coils
- Front: anterior abdominal wall and intestinal coils
- Back: right iliac fossa and external iliac vessels
- Bottom: pelvic organs



- On surface:

- The base of the appendix projects on the half of the line joining the anterior superior iliac spine to umbilicus (Mac Burney's point)

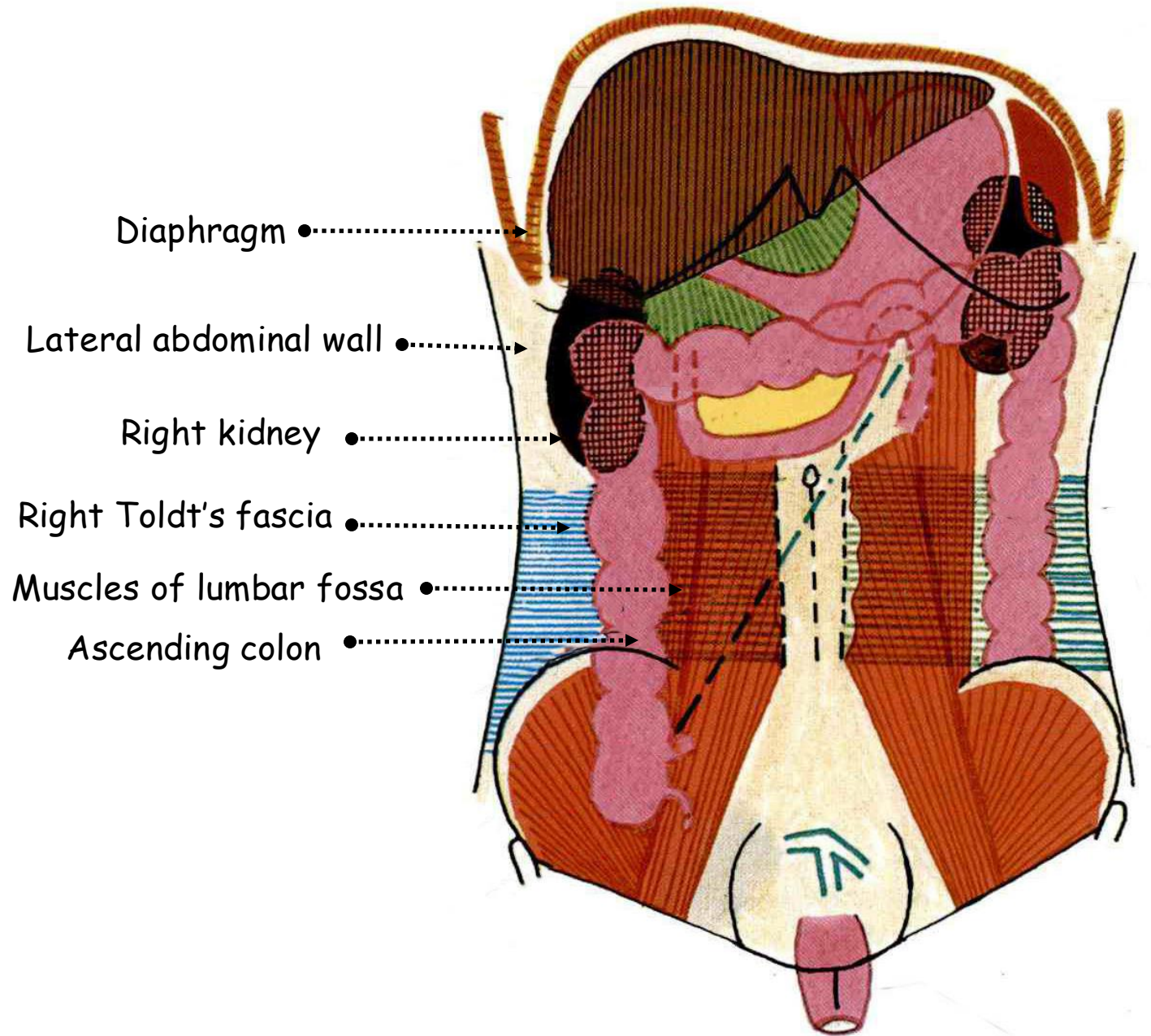
- The tip projects on the junction of the right and middle thirds of the line joining the two anterior superior iliac spines



ANTERIOR VIEW OF ANTERIOR ABDOMINAL WALL SHOWING THE PROJECTION OF APPENDIX

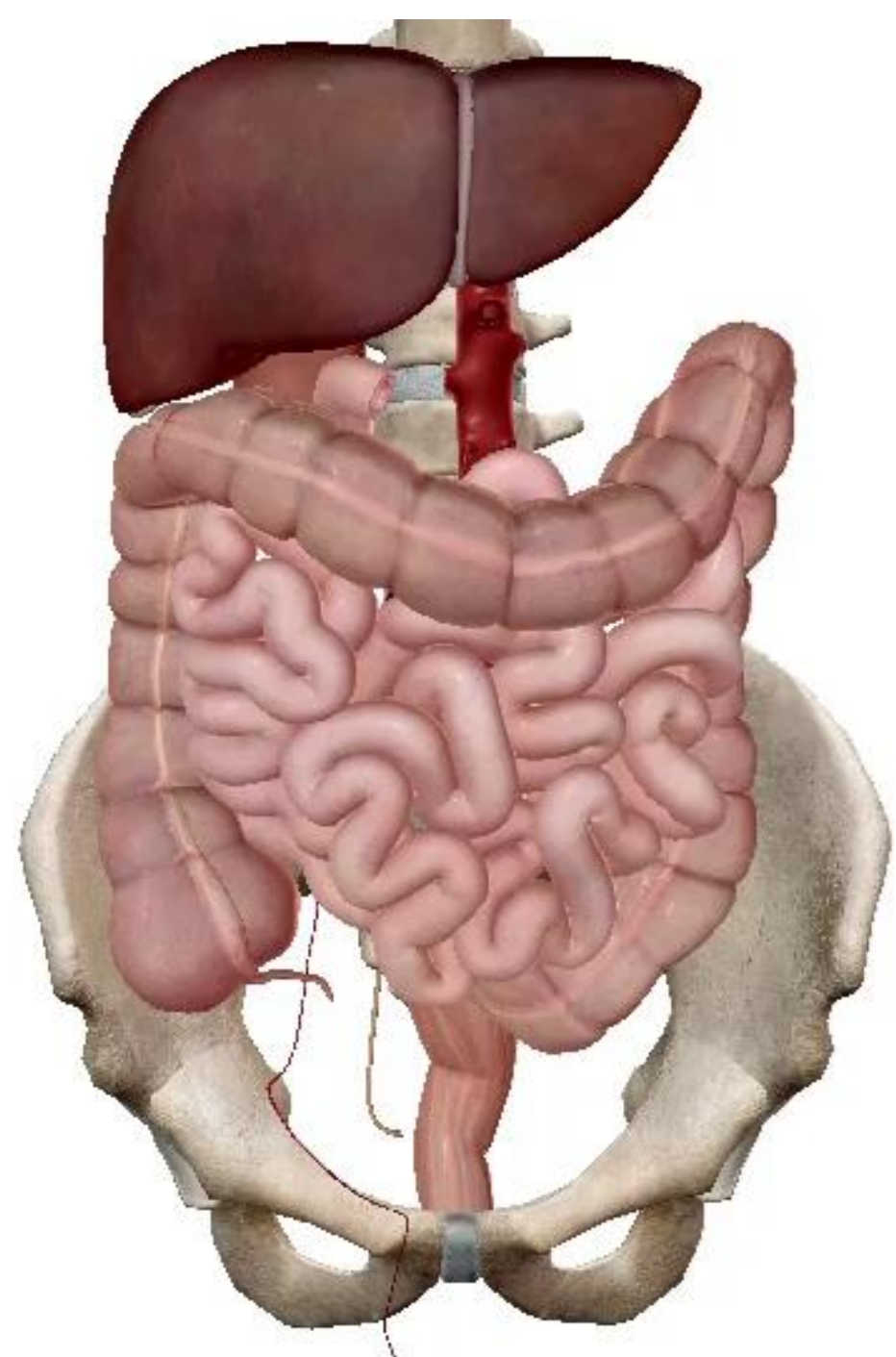
B. ASCENDING COLON

- Back:
 - Right Toldt's fascia
 - Lower pole of right kidney and prerenal fascia
 - Lumbar fascia
- Outside:
 - Lateral abdominal wall
 - Diaphragm



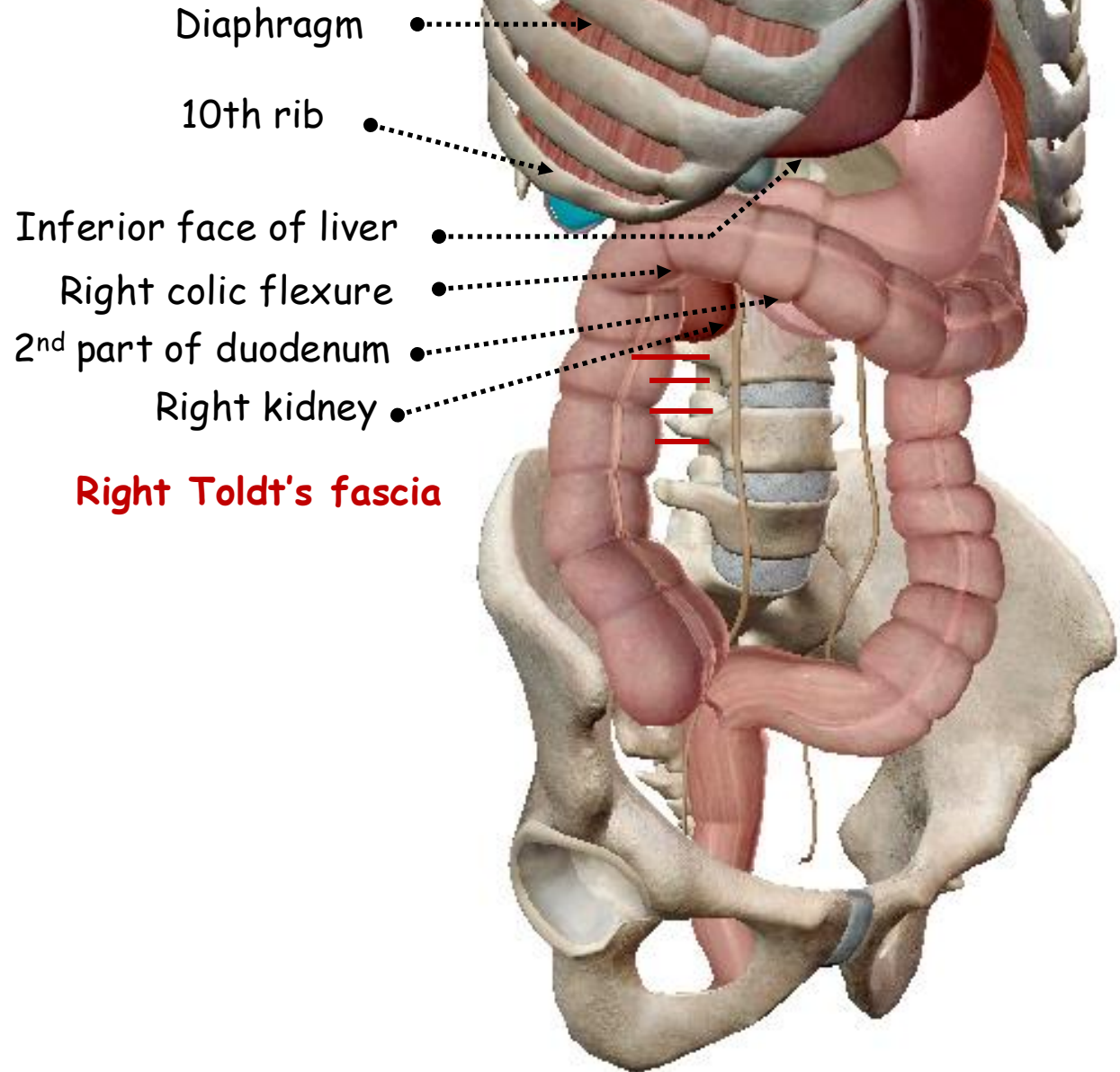
ANTERIOR VIEW OF ABDOMEN

- Front:
 - Anterior abdominal wall
 - Intestinal coils
- Top:
 - Inferior face of liver
- Inside:
 - Lower pole of the second part of the duodenum
 - Intestinal coils
 - Right ureter
 - Right genital vessels



C. HEPATIC FLEXURE

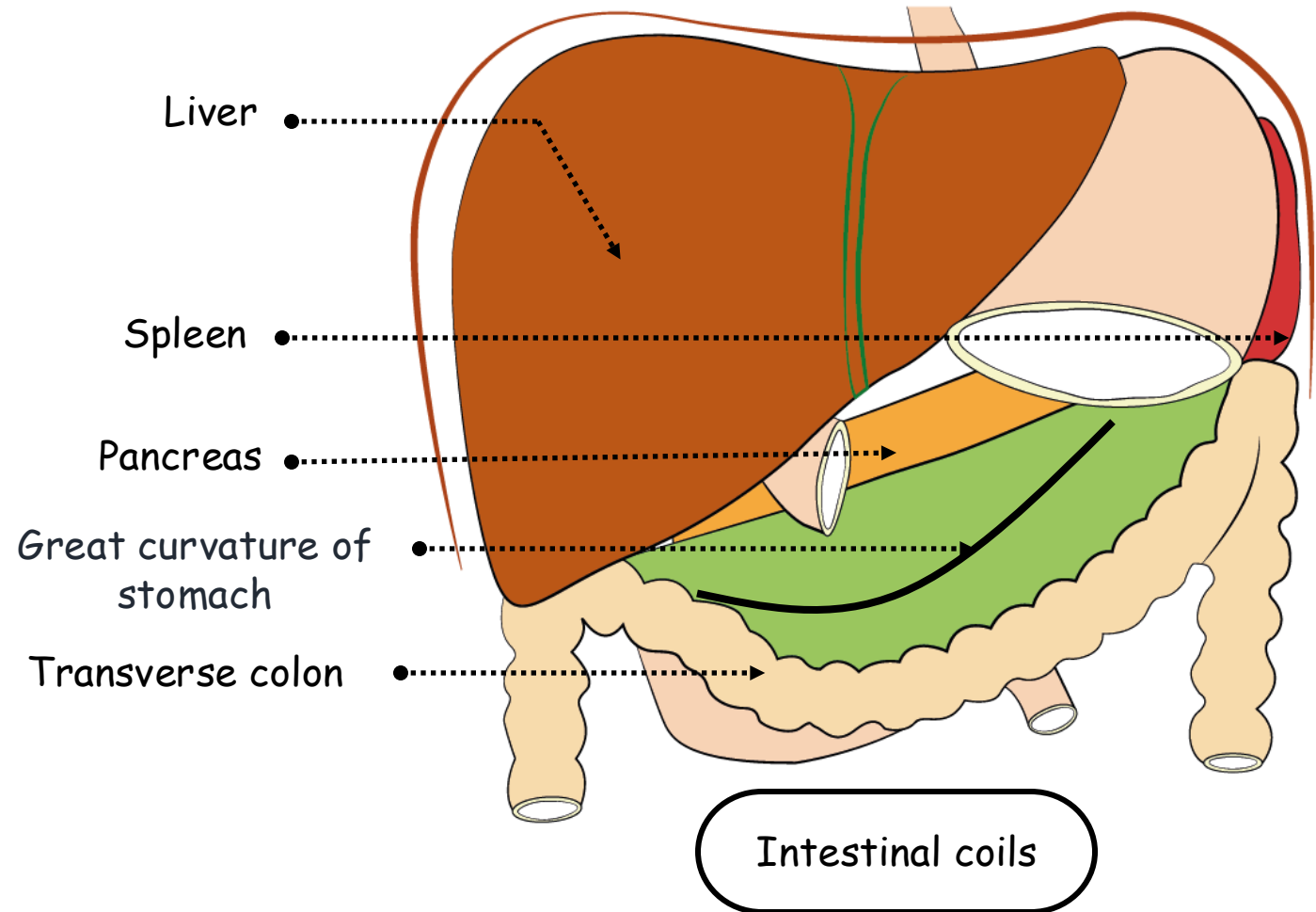
- Top:
 - Inferior face of the liver
- Inside:
 - The second part of the duodenum
- Back:
 - Right Toldt's fascia of the duodenum
 - Lower half of right kidney
- Outside:
 - Diaphragm and the right phrenicocolic ligament



ANTERIOR LATERAL VIEW OF THE TRUNK

D. TRANSVERSE COLON

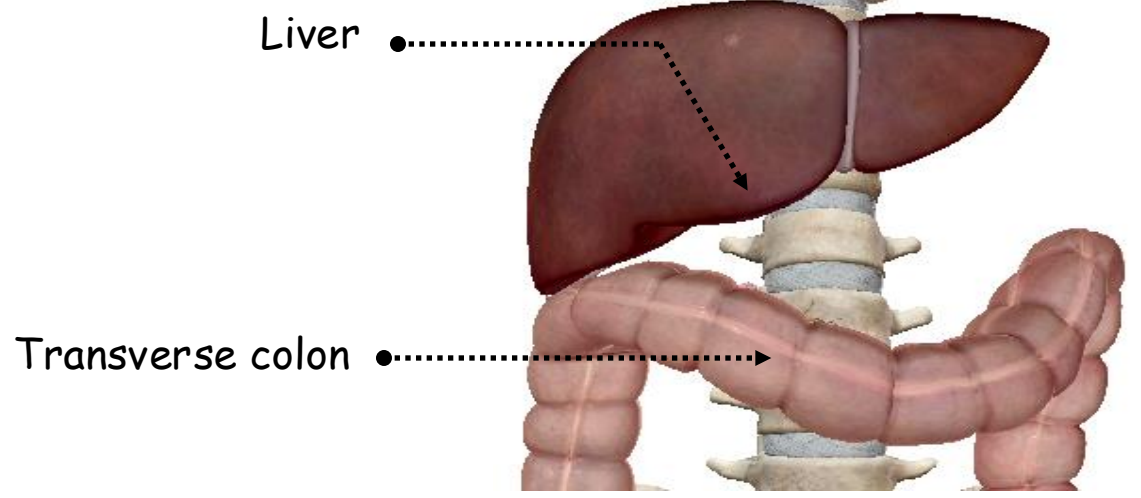
- Top:
 - Right part: liver
 - Left part: great curvature of the stomach, colic impression of spleen and inferior face of body of pancreas
- Bottom:
 - Intestinal coils



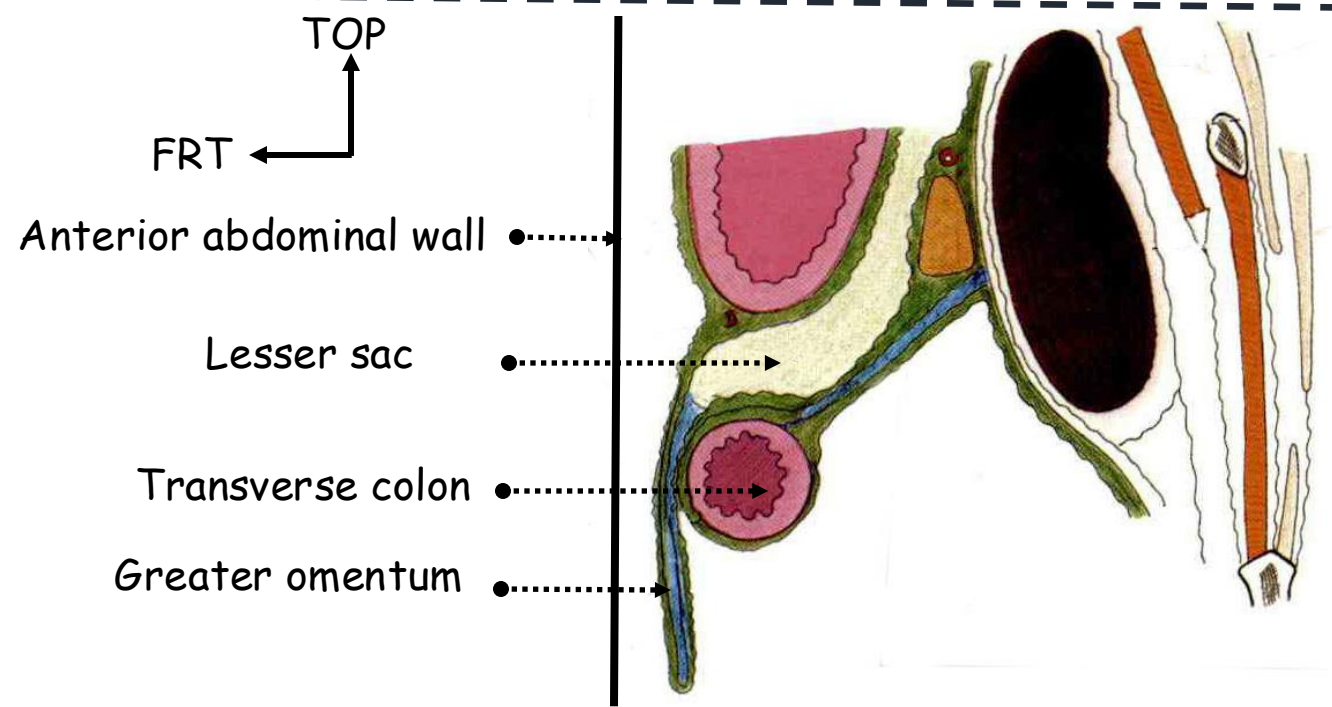
ANTERIOR VIEW OF SUPRACOLIC COMPARTMENT

• Front:

- Right part: liver
- Left part: lesser sac
- Greater omentum
- Anterior abdominal wall



ANTERIOR VIEW OF SUPRACOLIC COMPARTMENT

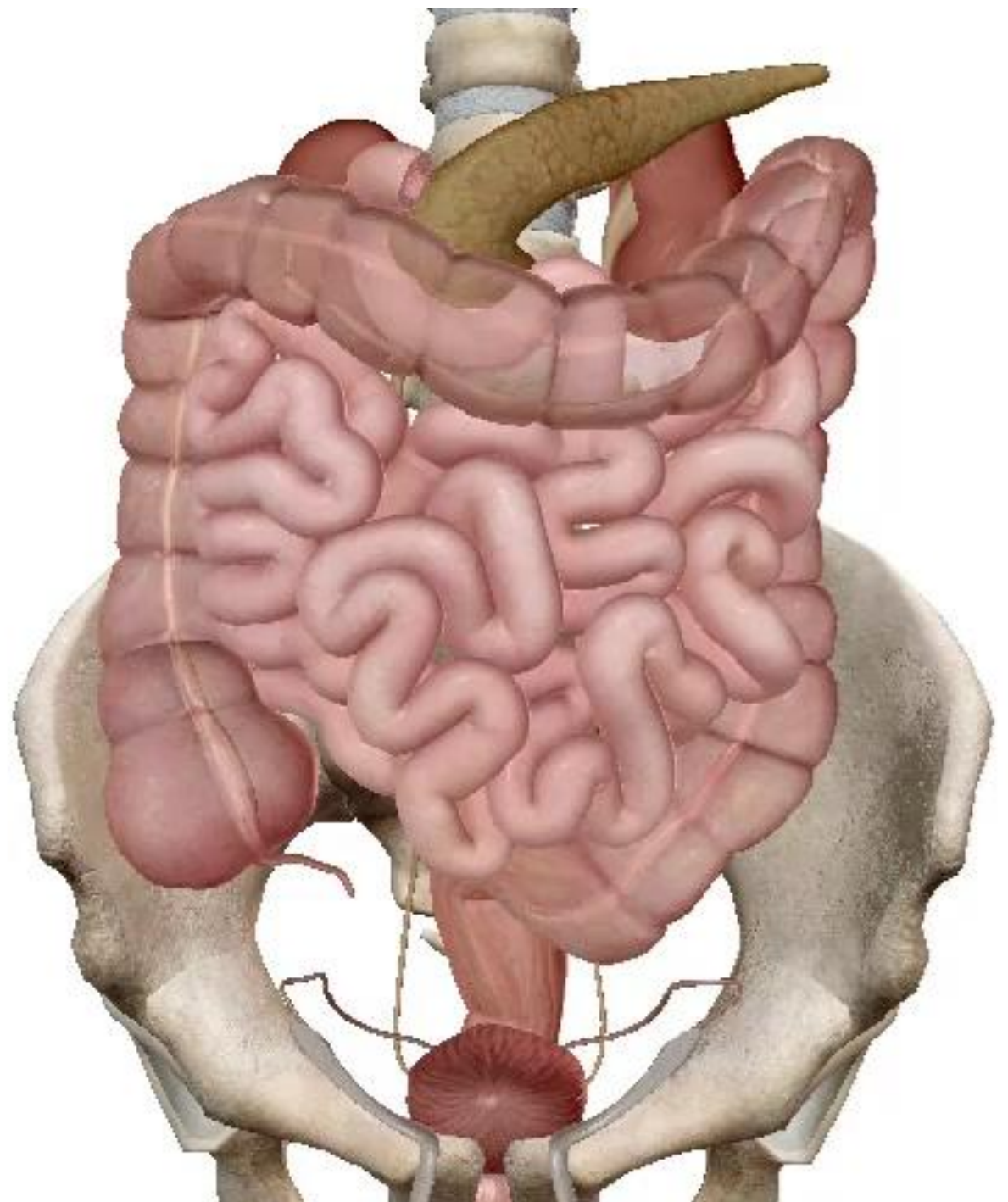


LEFT SAGITTAL SECTION SHOWING THE LESSER SAC

- Back:

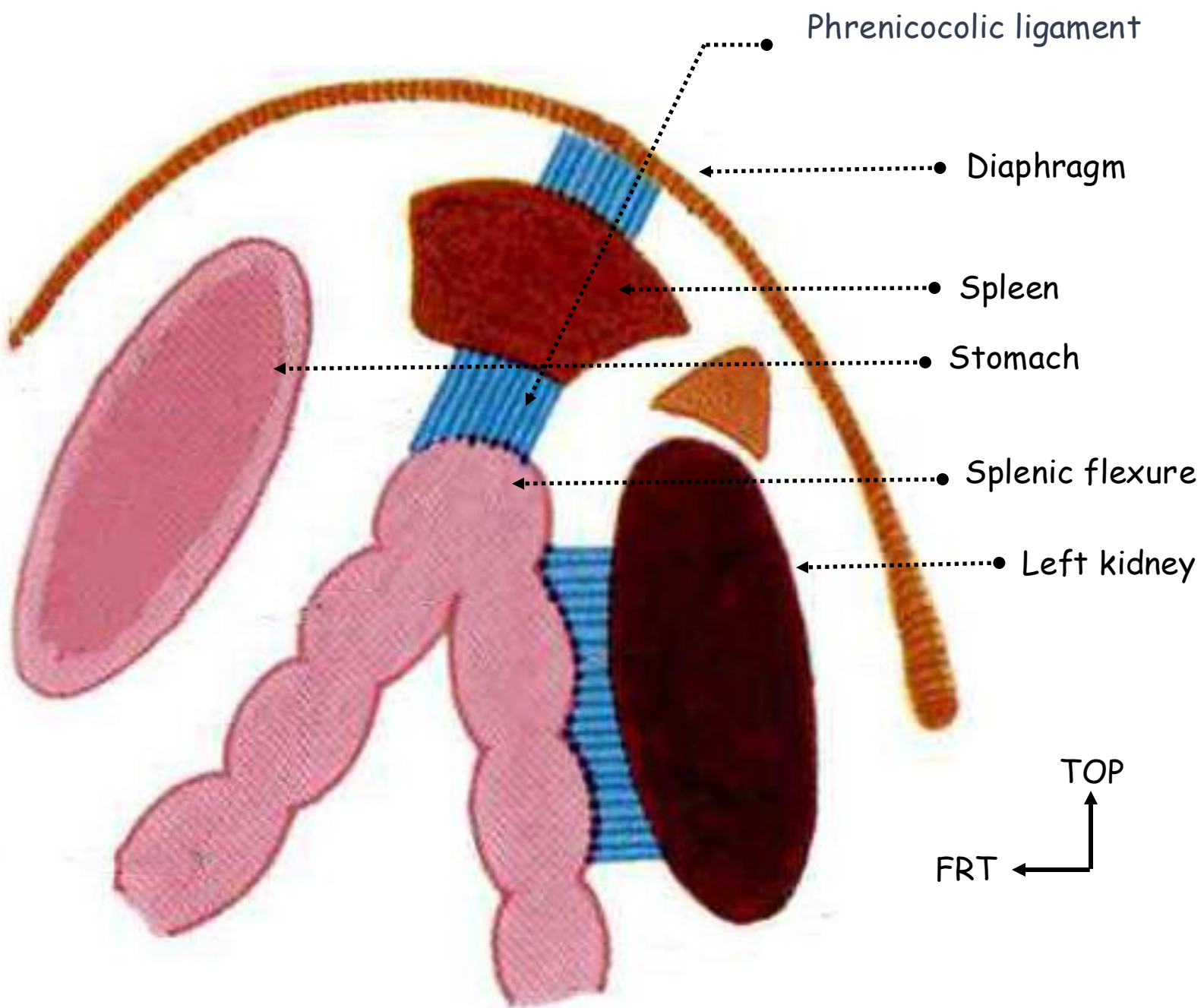
- Right part : right kidney and 2nd part of the duodenum

- Left part : head of pancreas, 3rd and 4th part of the duodenum, intestinal coils and left kidney



E. SPLENIC FLEXURE

- Front:
 - Great curvature of the stomach
- Back:
 - Left kidney
- Top:
 - Phrenicocolic ligament

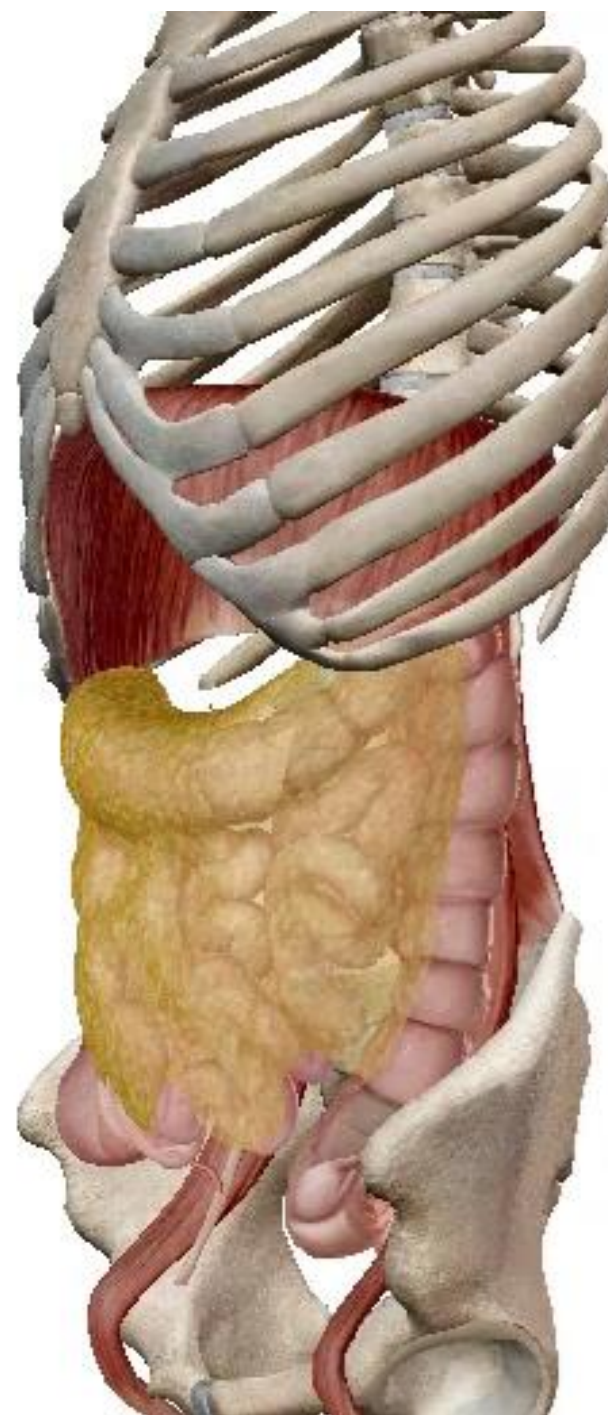


LEFT SAGITTAL SECTION SHOWING THE SPLENIC FLEXURE

F. DESCENDING COLON

1. Lumbar colon:

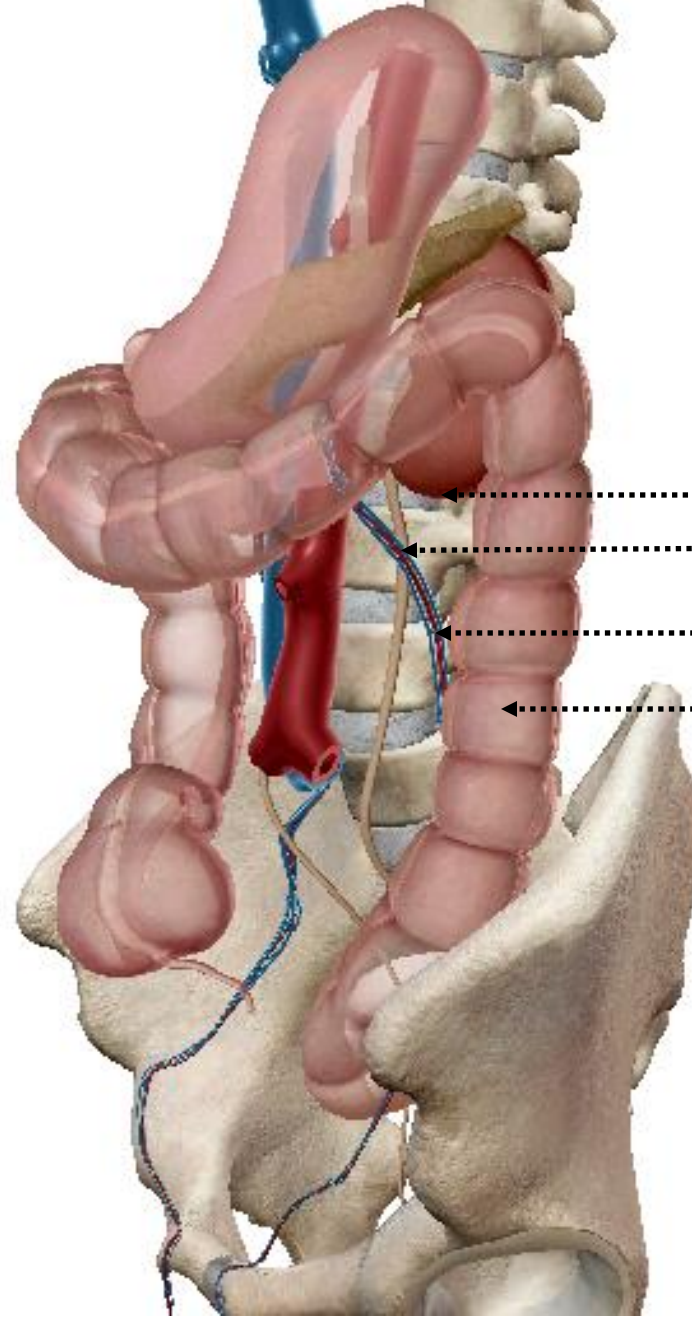
- Back:
 - Top: diaphragm and two last ribs
 - Bottom: muscular wall of left lumbar fossa
- Front and outside:
 - Intestinal coils
 - Greater omentum
 - Anterior lateral abdominal wall



- Inside:

- Top: left kidney

- Middle: left ureter and left genital vessels

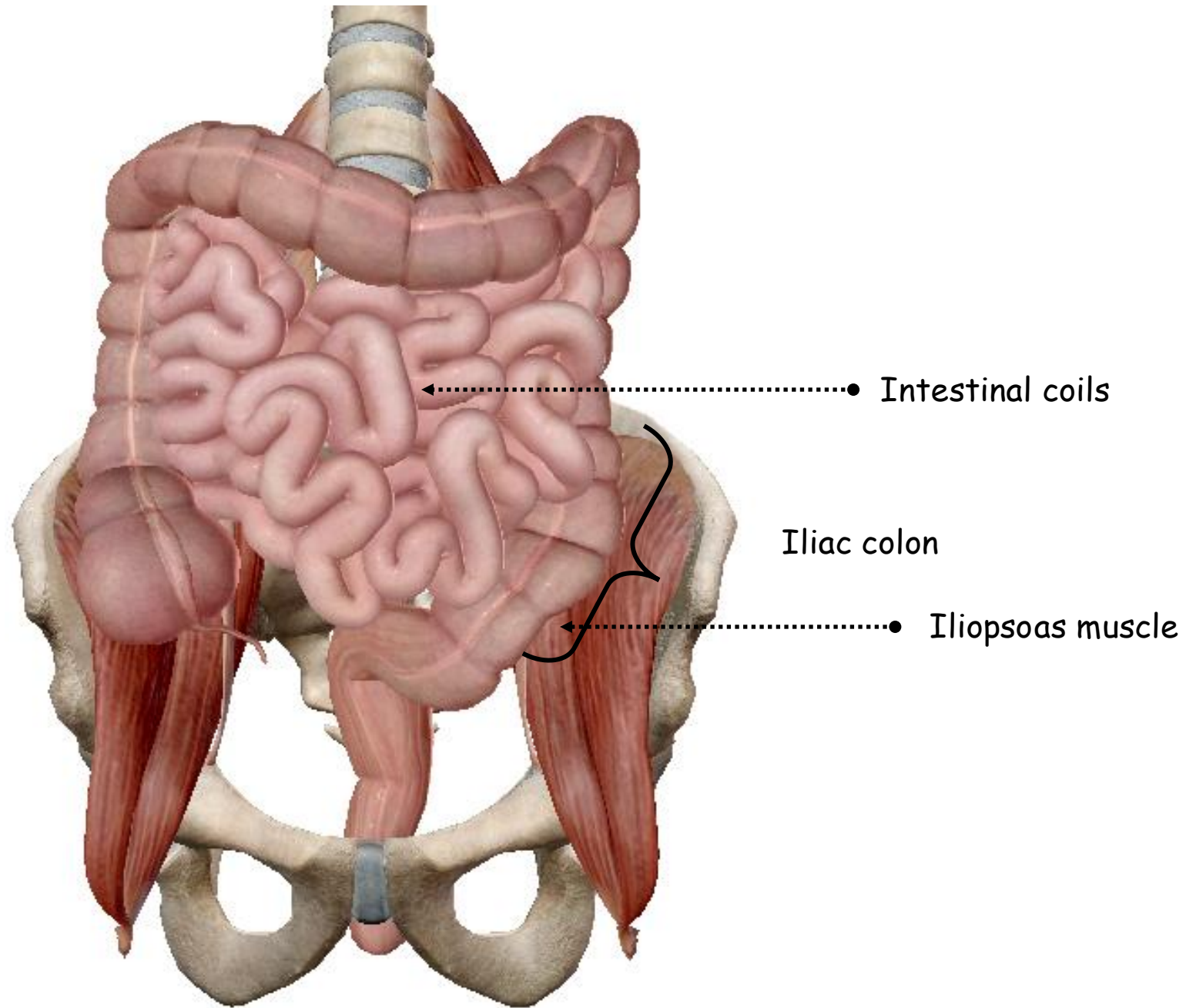


- Left kidney
- Left ureter
- Genital vessels
- Descending colon

LEFT ANTERIOR LATERAL VIEW OF ABDOMEN AND PELVIS

2. Iliac colon:

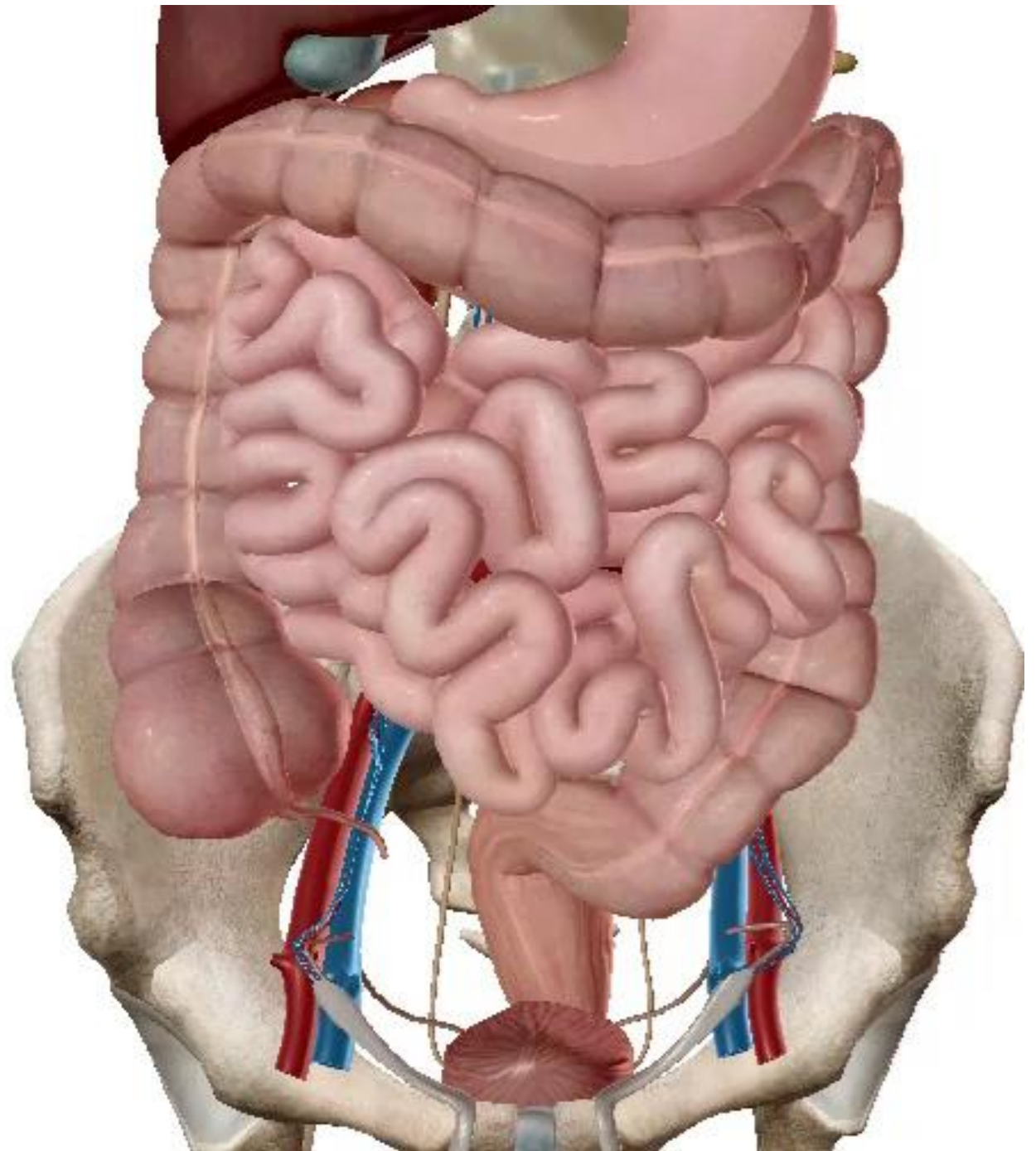
- Back: iliopsoas muscle
- Front and outside: intestinal coils



ANTERIOR VIEW OF ABDOMEN AND PELVIS

G. SIGMOID COLON

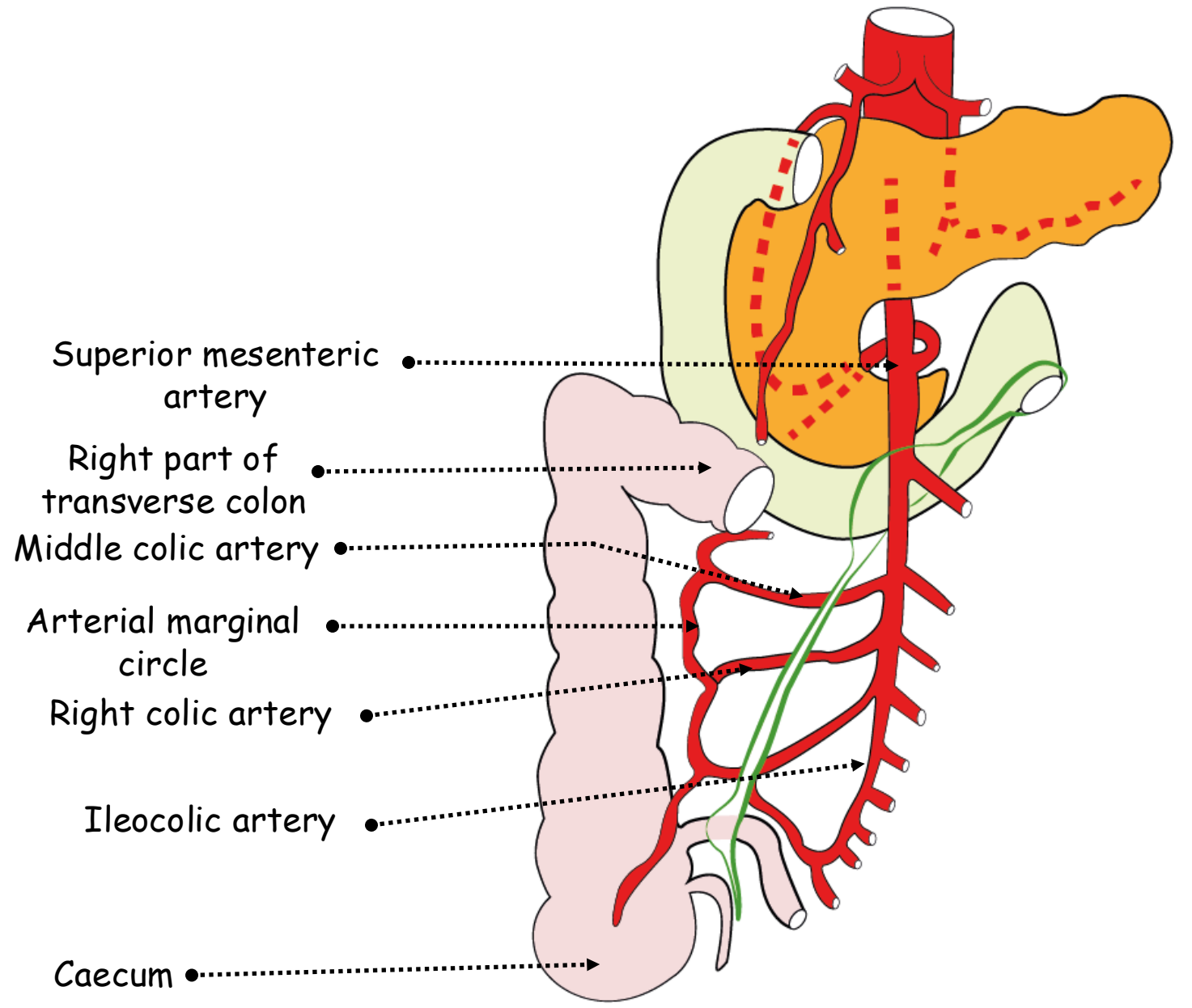
- Top: intestinal coils
- Front:
 - Urinary bladder in men
 - Uterus in women
 - Anterior abdominal wall
- Back:
 - Left ureter
 - Left genital vessels
- Bottom:
 - Rectum and bladder in men
 - Rectum and uterus in women



X. BLOOD SUPPLY, LYMPH DRAINAGE AND NERVE SUPPLY

A. ARTERIES

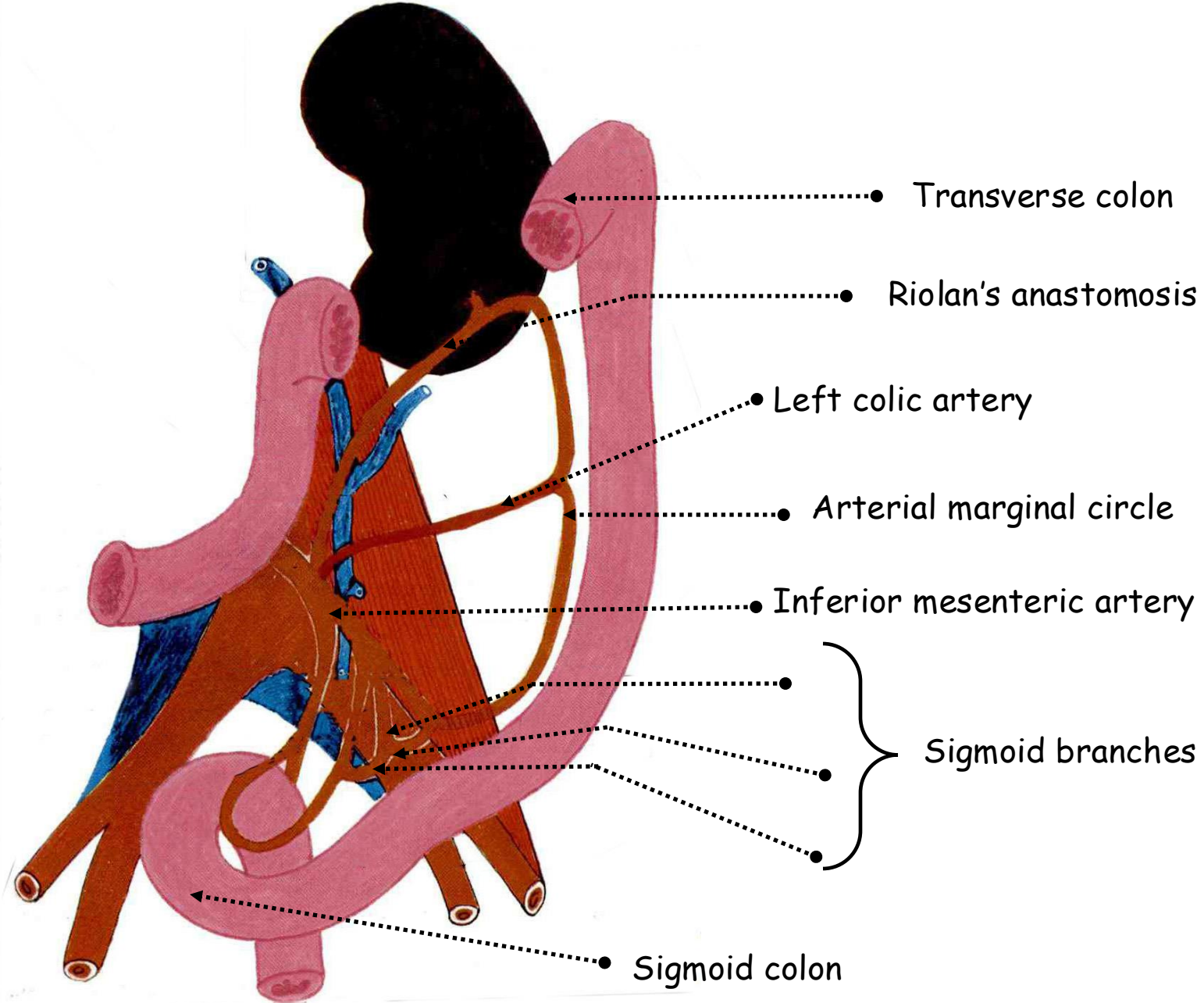
- 1. Superior mesenteric artery:
 - Vascularises the caecum, ascending colon, hepatic flexure and two thirds of transverse colon
 - 3 terminal branches :
 - Ileocolic artery
 - Right colic artery
 - Middle colic artery
 - The anastomotic branches near the medial margin of the whole colon form the 'arterial circle' commonly called (unofficially) the marginal artery
 - It is from this that short vessels run into the gut wall
 - The appendix is supplied by the posterior caecal artery through the appendicular artery



ANTERIOR VIEW SHOWING THE ARTERIES OF RIGHT COLON

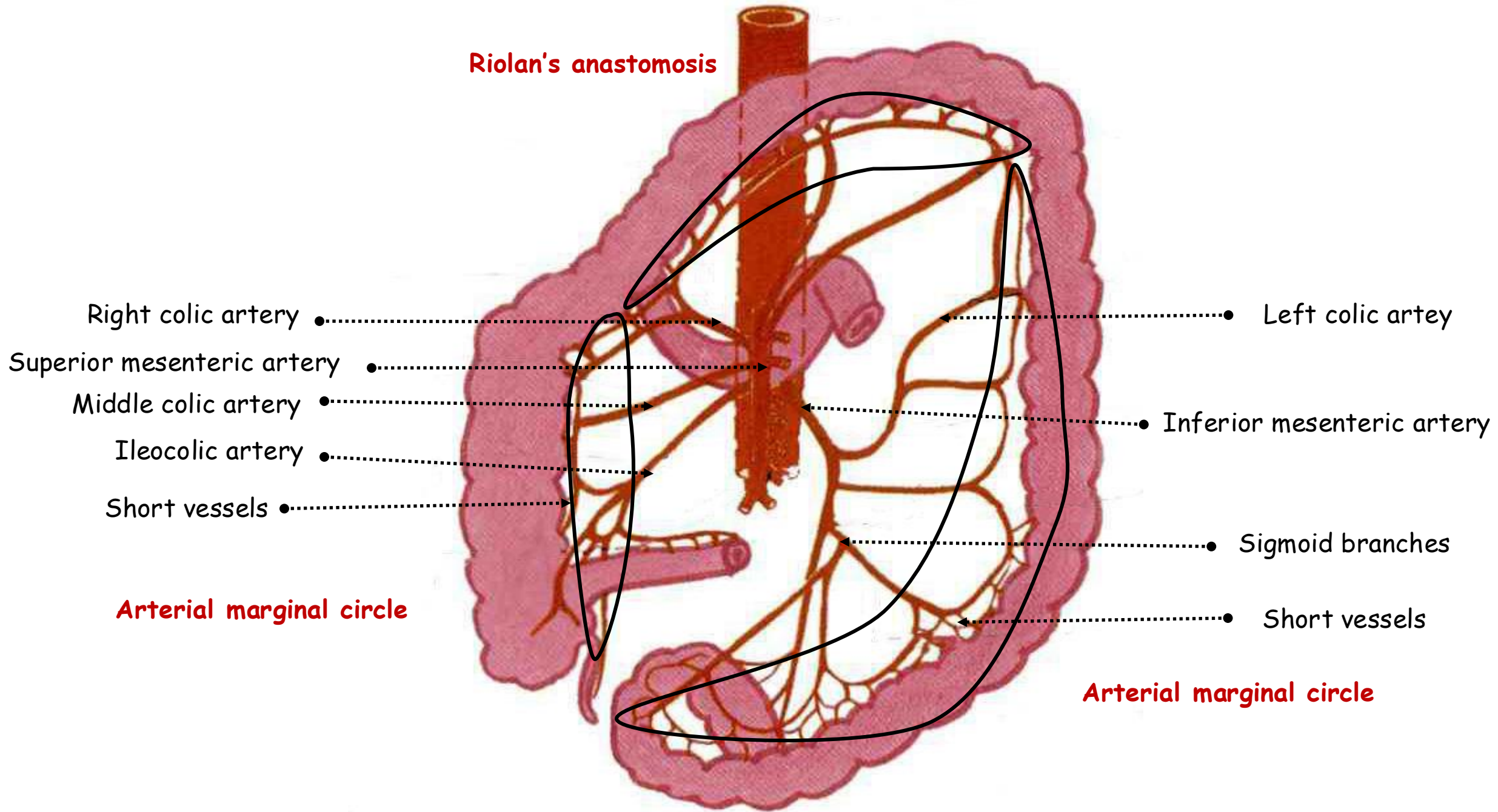
2. Inferior mesenteric artery:

- Vascularises the left third of transverse colon, splenic flexure, descending colon and sigmoid colon
- 2 collateral branches:
 - Left colic artery
 - Sigmoid arteries
- The anastomotic branches near the medial margin of the whole colon form the 'arterial circle' commonly called (unofficially) the **marginal artery**
- It is from this that **short vessels** and **long vessels** run into the gut wall



ANTERIOR VIEW SHOWING ARTERIES OF LEFT COLON

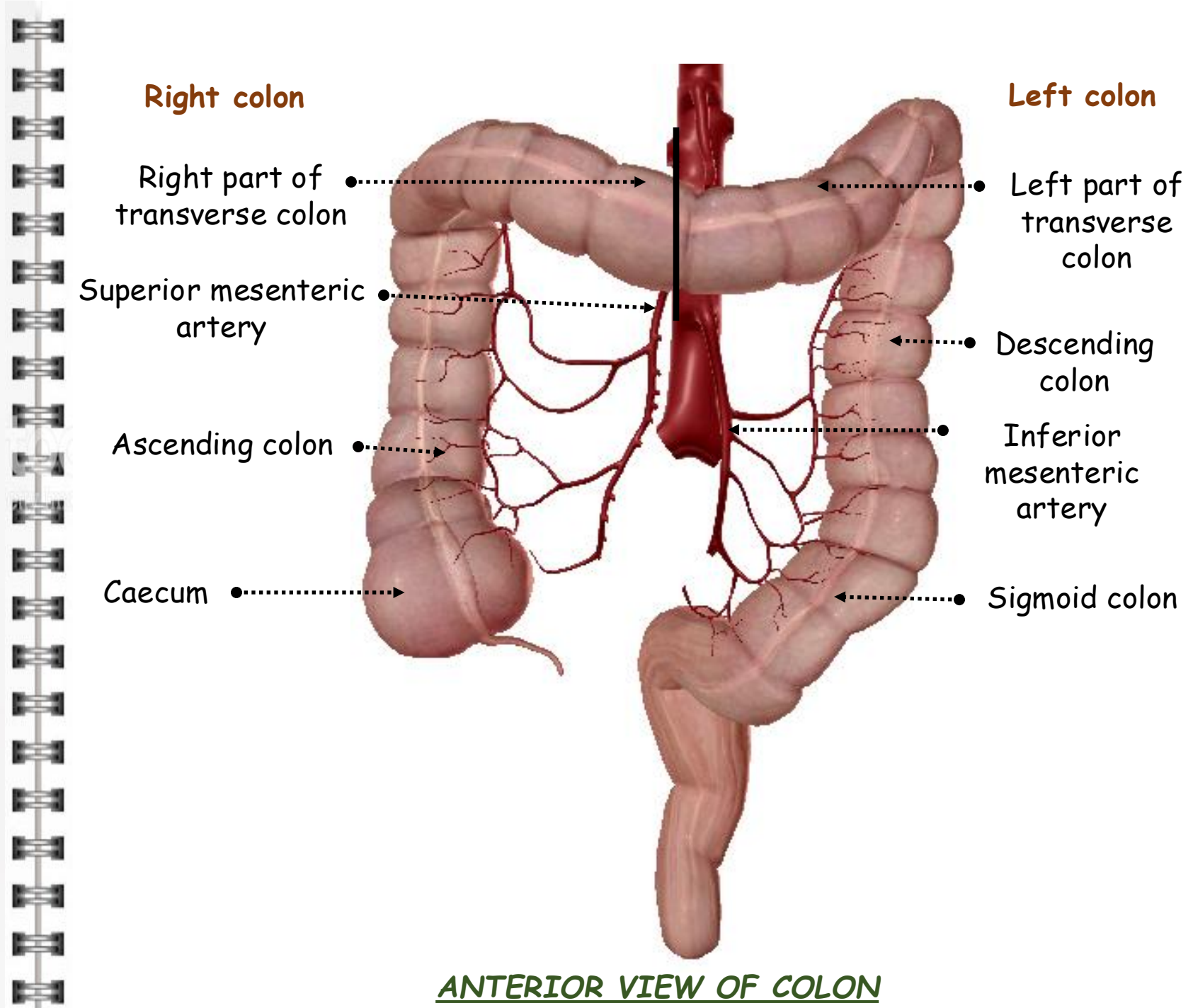
Riolan's anastomosis



ANTERIOR VIEW SHOWING ARTERIES OF THE COLON

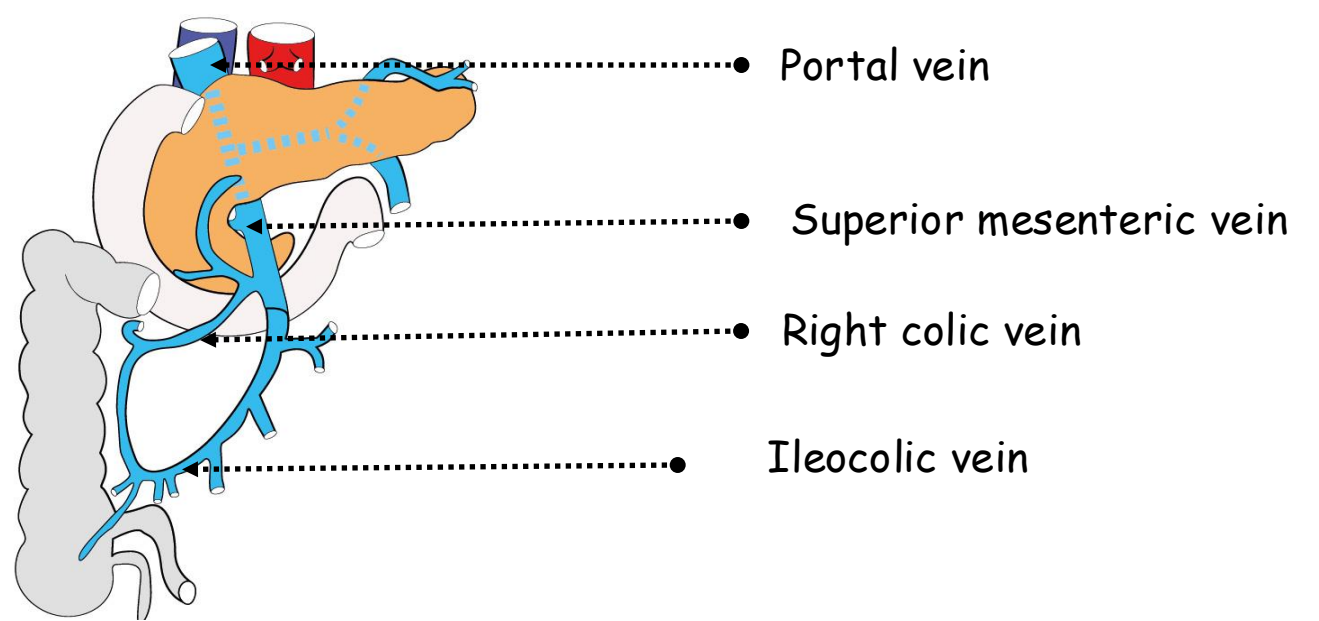
3. Surgical parts of colon:

- Depends on the territories of arteries of colon
- Right colon : territory of superior mesenteric artery:
 - Caecum
 - Ascending colon
 - Right two thirds of transverse colon
- Left colon: territory of inferior mesenteric artery:
 - Left third of transverse colon
 - Descending colon
 - Sigmoid colon

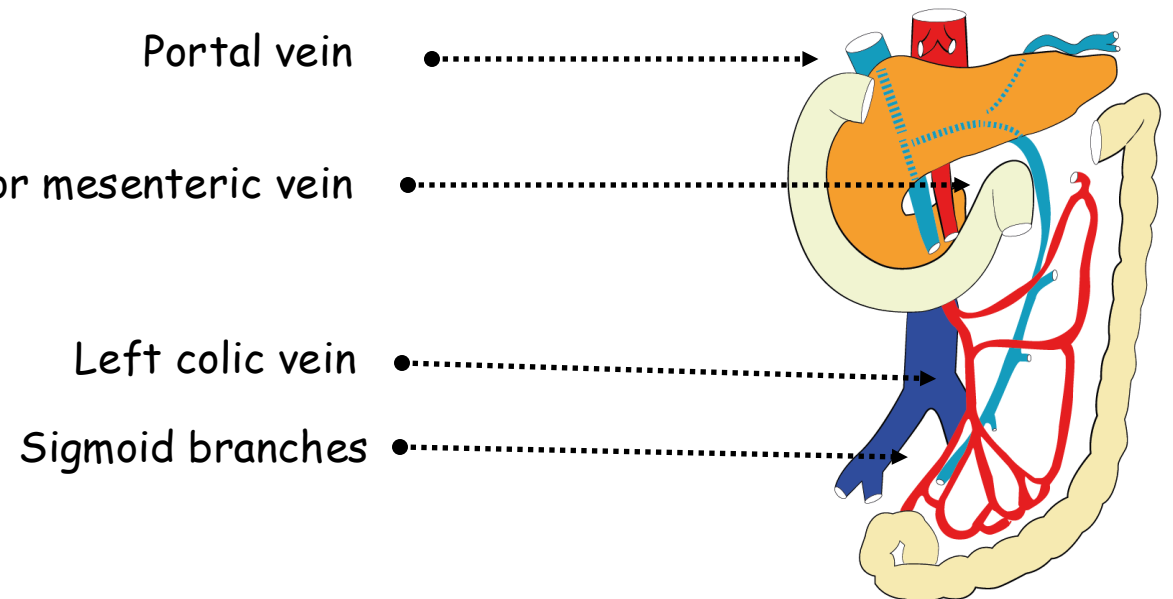


B. VEINS

- Correspond to the arteries
- Reach the portal vein via the superior or inferior mesenteric tributaries



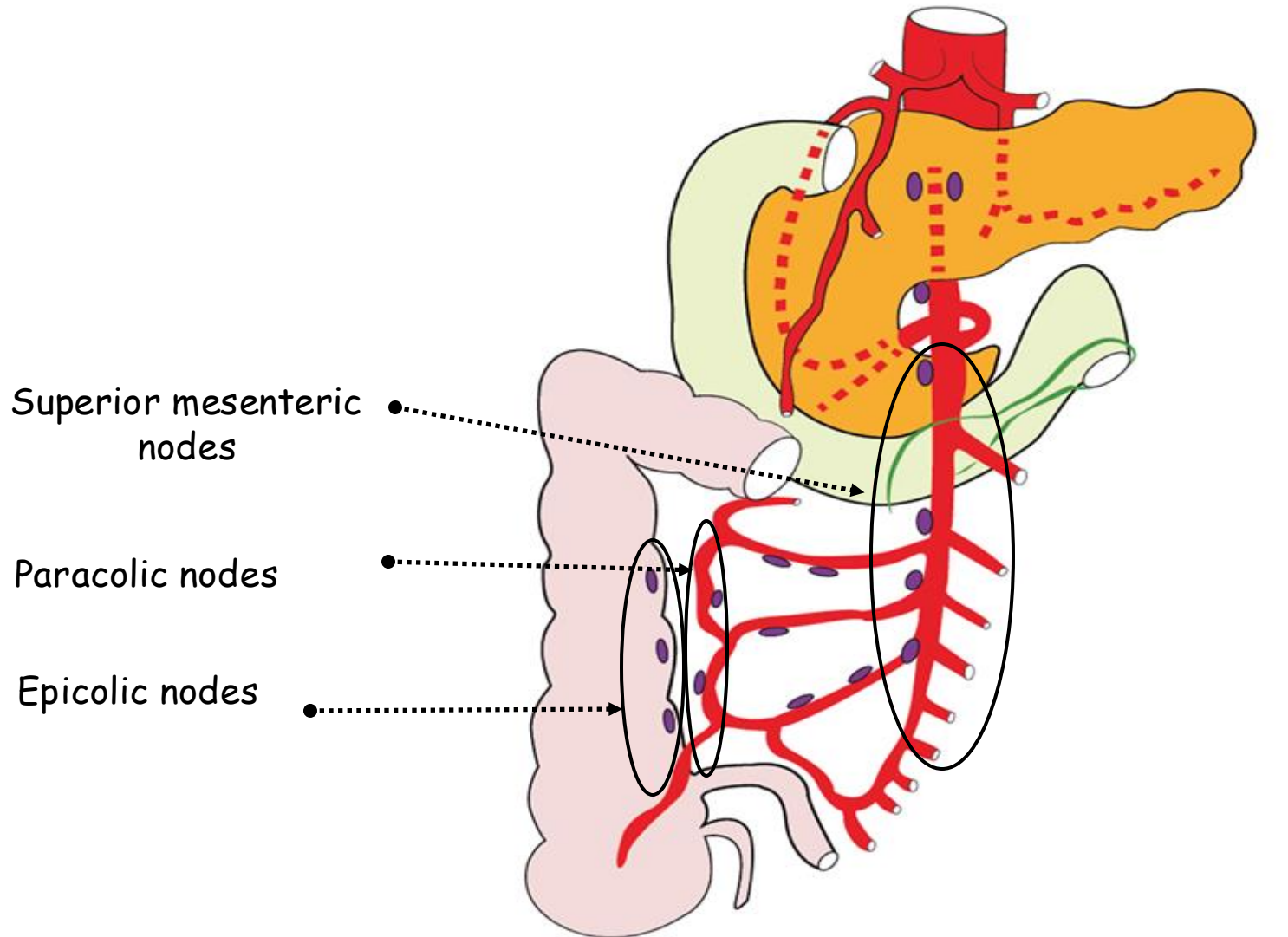
ANTERIOR VIEW SHOWING VEINS OF RIGHT COLON



ANTERIOR VIEW SHOWING VEINS OF LEFT COLON

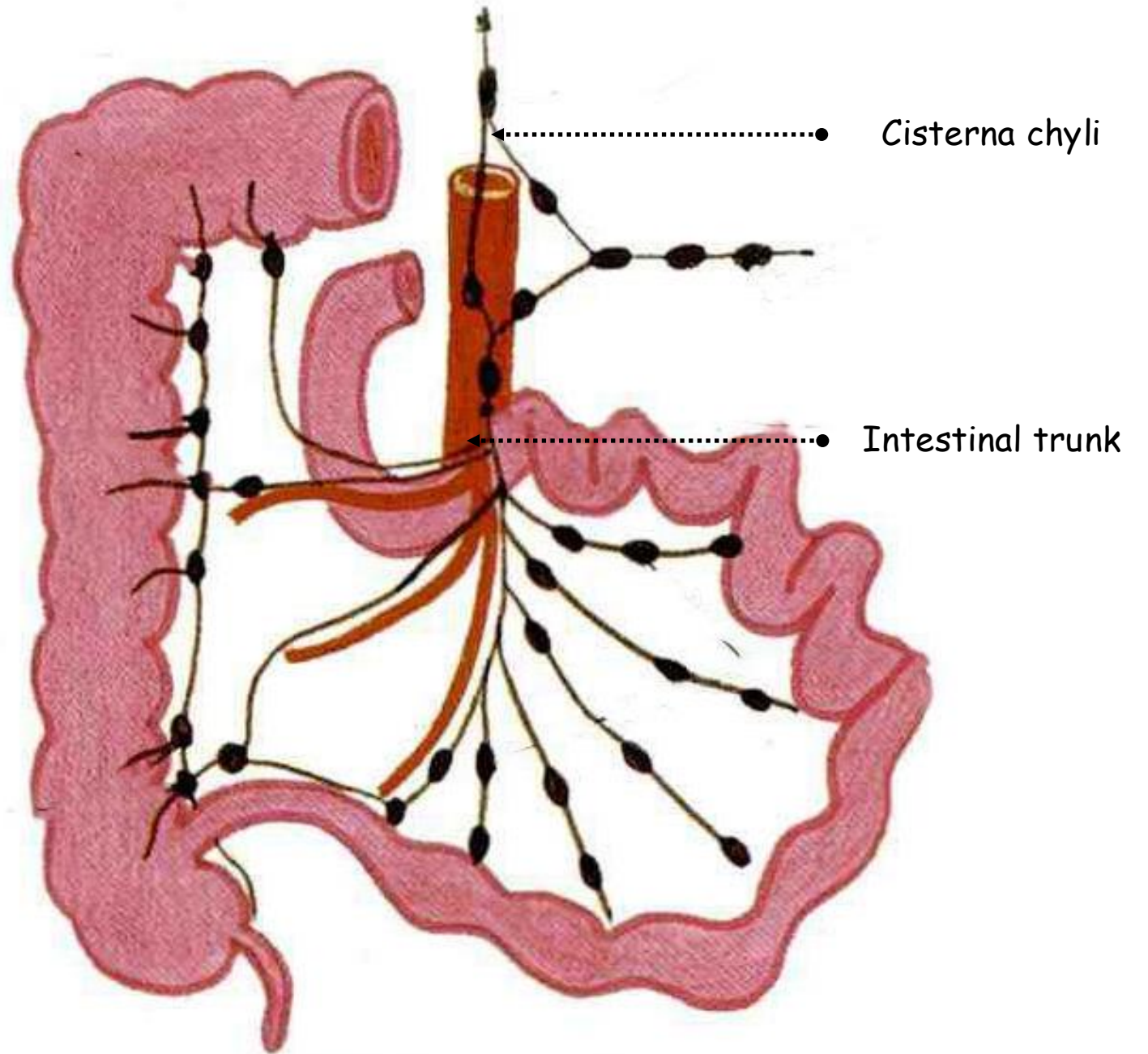
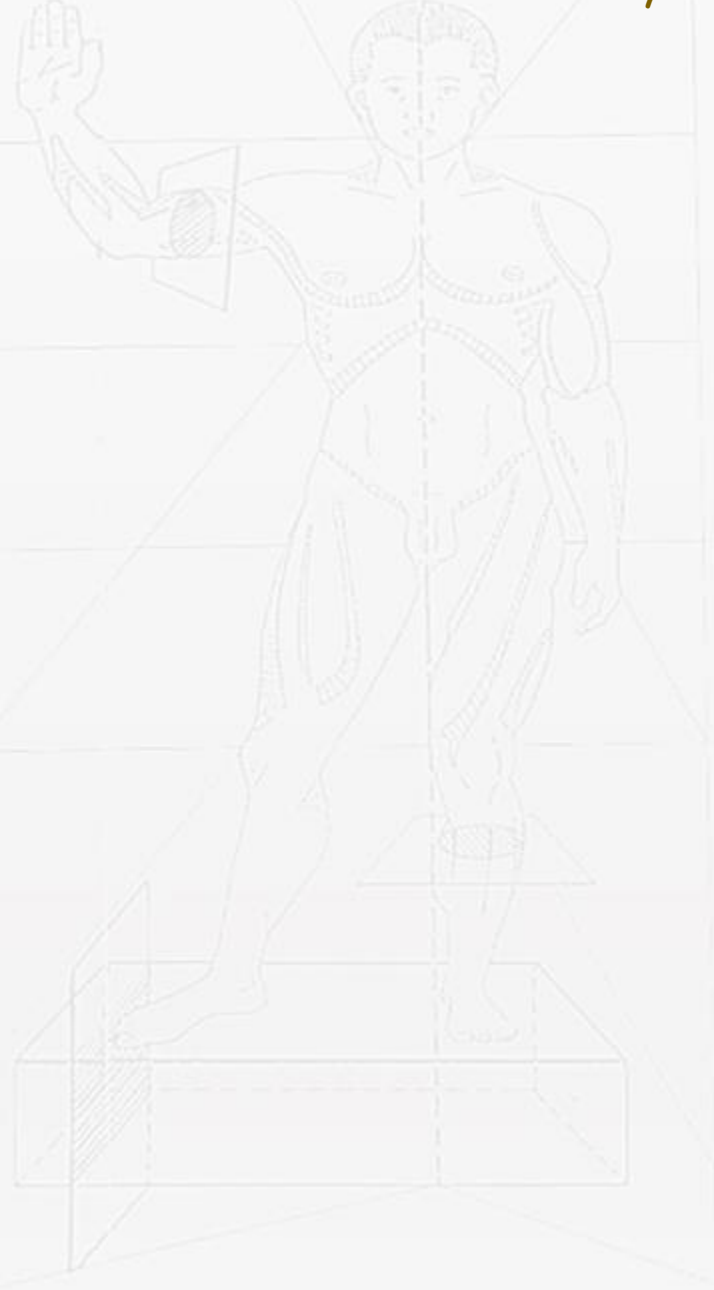
C. LYMPH DRAINAGE

- Pass back along the arteries to lymph nodes that lie in front of the aorta at the origins of the arteries
- Series of lymph node filters that lie between the mucous membrane of the gut and the cisterna chyli:
 - Epicolic nodes
 - Paracolic nodes
 - Mesocolic nodes
 - Superior mesenteric nodes
 - Inferior mesenteric nodes



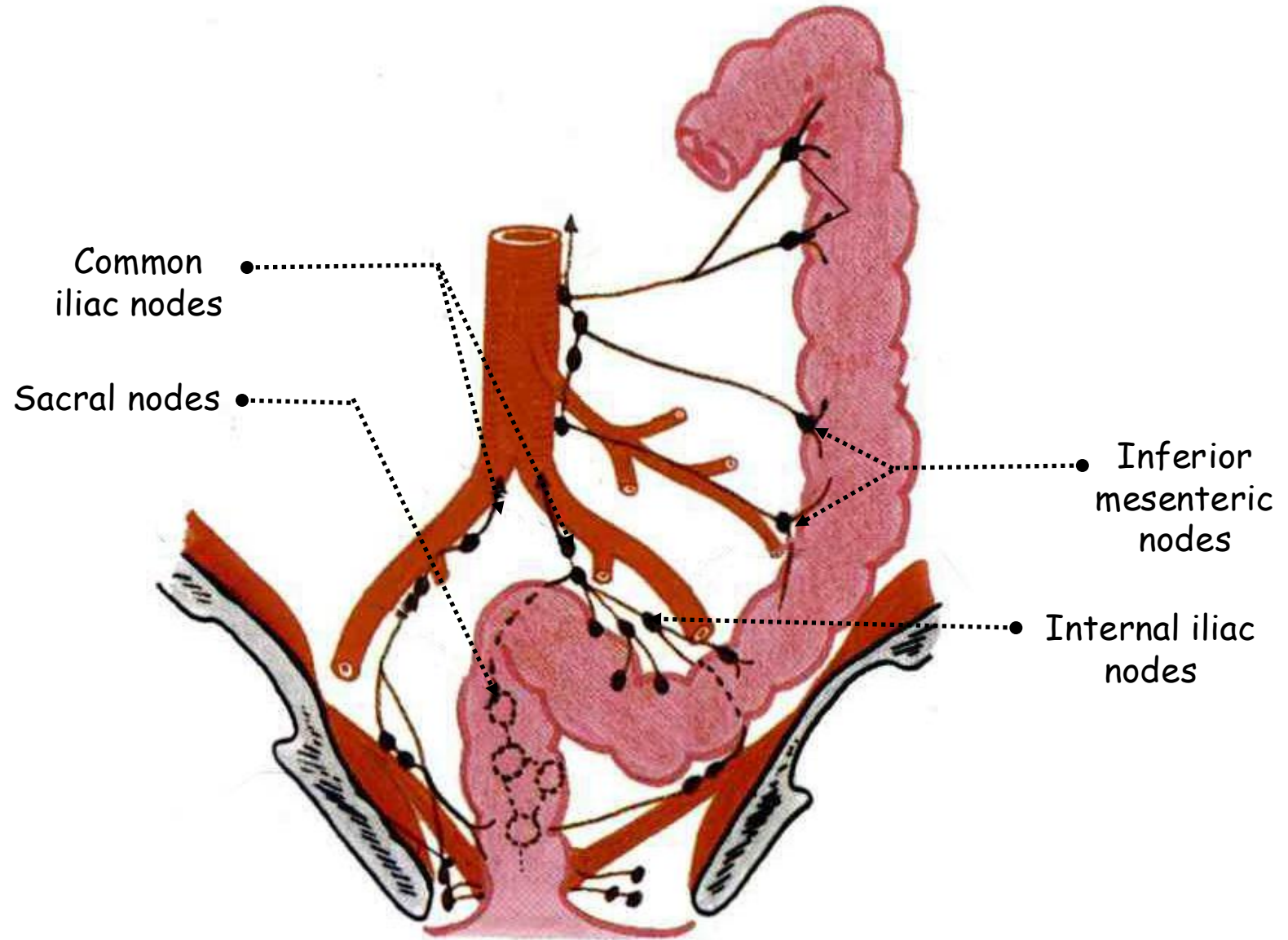
ANTERIOR VIEW SHOWING LYMPH DRAINAGE OF RIGHT COLON

- Draining by two or three lymph channels into the cisterna chyli



ANTERIOR VIEW SHOWING LYMPH DRAINAGE OF RIGHT COLON

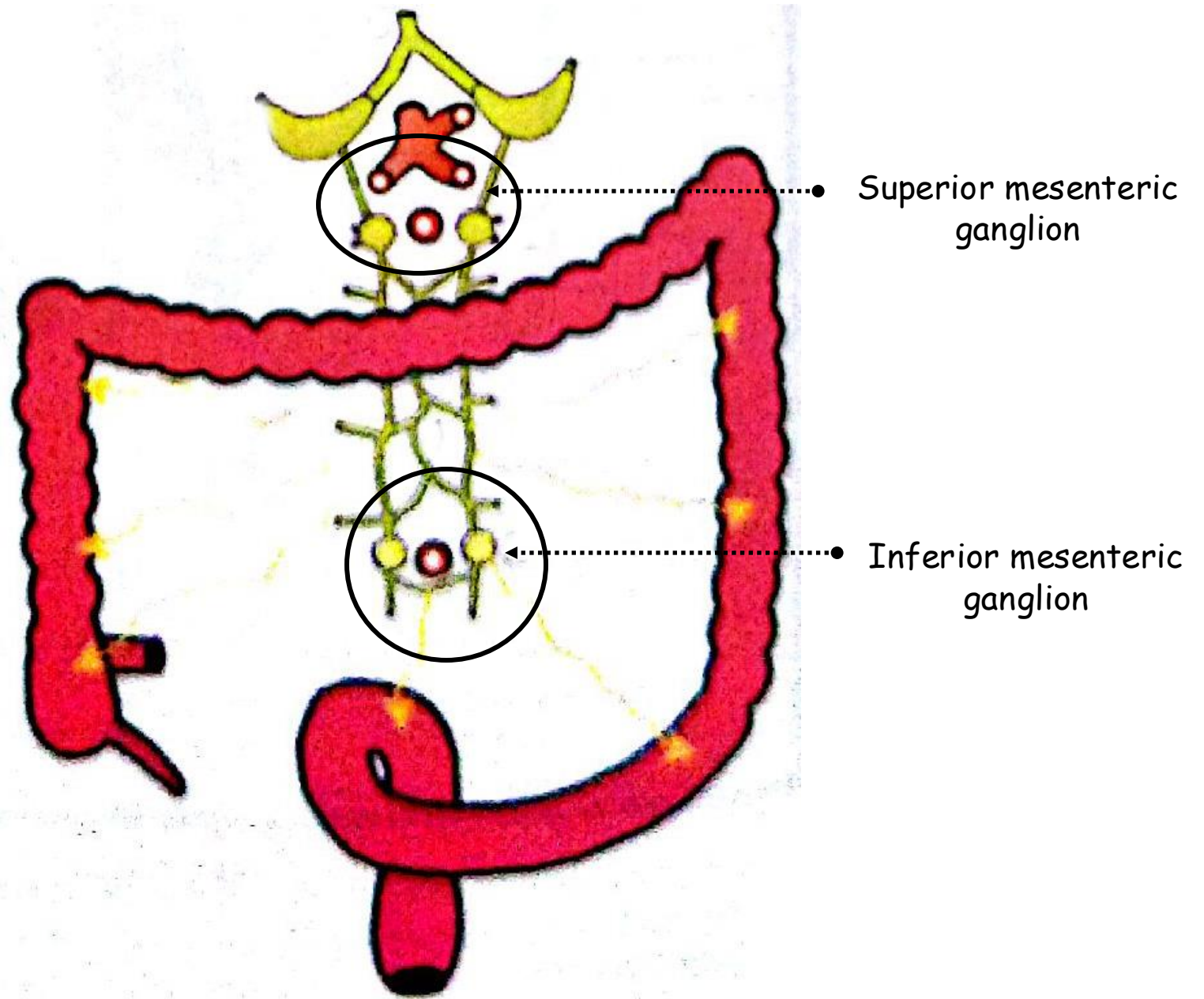
- Sacral nodes
- Internal iliac nodes
- Common iliac nodes



ANTERIOR VIEW SHOWING LYMPH DRAINAGE OF LEFT COLON

D. NERVES

- **Parasympathetic:** the vagi and partly from the pelvic splanchnic nerves
- **Sympathetic:** spinal cord segments T10-L2



ANTERIOR VIEW OF COLON

VII. SURGICAL APPROACH

- **Right hemicolectomy:** extends from the terminal ileum to the proximal part of the transverse colon, with ligation of the ileocolic and right colic vessels adjacent to superior mesenteric parent
- **Transverse colectomy:** the transverse colon and the right and left colic flexures are removed together with the transverse mesocolon and greater omentum and the middle colic vessels
- **Left hemicolectomy:** the resection is from the left end of the transverse colon to part of the sigmoid colon, with ligation of left colic and sigmoid vessels
- **Sigmoid colectomy:** the removal extends from the lower descending colon to the rectum
- **Appendectomy**



VIII. CONCLUSION

- Terminal part of the gastrointestinal tract
- Spread over all areas of the abdomen
- Stereotyped architecture with particularities
- Different fixity from part to part
- Several peritoneal and visceral relations
- Multiple anatomical variations
- Rich blood supply
- Lymph drainage is ensured mainly by the preaortic nodes





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