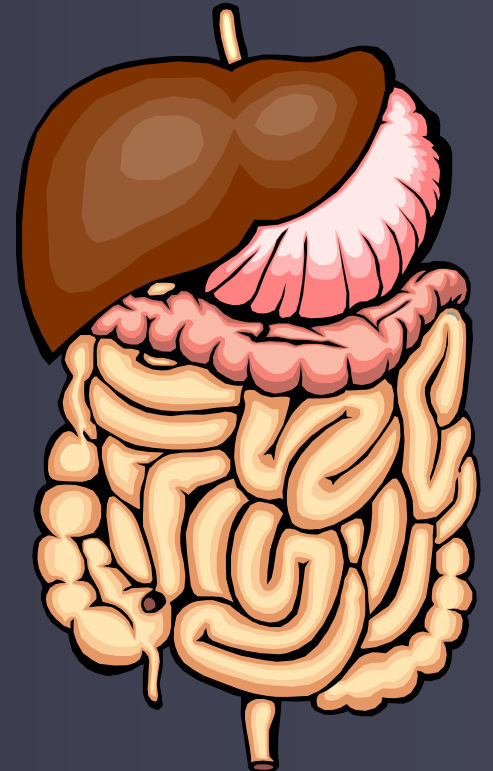
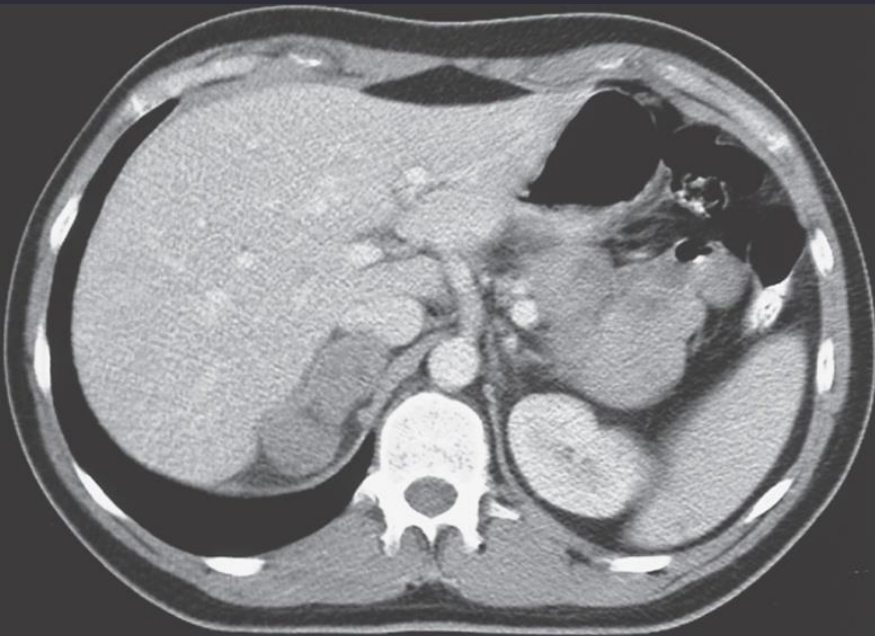


Chapter 7

Abdomen



Two Thoughts on Teaching

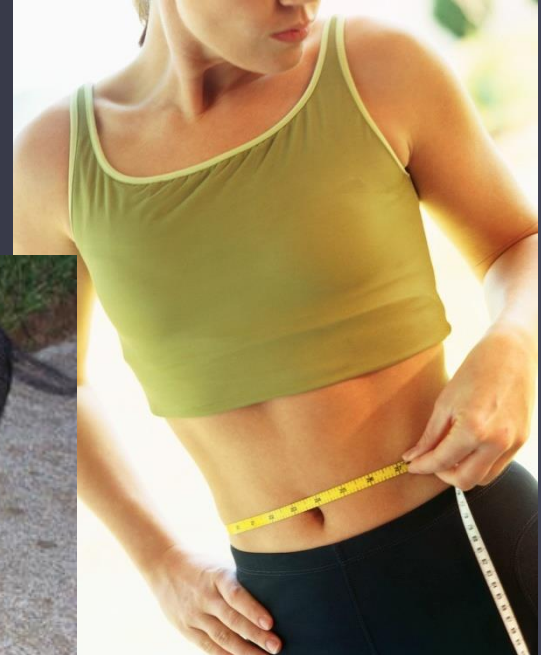
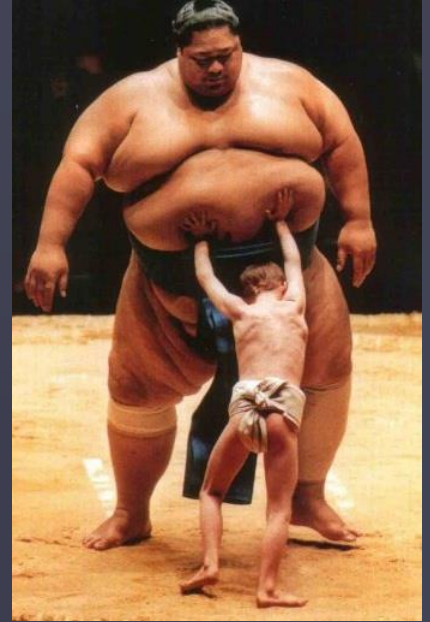
- The one exclusive sign of a thorough knowledge is the power of teaching
 - **Aristotle**
- Everybody who is incapable of learning has taken to teaching
 - **Oscar Wilde**

Thoracic Website

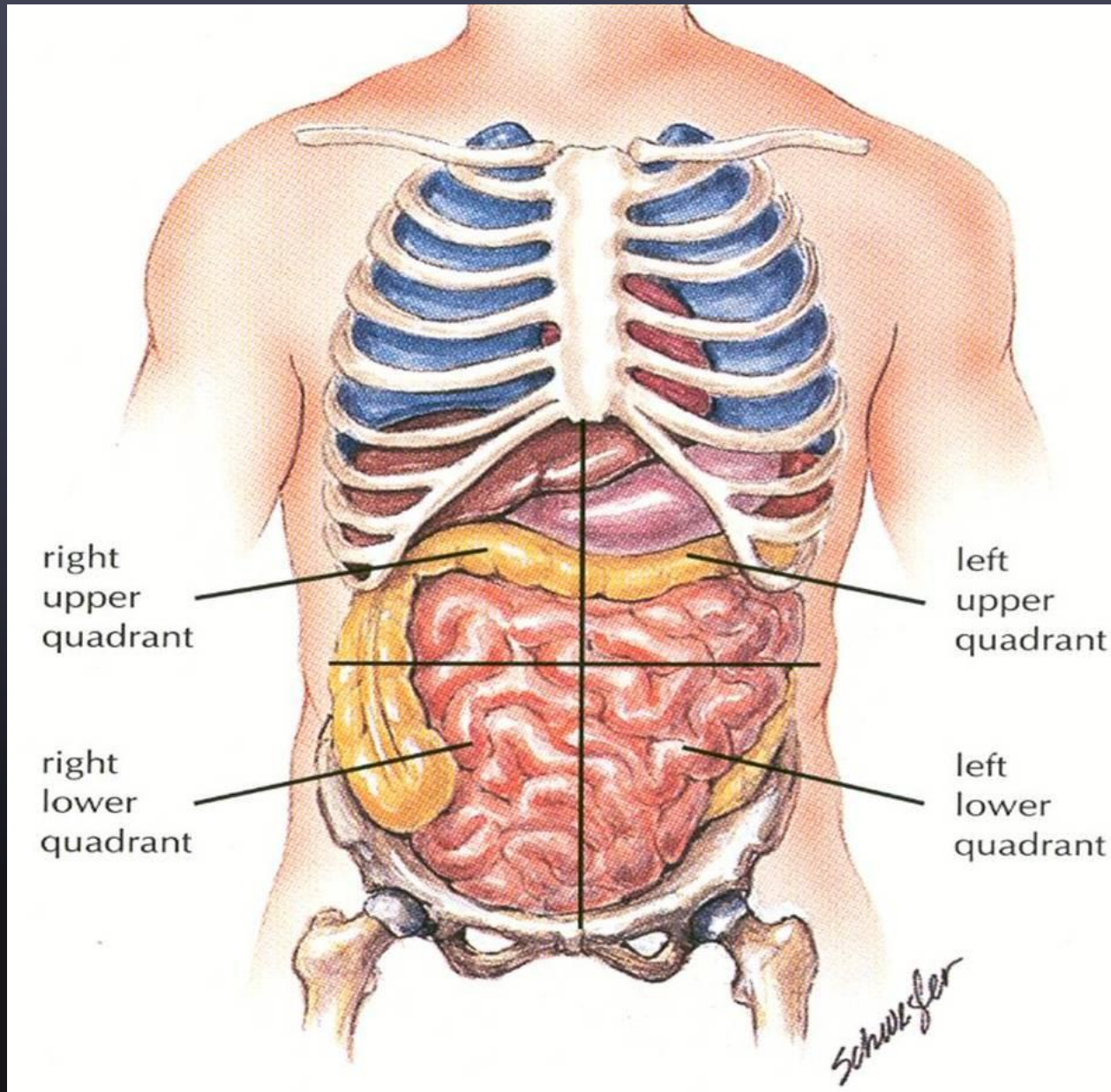
- <https://www.fmhs.auckland.ac.nz/en/sms/about/our-departments/anatomy-with-medical-imaging/teaching-and-learning/atlas1/thorax.html>

Abdominal Website

- <https://sectional-anatomy.org/ct-abdomen/>

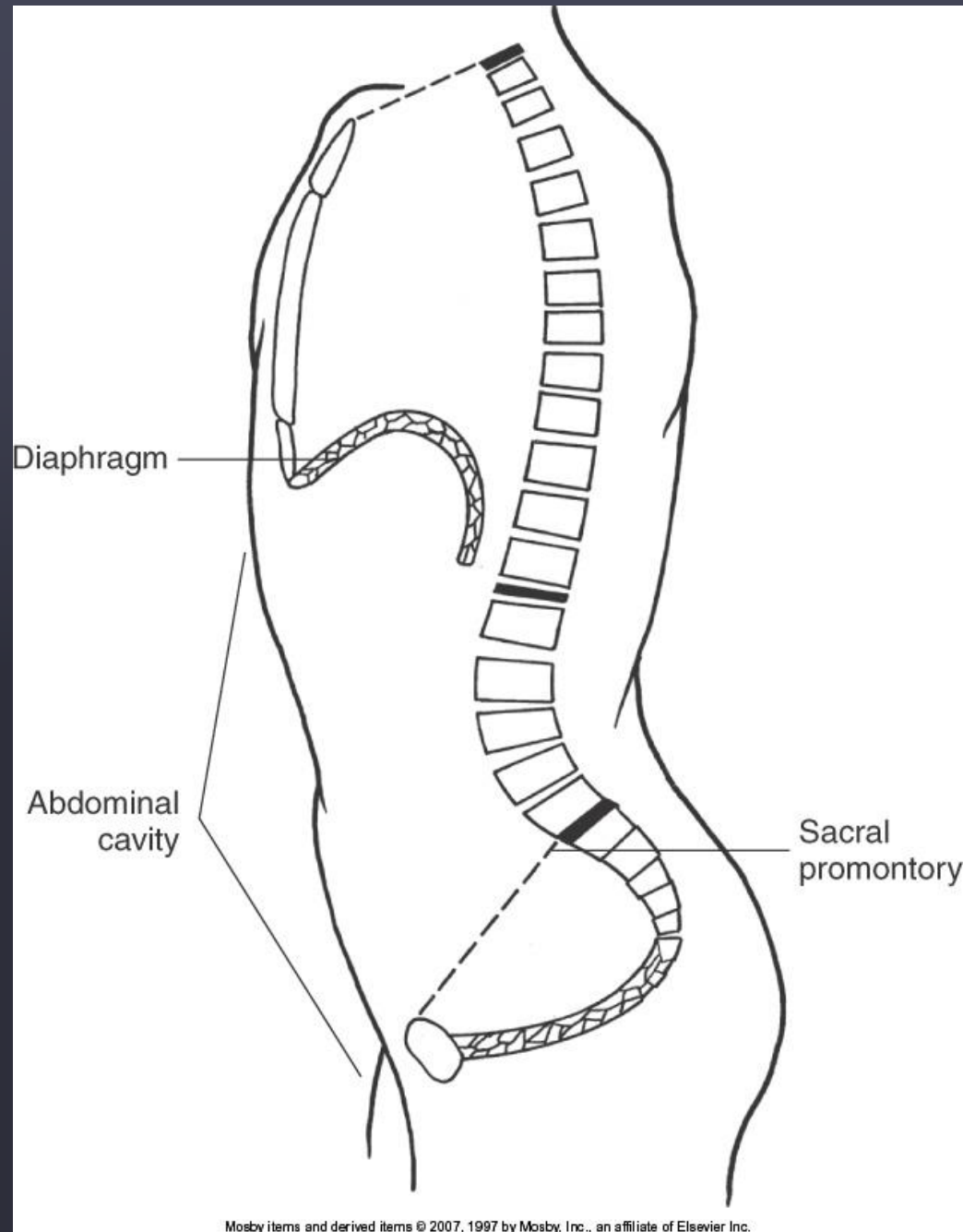


Abdominal Quadrants

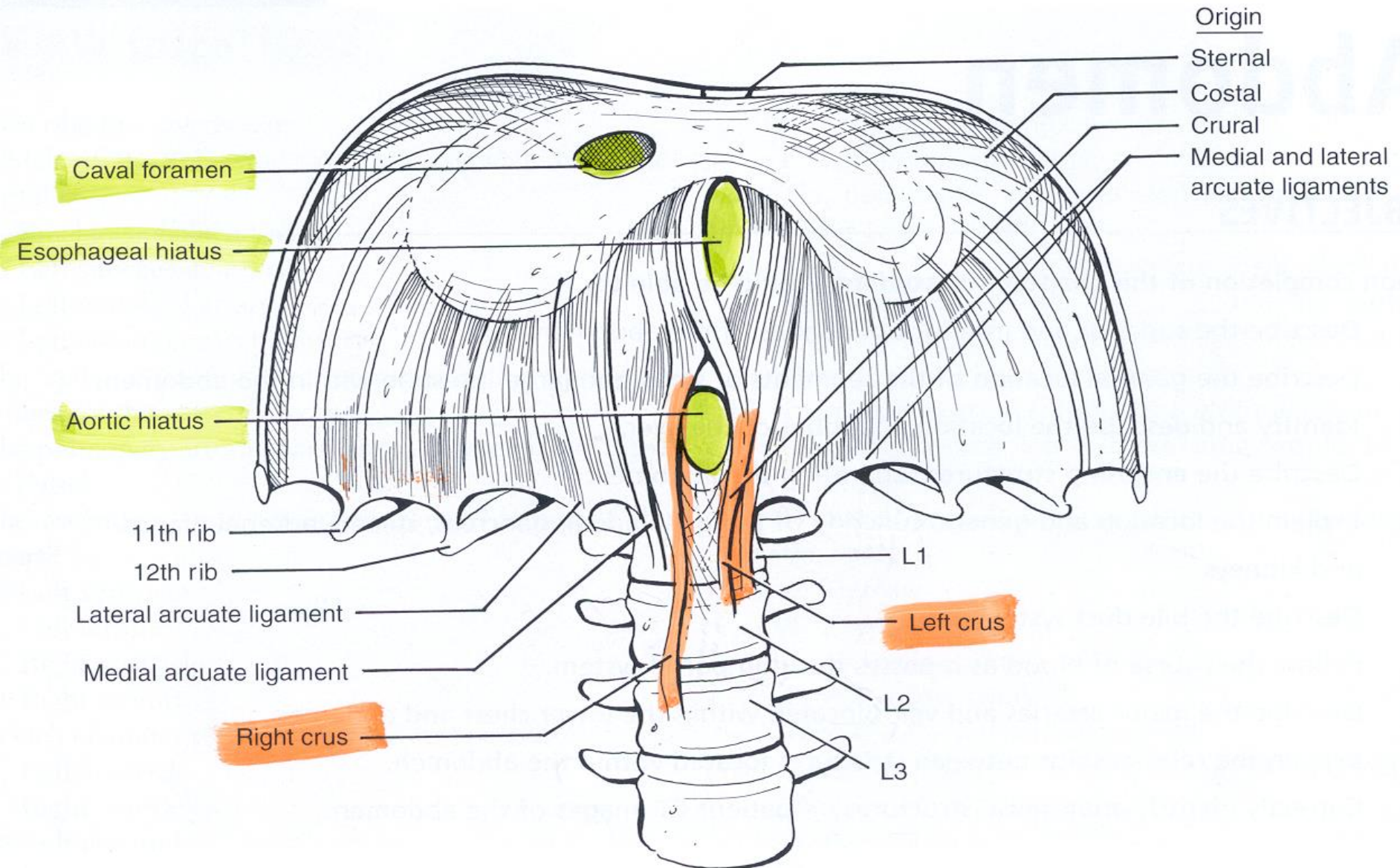


Abdominal Cavity

- From diaphragm
To Sacral
Promontory



Diaphragm and Crus

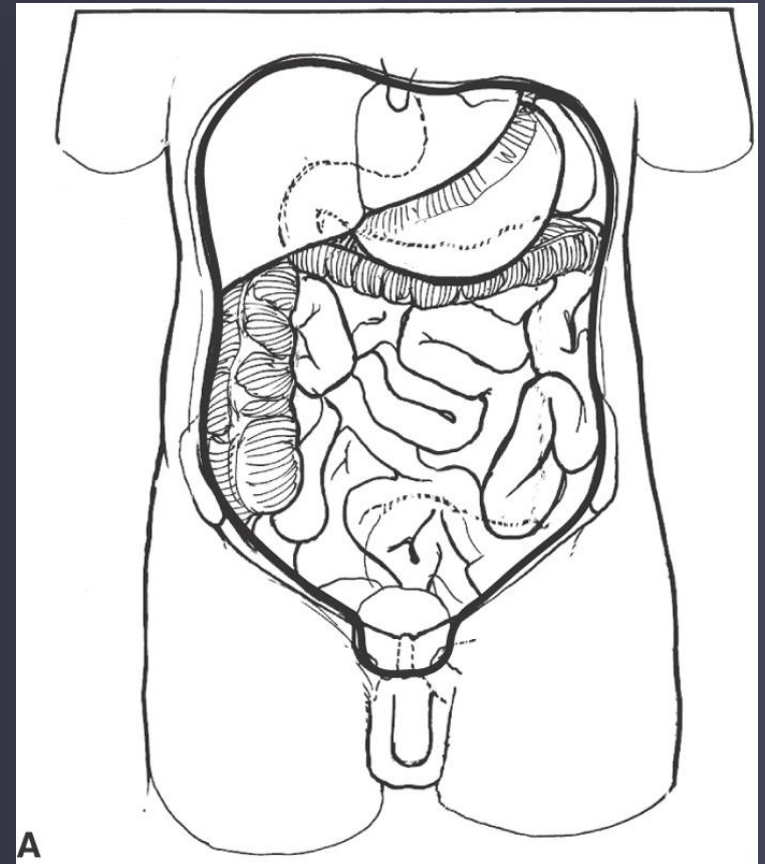
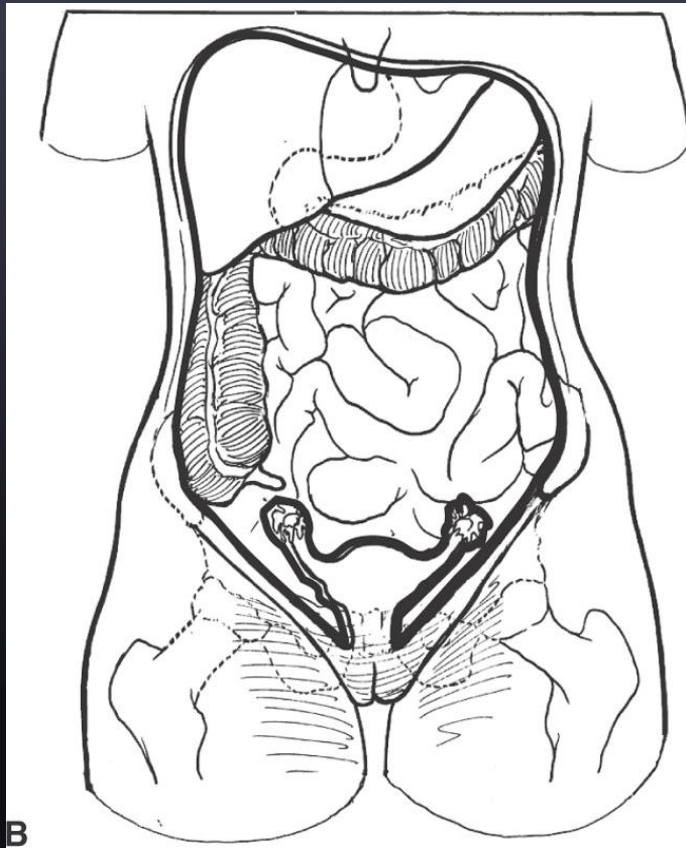


ORGANS OF ABDOMEN

- Liver
- Gallbladder
- Biliary System
- Spleen
- Stomach
- Pancreas
- Adrenal Glands
- Kidneys
- Ureters
- Intestines
- Vascular Structures

ABDOMINAL CAVITY

- Male – Enclosed
- Female – Abdominal Cavity Communicates With Reproductive Organs



ABDOMINAL LINING

- Peritoneum

- Parietal Peritoneum

- Covers Abdomen Wall

- Visceral Peritoneum

- Covers Each Organ

PERITONIUM

- **Imagine Peritoneum As A Sheet With Many Folds**
- **Folds Are Of Three Types**
 - **Mesentery**
 - **Omentum**
 - **Peritoneal Ligaments.**

Abdominal Linings

■ Mesentery

- Peritoneum that covers the intestines---attaches to abdominal wall

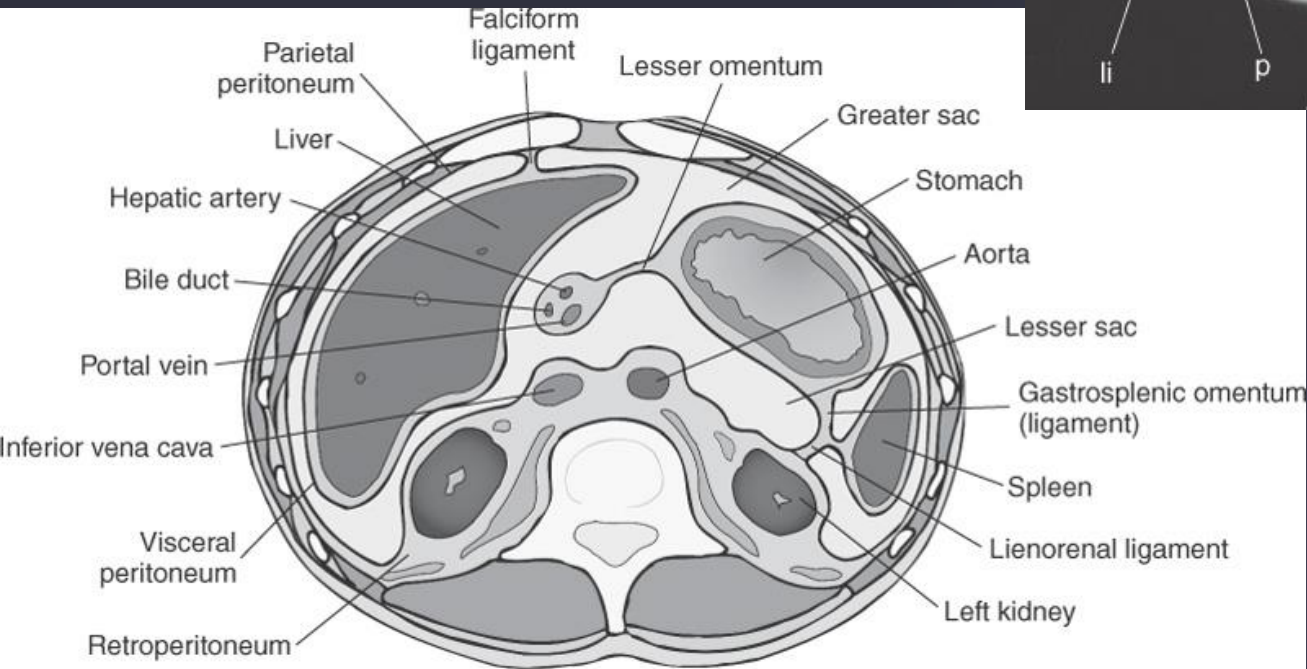
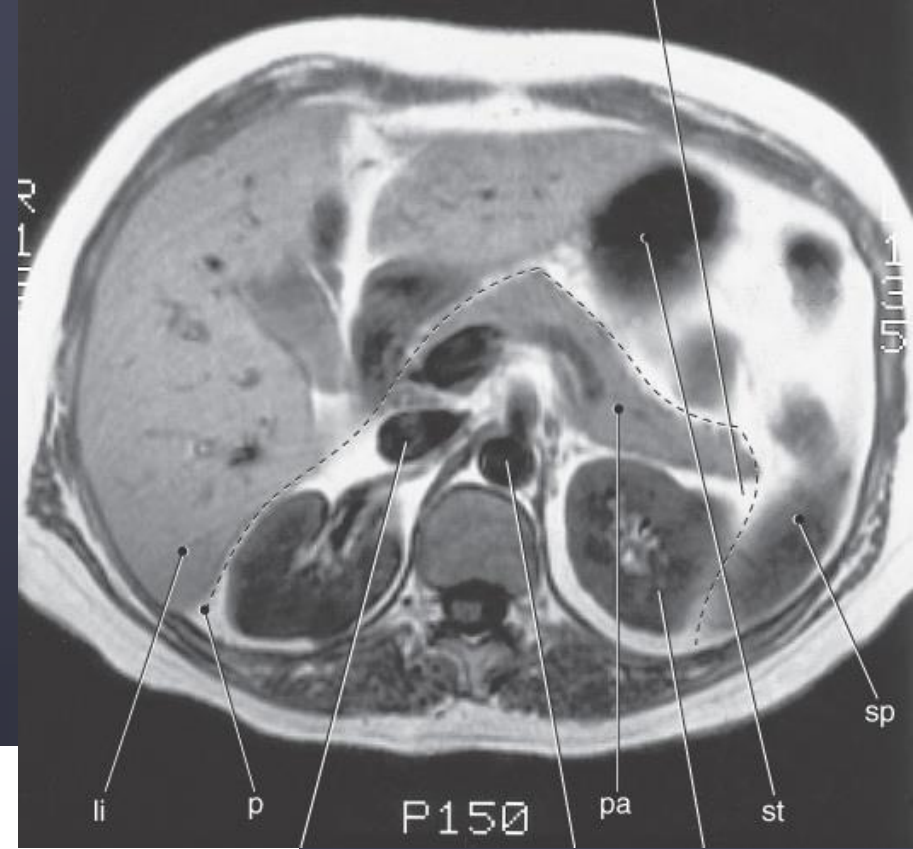
■ Omentum

- Mesentery flap that attaches to stomach
- Visualized only when fluid is present
- Has greater and lesser parts that are fat laden

■ Ligaments

- Falciform
- Ligamentum Teres
- Divide the liver into right and left lobes and attach to abdominal wall

Peritoneal and Retroperitoneal Cavities



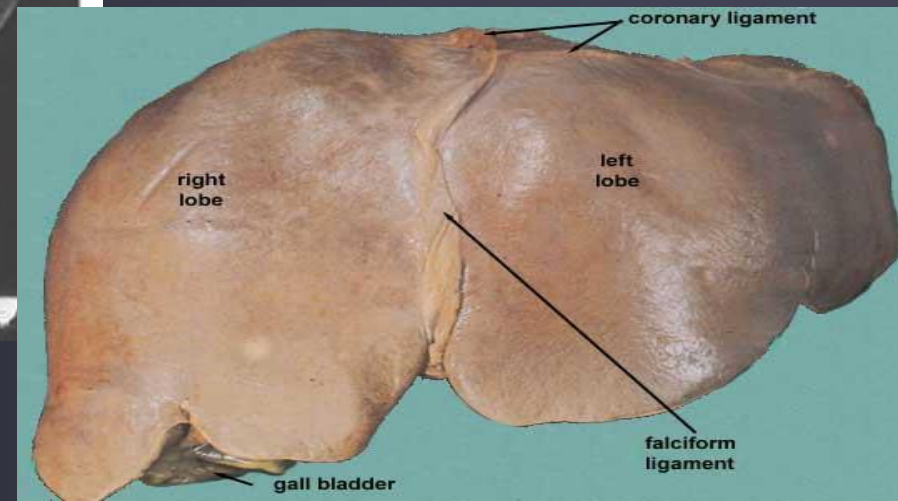
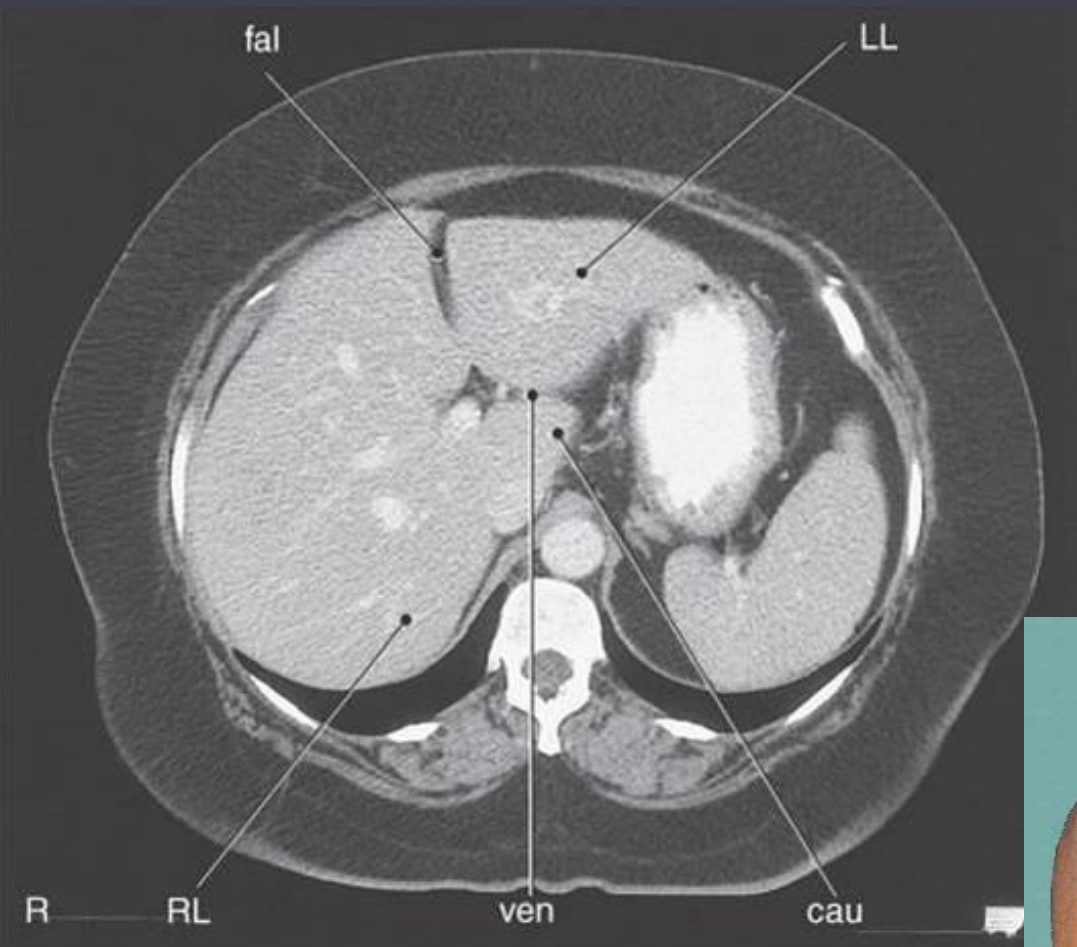
Peritoneal Structures

- Liver
- Gallbladder
- Spleen
- Stomach
- Small Intestine (Except Part Of Duodenum)
- Parts Of The Larger Intestine
- Ovaries

Retroperitoneal Structures

- Kidneys
- Ureters
- Adrenals
- Pancreas
- Distal Duodenum
- Ascending Colon
- Descending Colon
- Aorta
- Inferior Vena Cava

Ligaments Dividing The Lobes Of The Liver



LIVER

- **Largest Organ in Abdomen**
- **Superior Border – Diaphragm**
- **Has 2 blood supplies**
 - **Hepatic Artery 25%**
 - **Portal Vein 75%**
- **Hilum (Portal Hepatis) of Liver**
 - **Depression on inferomedial surface of liver where the vessels enter or exit:**
 - **Portal Vein**
 - **Hepatic Artery**
 - **Hepatic Duct**

Lobes of LIVER

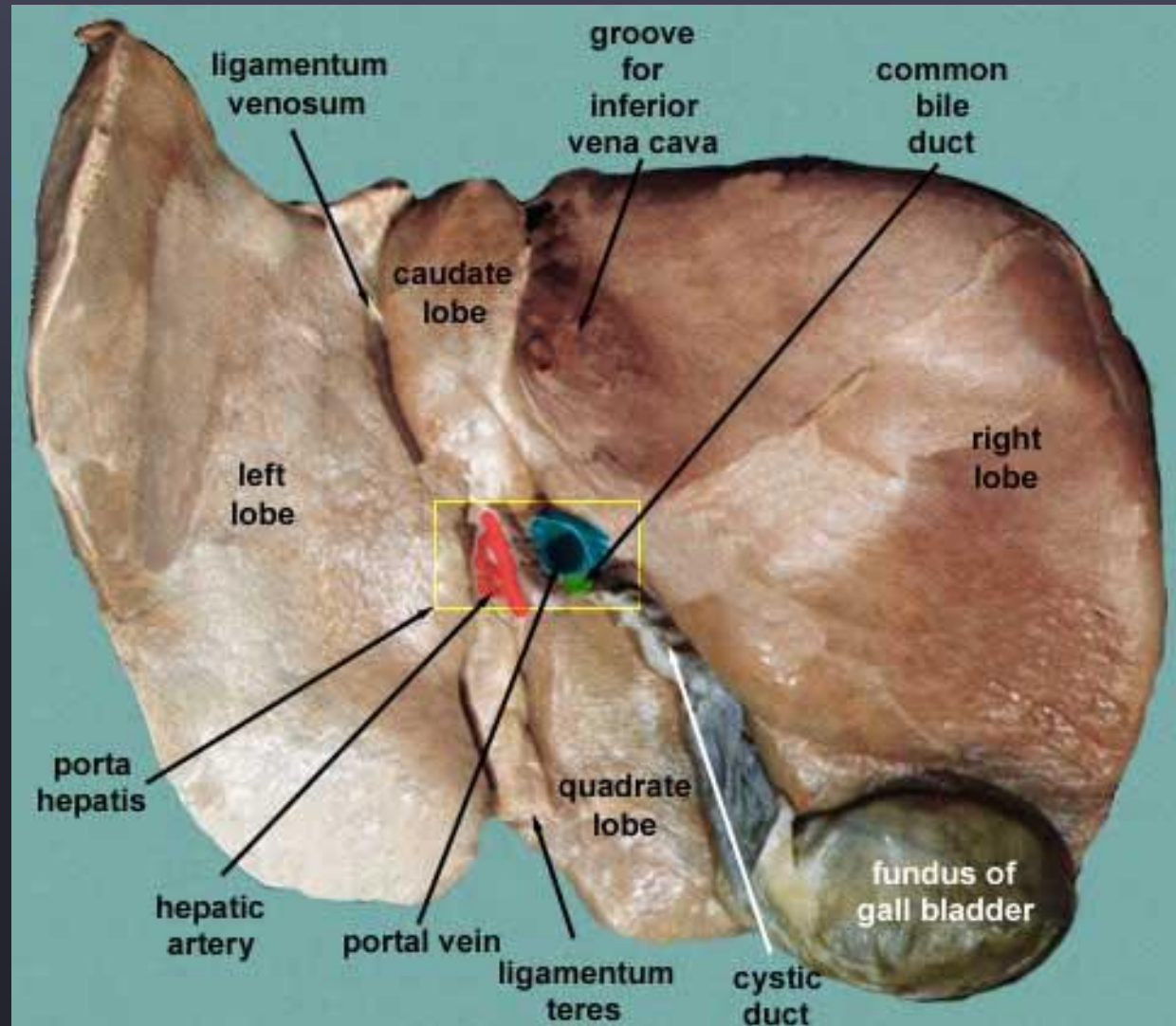
■ Four Lobes

■ Right

■ Left

■ Caudate

■ Quadrate



Four Lobes of Liver

1. Left Lobe

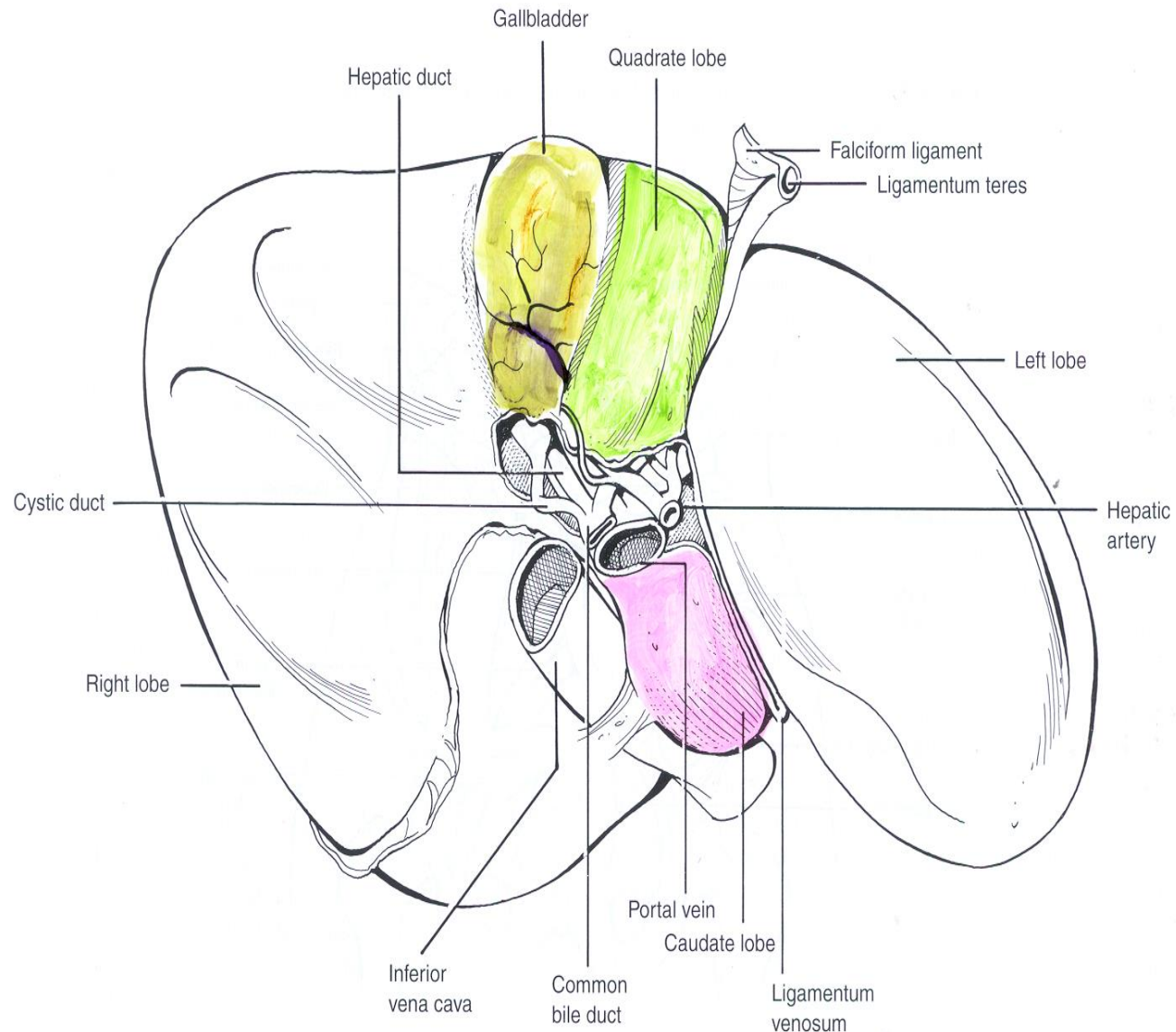
2. Right Lobe

3. Caudate Lobe

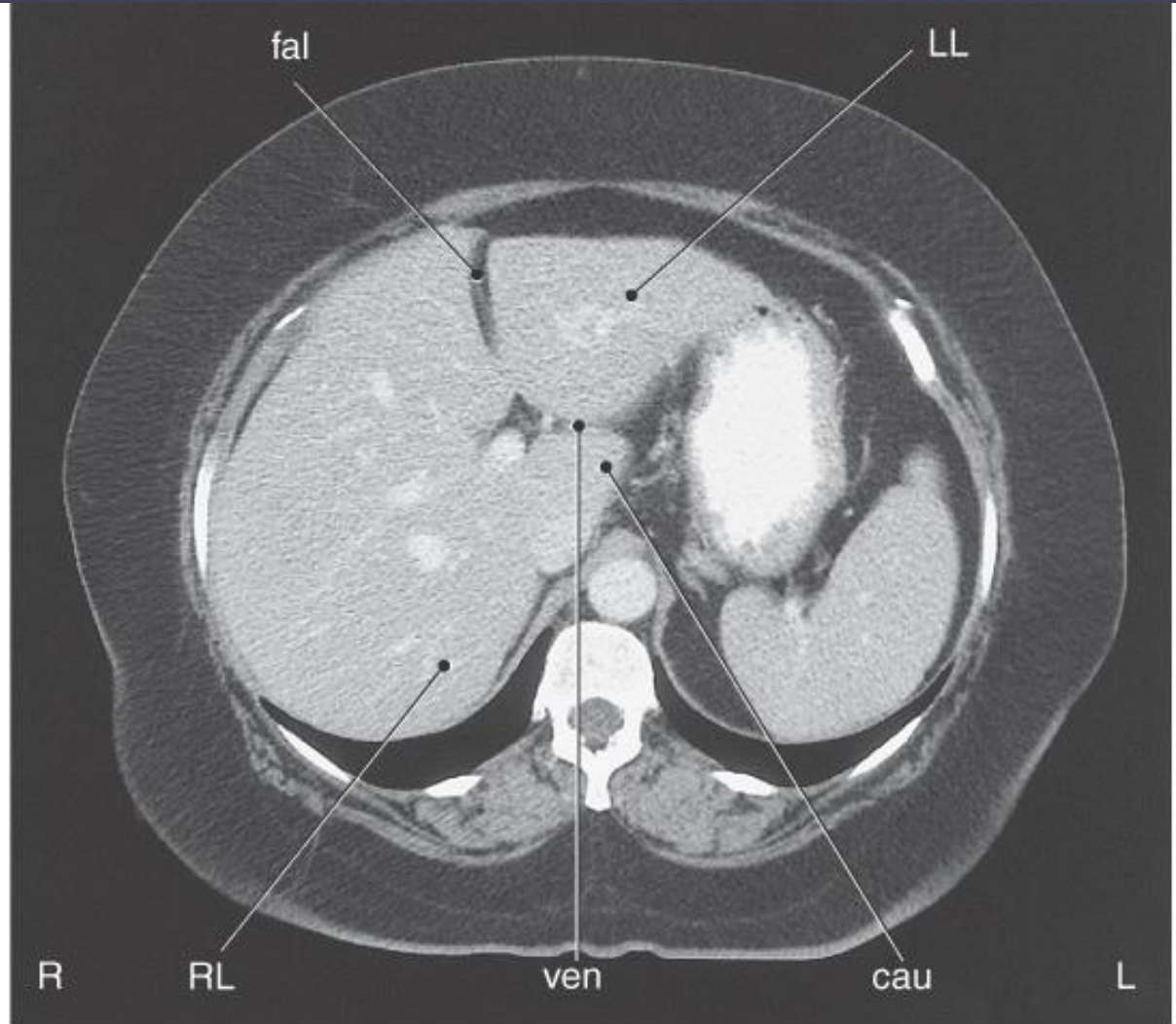
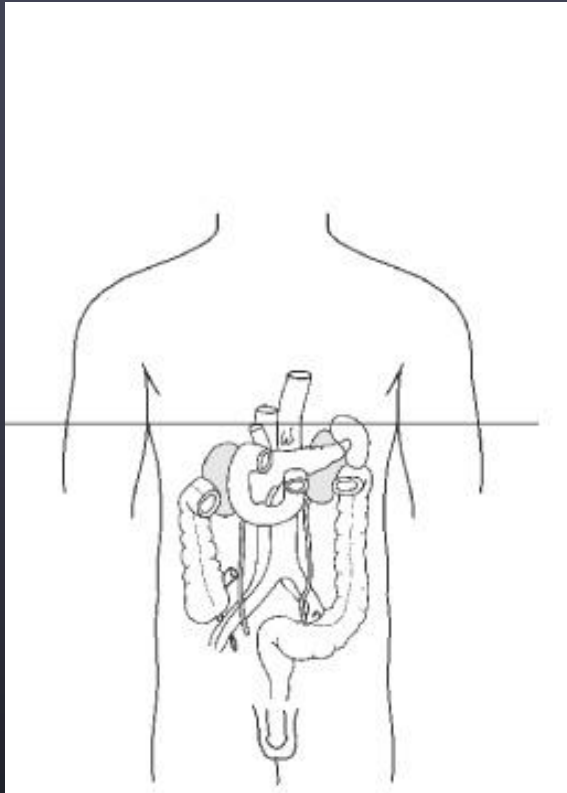
-posterior to
portal vein -
near the IVC

4. Quadrate

-small anterior
lobe between
Gall Bladder
& Ligamentum
teres

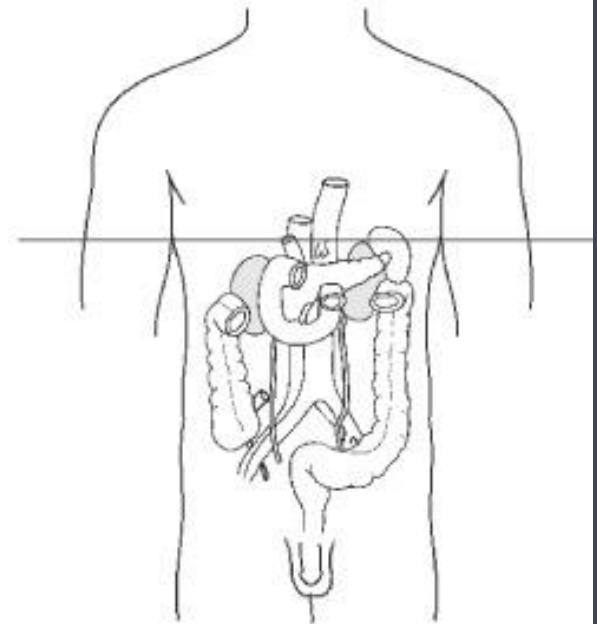
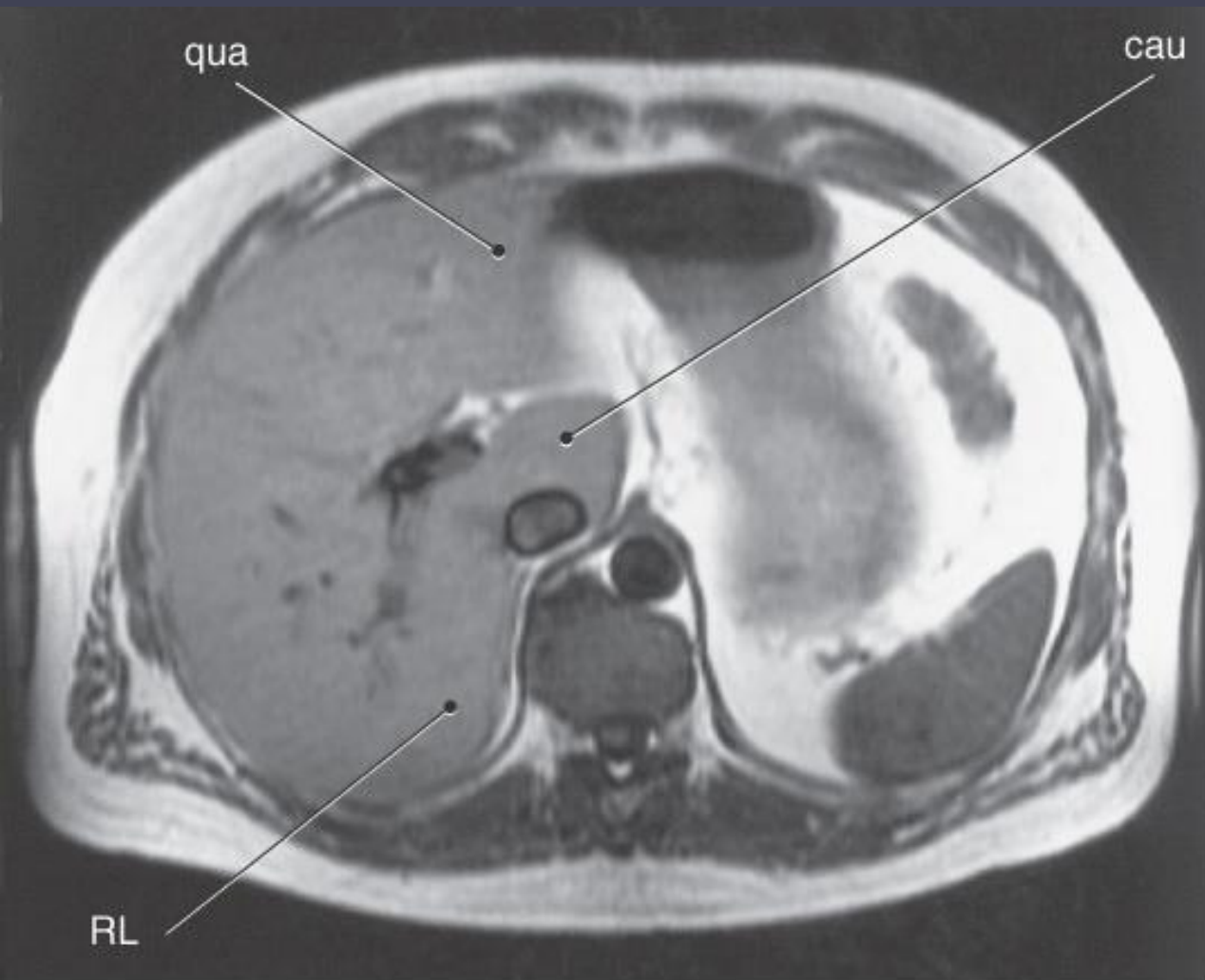


Caudate Lobe and Ligament



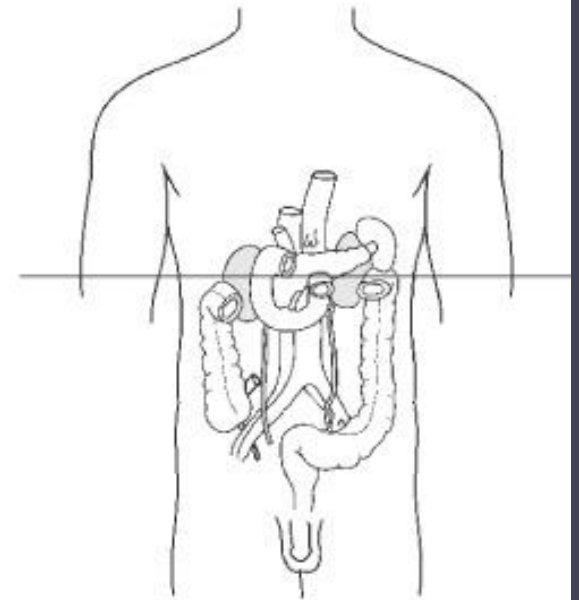
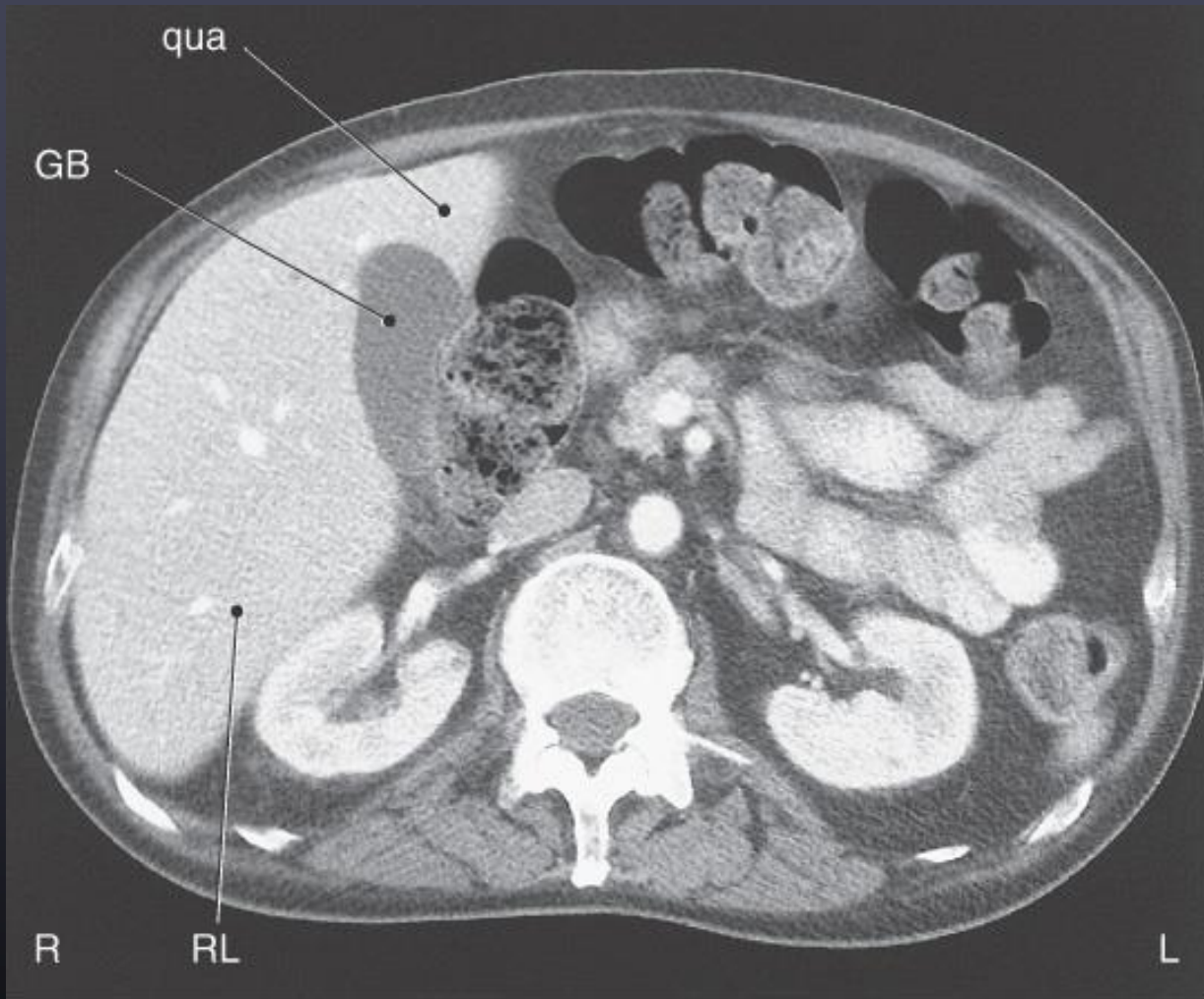
KEY: **fal**, Falciform ligament; **LL**, left lobe of liver; **ven**, ligamentum venosum; **RL**, right lobe of liver; **cau**, caudate lobe of liver.

Caudate and Quadrate Lobes



KEY: qua, Quadrate lobe of liver; cau, caudate lobe of liver; RL, right lobe of liver.

Quadrate Lobe and Gallbladder

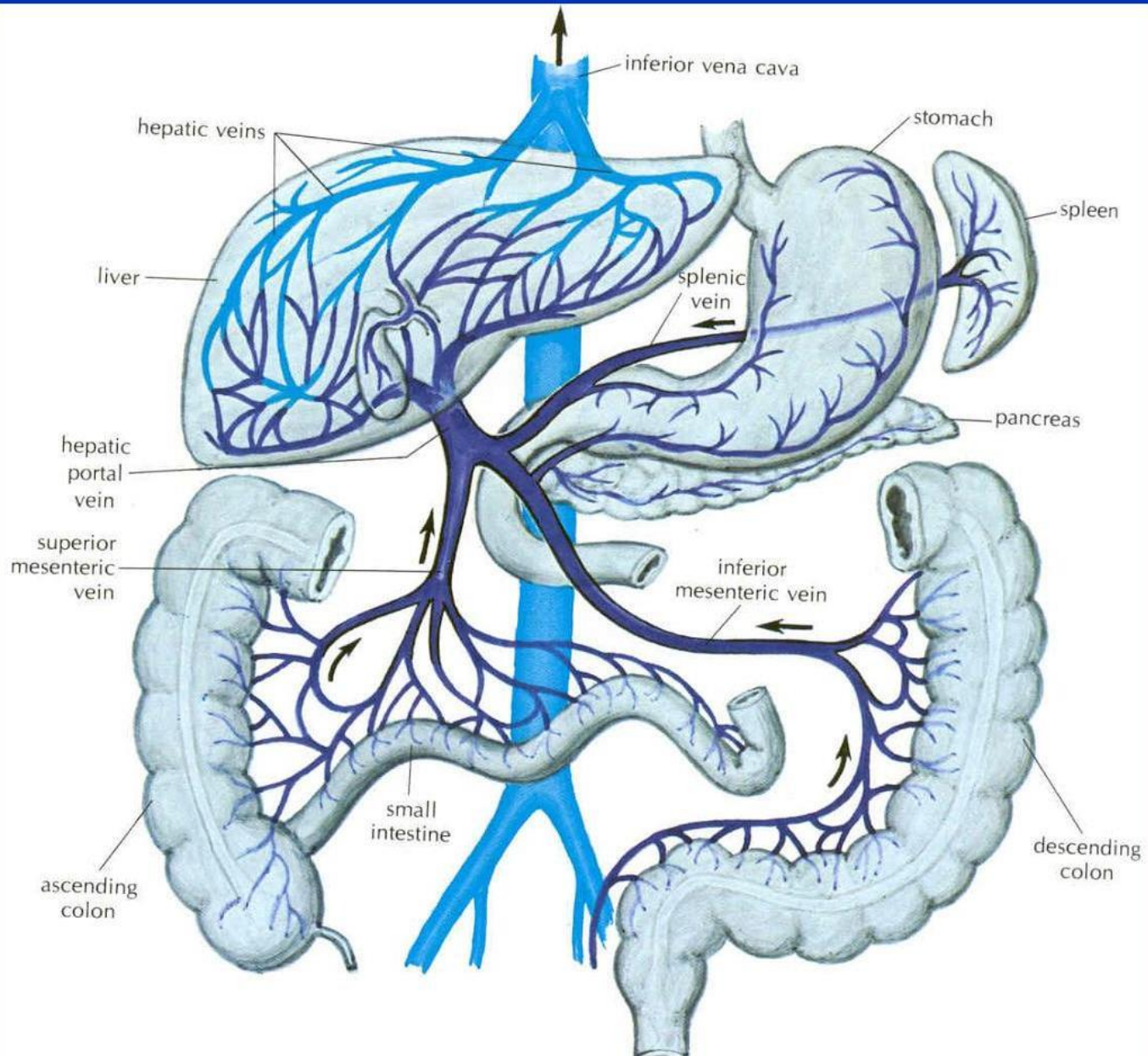


KEY: qua, Quadrate lobe of liver; RL, right lobe of liver; GB, gallbladder.

PORTAL HEPATIC SYSTEM

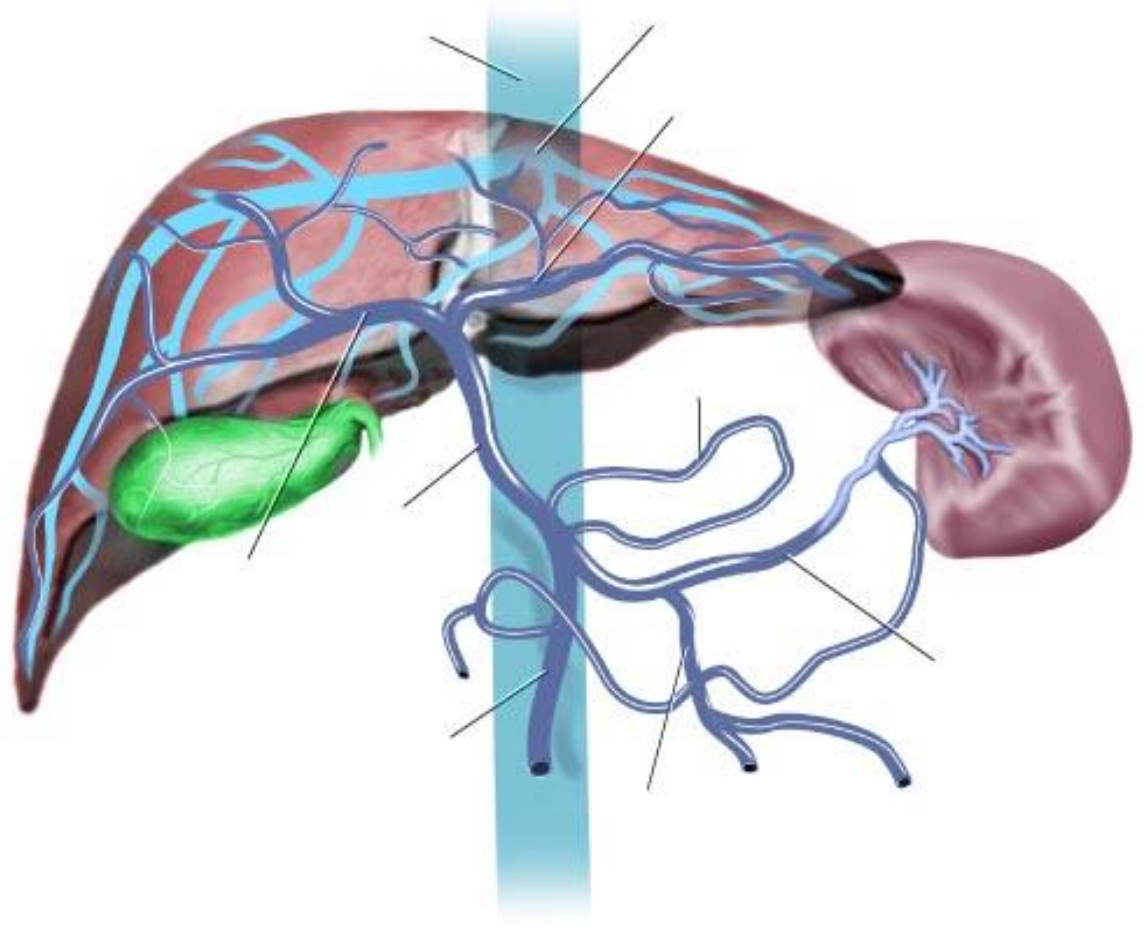
- **Venous Blood Supply to the Liver Is Via:**
 - **Portal Vein**
 - **Divides into the Right and Left Portal Vein**
- **Portal Vein Is Formed By**
 - **Superior Mesenteric Vein**
 - **Splenic Vein**
 - **Inferior Mesenteric Vein (not by your book)**
- **Blood is processed in liver and Goes To Hepatic Veins and into IVC.**

Portal System



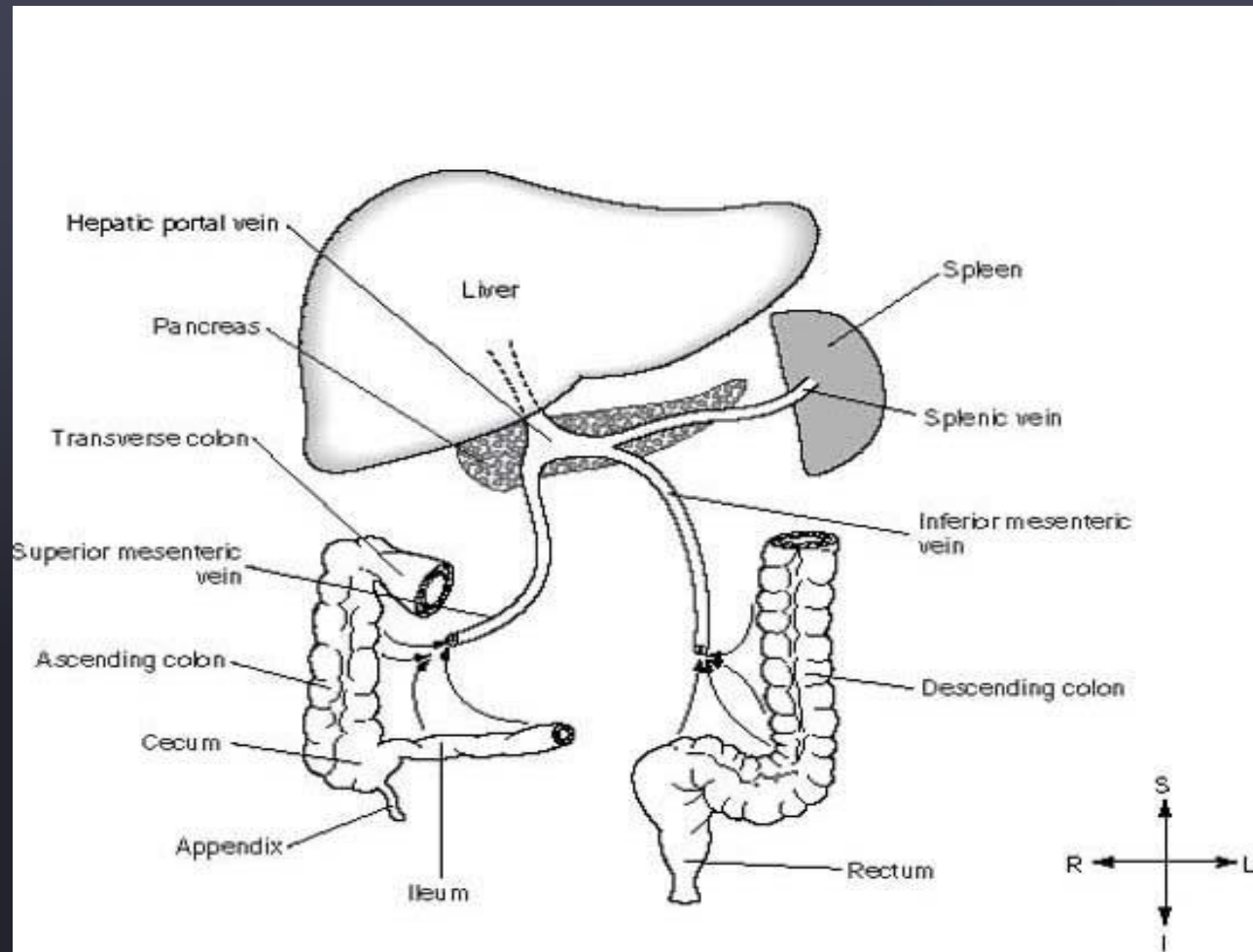
Veins of the Portal Vascular System

1. Splenic
2. Superior Mesenteric
3. Inferior Mesenteric
4. Gastric

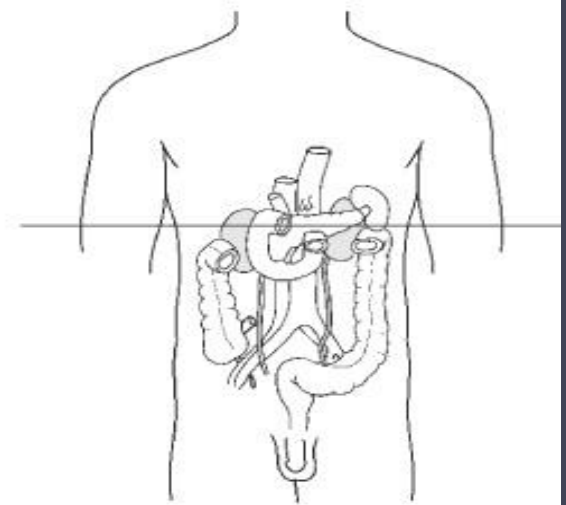
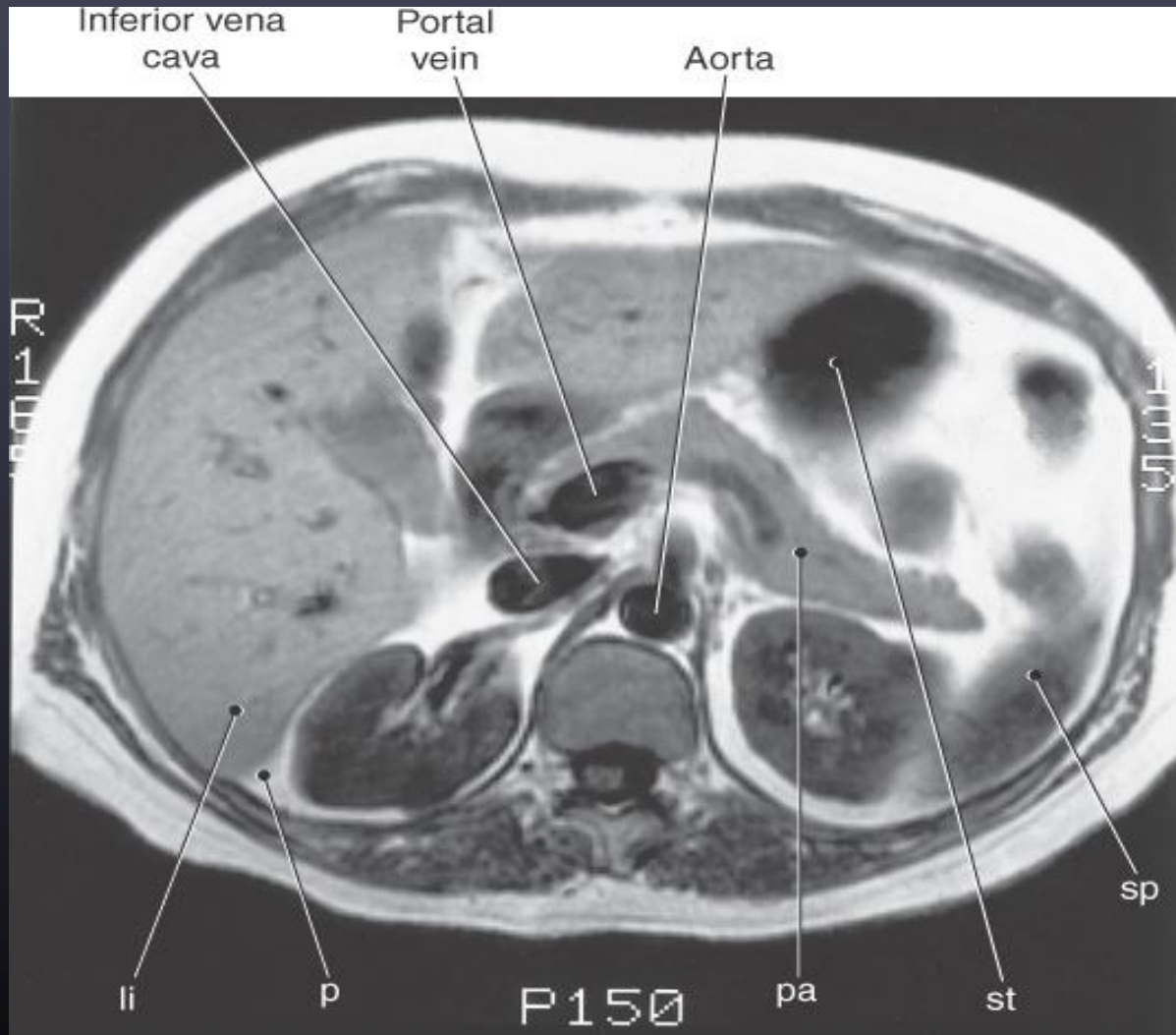


Portal Venous System

- **Splenic Vein**
 - Spleen and pancreas
- **Inferior Mesenteric**
 - Descending Colon
- **Superior Mesenteric**
 - Ascending Colon and Small Intestines

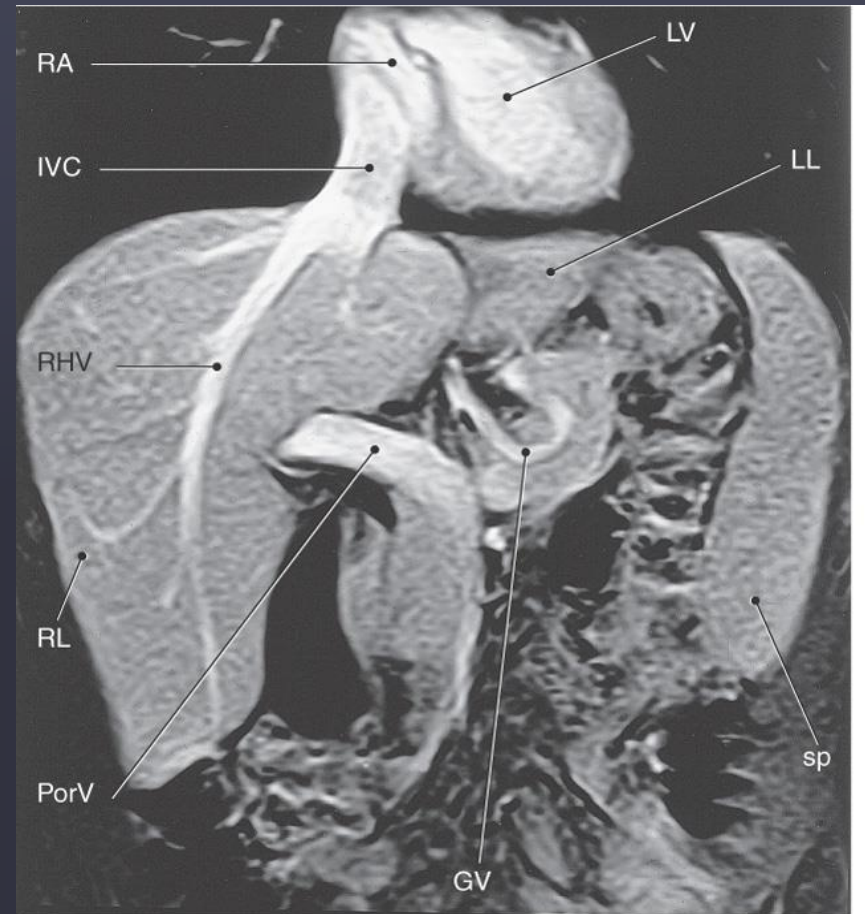
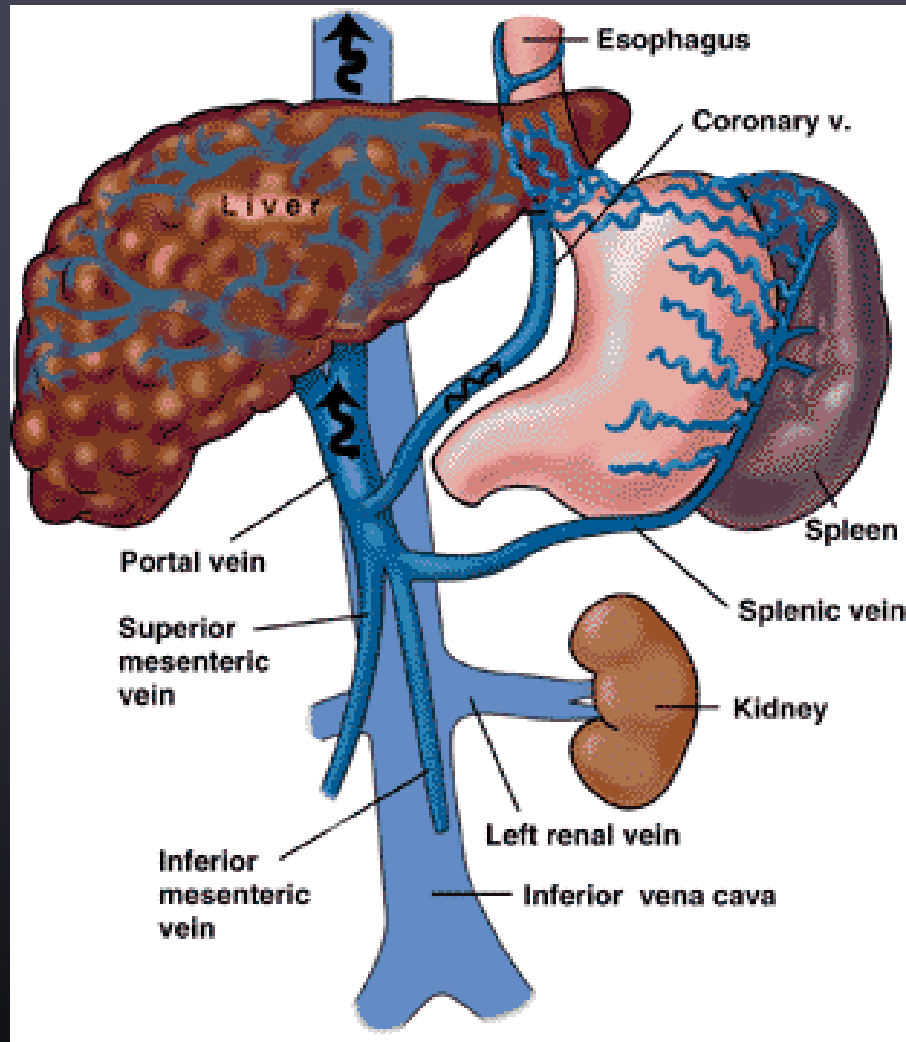


Liver and Other Organs



KEY: li, Liver; p, peritoneum; pa, pancreas; st, stomach; sp, spleen.

Portal System

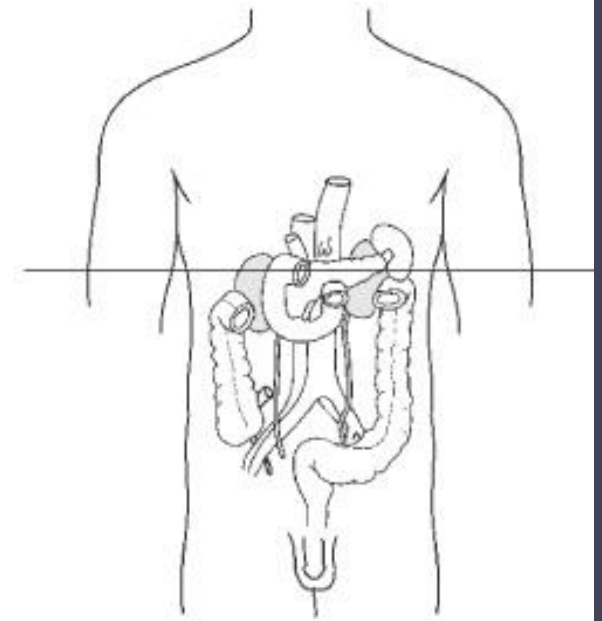
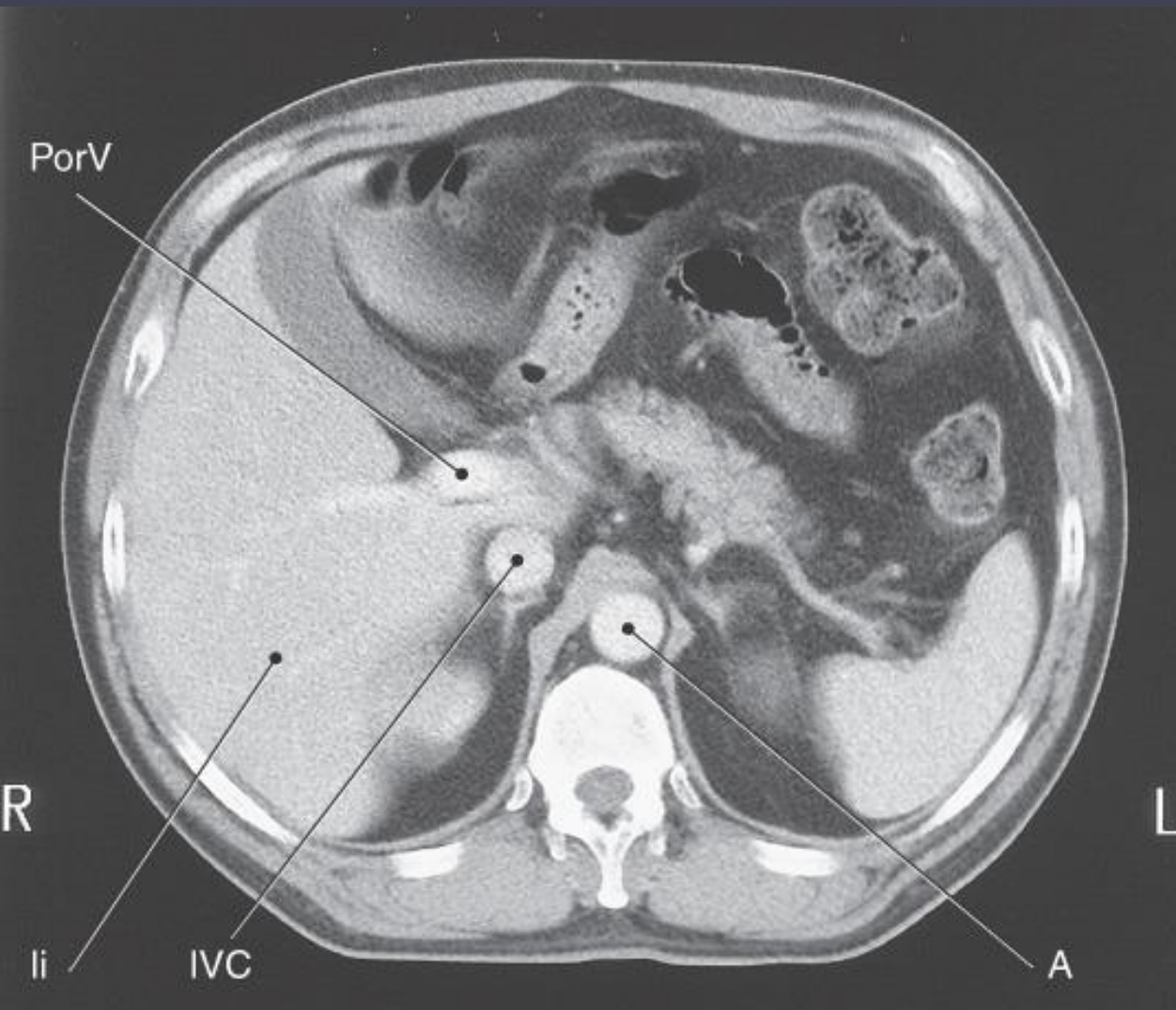


KEY: PorV, Portal vein; IVC, inferior vena cava; Sp, splenic; RA, right atrium; LV, left ventricle; LL, left lobe of liver; RHV, right hepatic vein; RL, right lobe of liver; GV, gastric vein; sp, spleen.

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Portal Hypertension caused by obstruction of blood flow in portal hepatic system

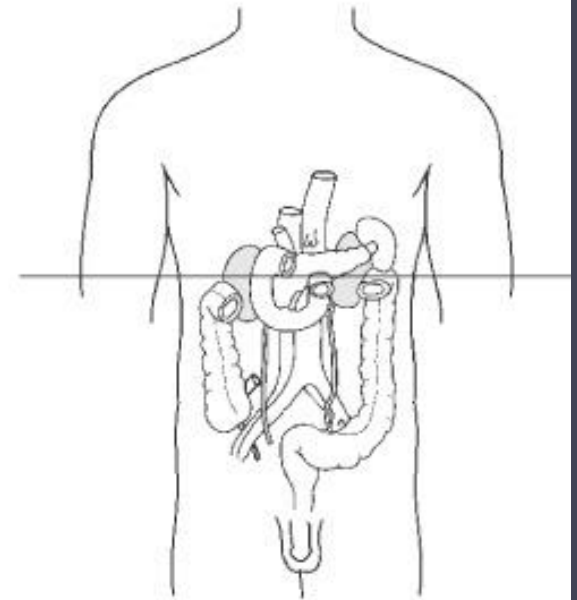
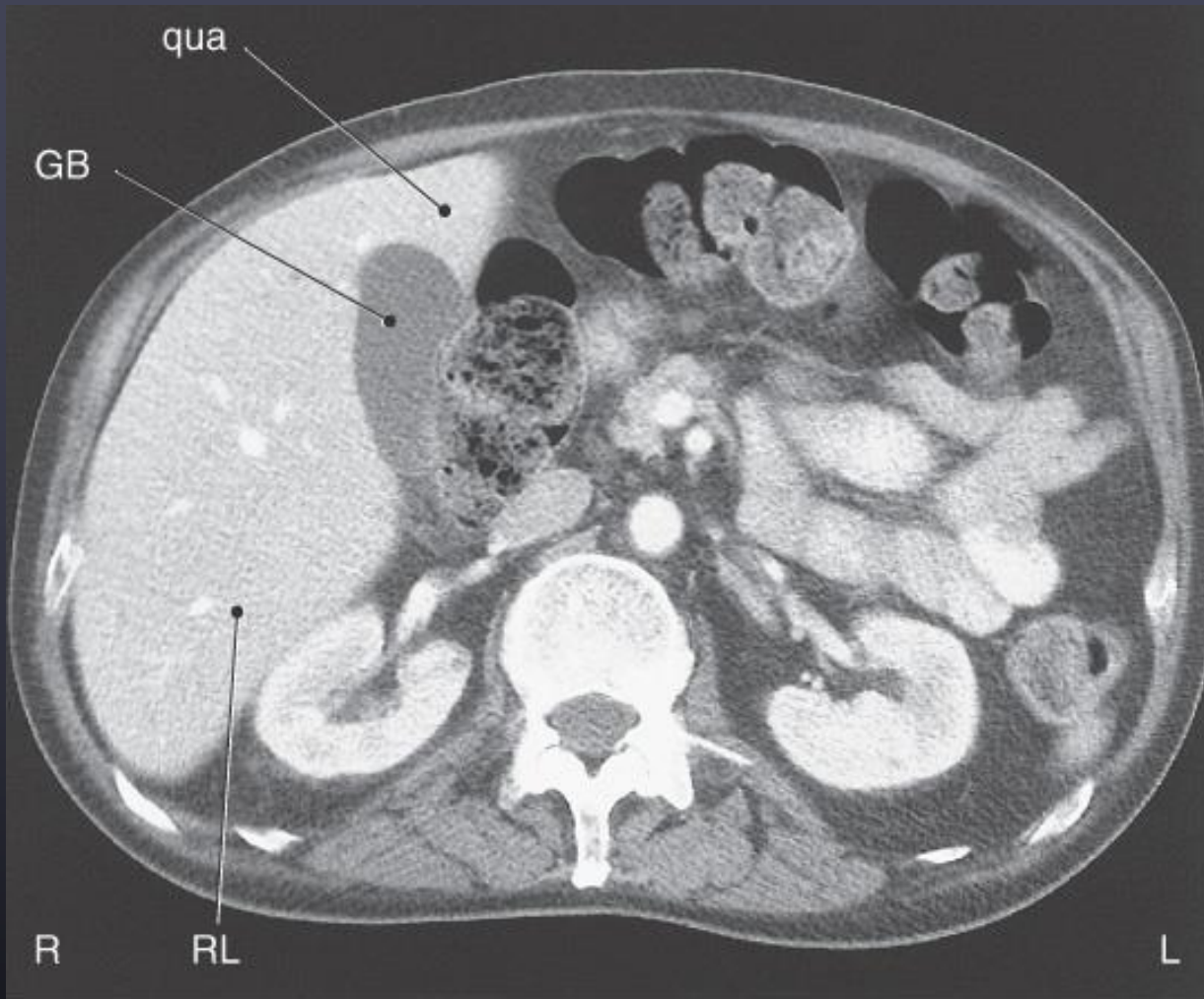
Another View of Liver & Vessels



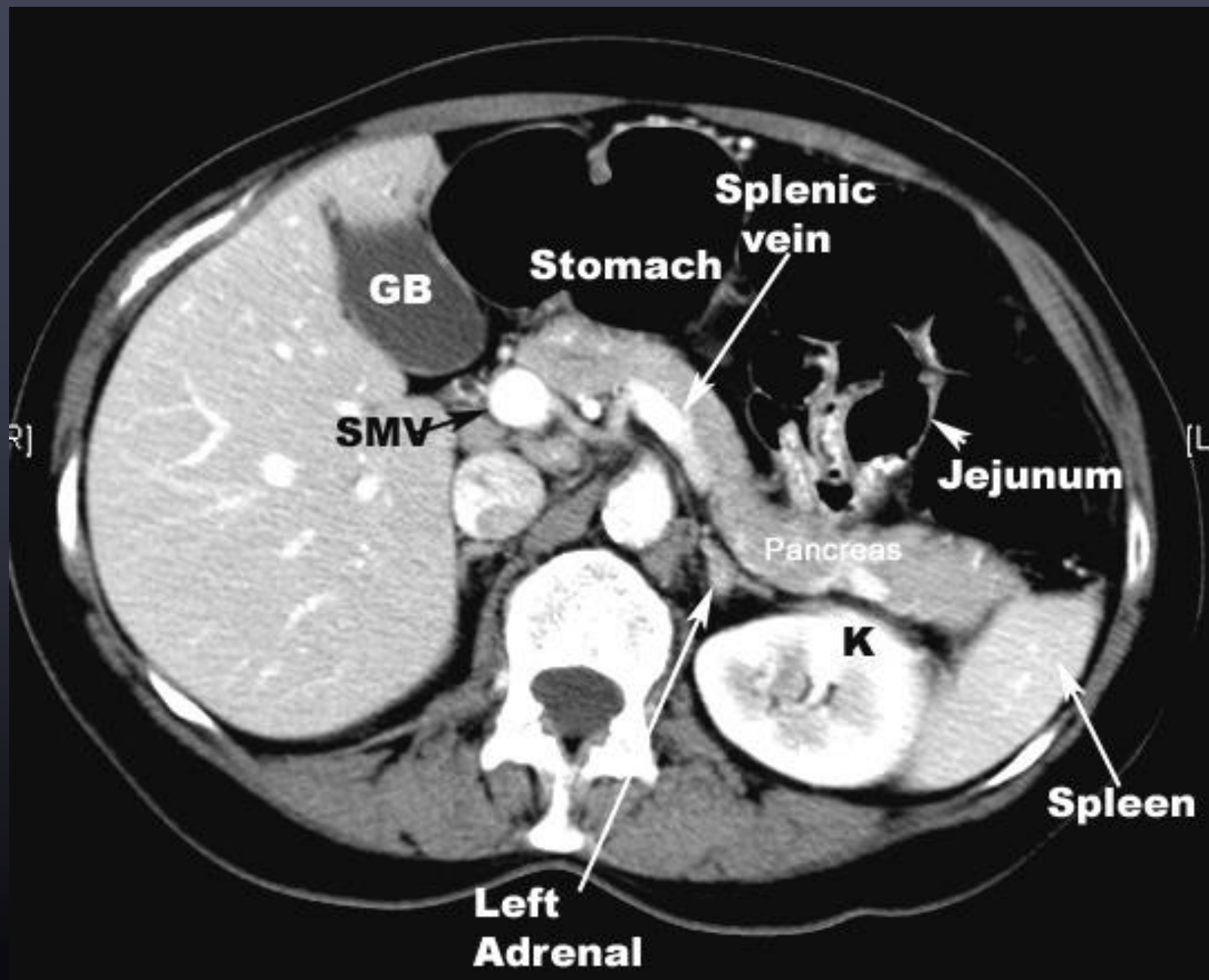
KEY: PorV, Portal vein; li, liver; IVC, inferior vena cava; A, aorta.

BILIARY SYSTEM

- **Composed Of:**
 - **Gallbladder**
 - **Intrahepatic ducts (run along beside veins and arteries)**
 - **Cystic Duct (Serves as entry and exit for bile)**
 - **Common Bile Ducts**
- **Bile Produced In Liver**
- **Stored In Gallbladder**



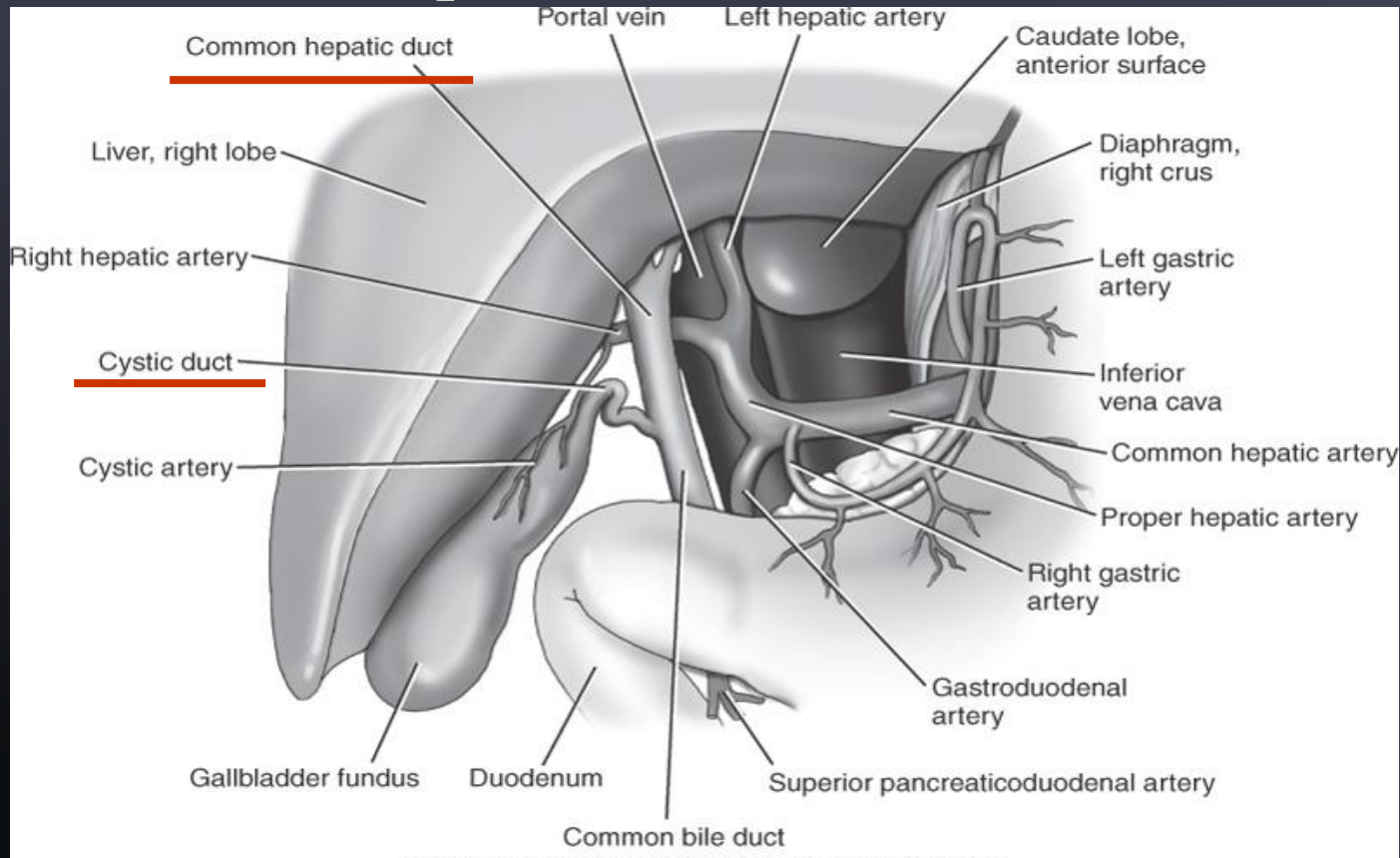
KEY: qua, Quadrate lobe of liver; RL, right lobe of liver; GB, gallbladder.



BILIARY SYSTEM

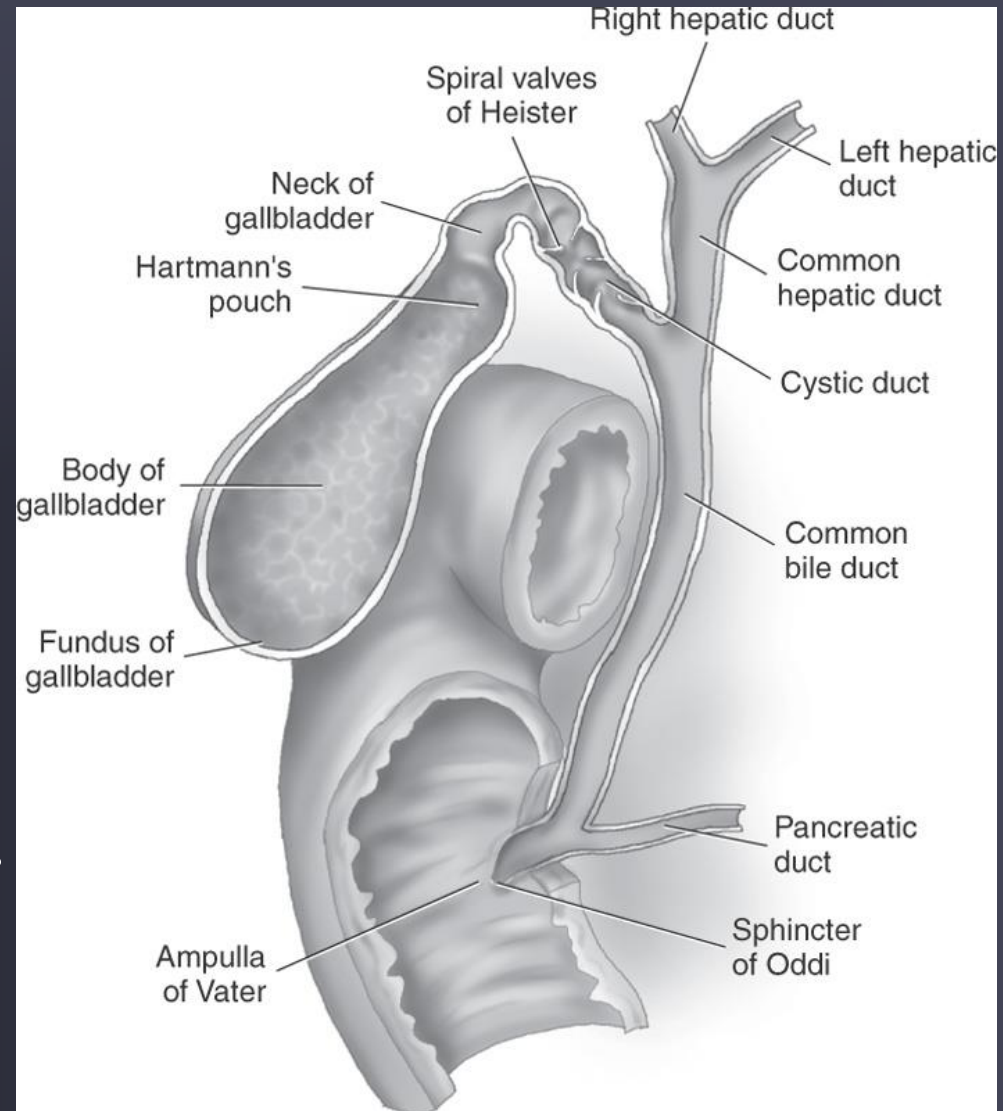
- Right And Left Hepatic Ducts in Liver Join To Form:
 - Common Hepatic Duct

- Cystic Duct from GB & Common Hepatic Duct Join To Form:
 - Common Bile Duct

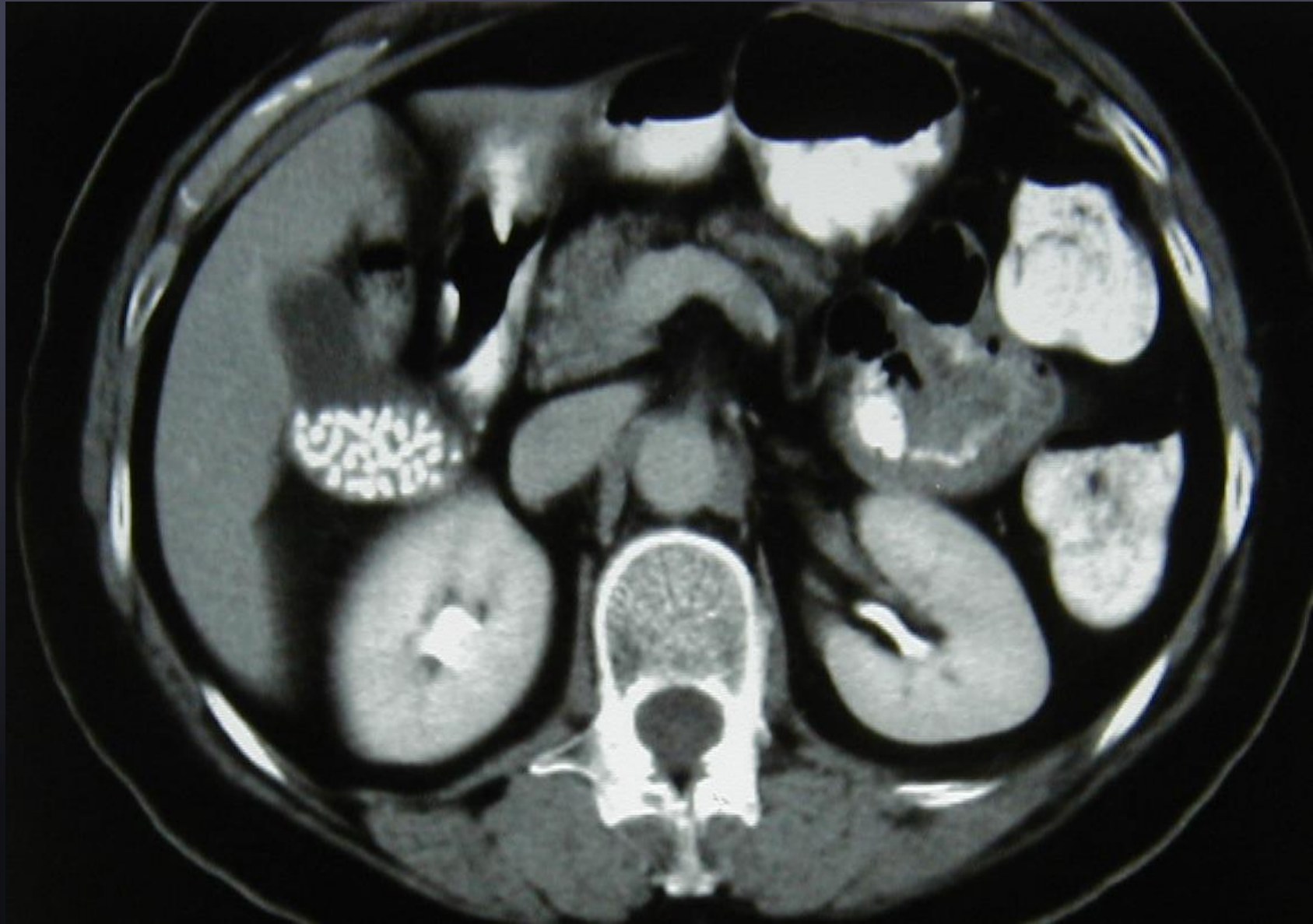


BILIARY SYSTEM

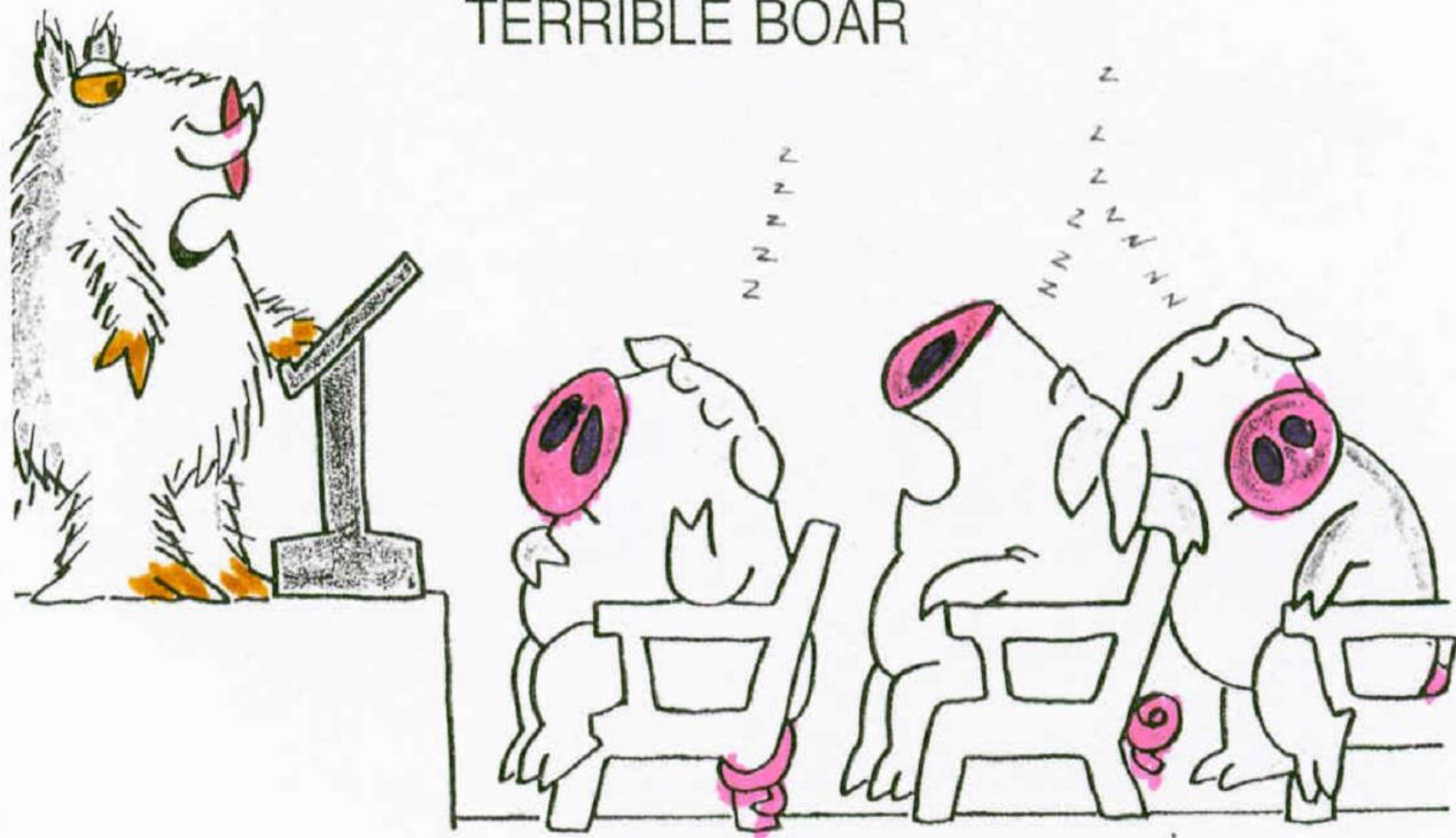
- **Common Bile Duct Empties At Duodenum**
- **Ampulla Of Vater**
- **Pancreatic Duct Also Empties Into Duodenum**
- **Both Pancreatic And Common Bile Duct Are Surrounded By Sphincter Of Oddi**



What is this??????????



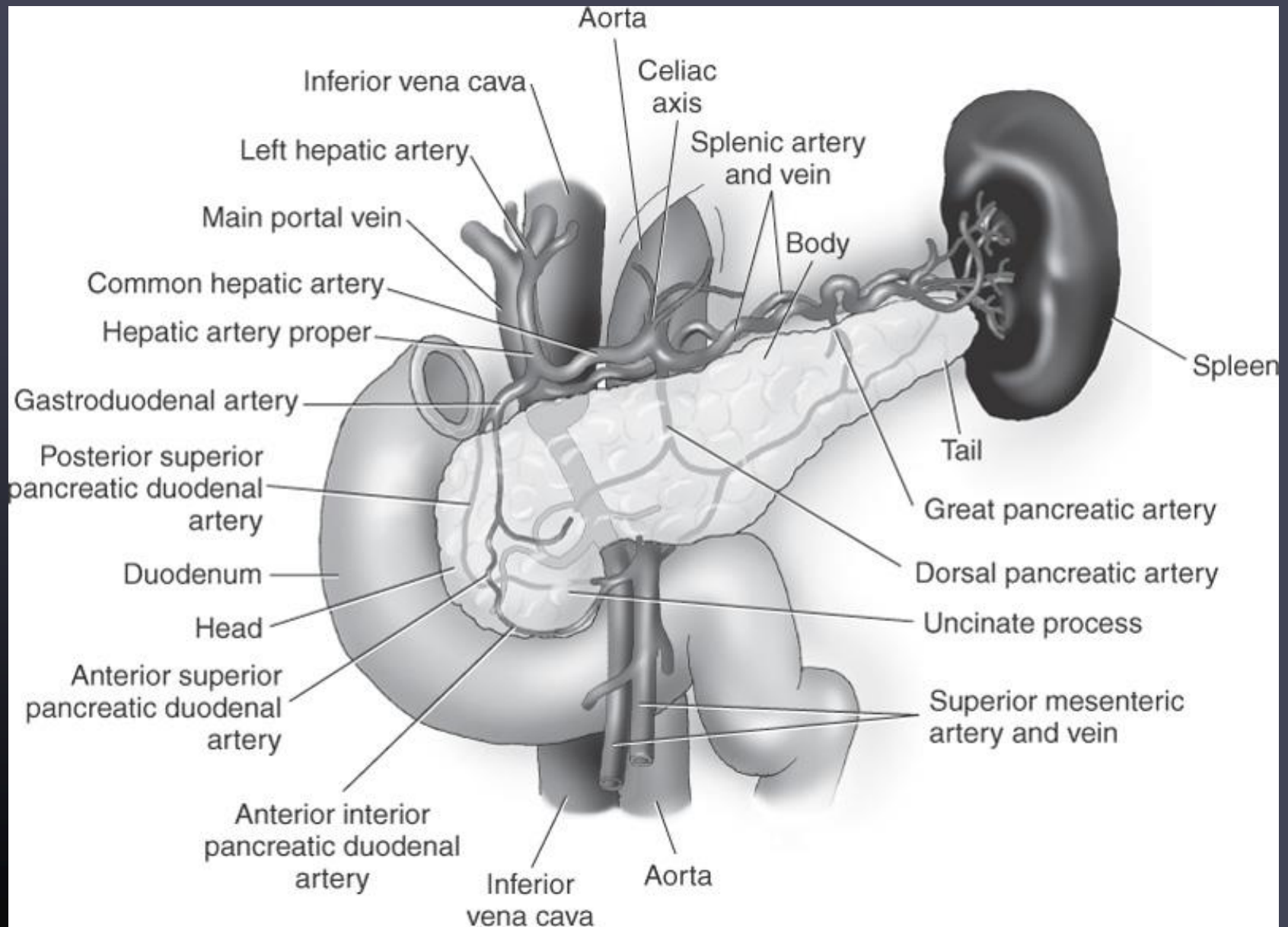
TERRIBLE BOAR



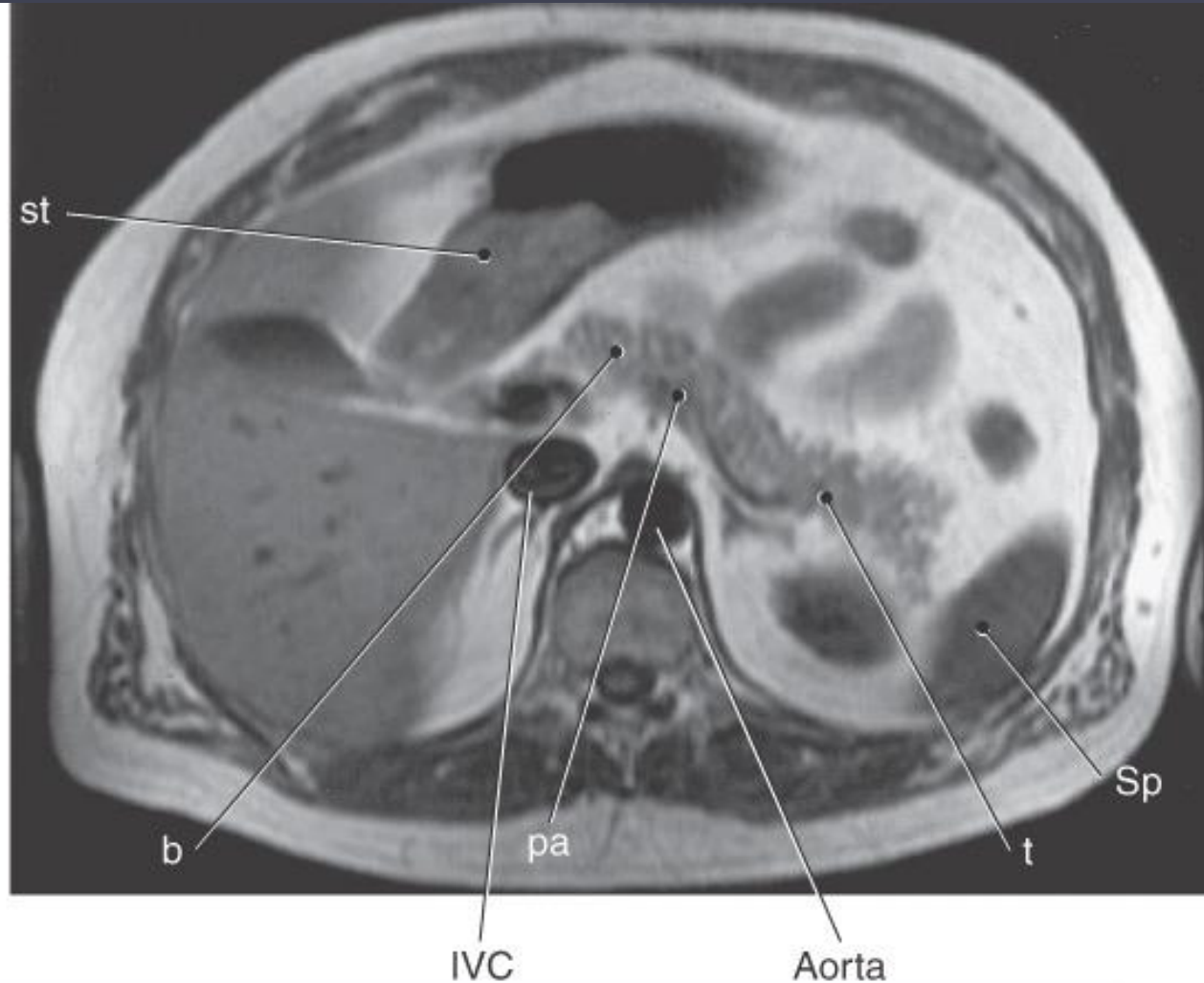
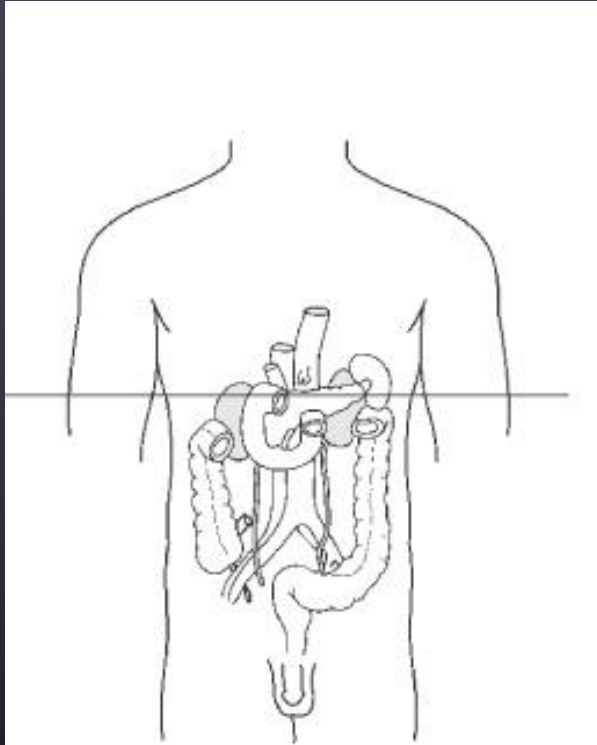
PANCREAS

- **Long And Narrow Retroperitoneal Organ**
- **Posterior to Stomach**
- **Extends Transversely from Spleen to Duodenum**
- **Head Is Inside The Duodenal Loop**
- **Tail Is Closer To Spleen and Superior to Head**

Pancreas

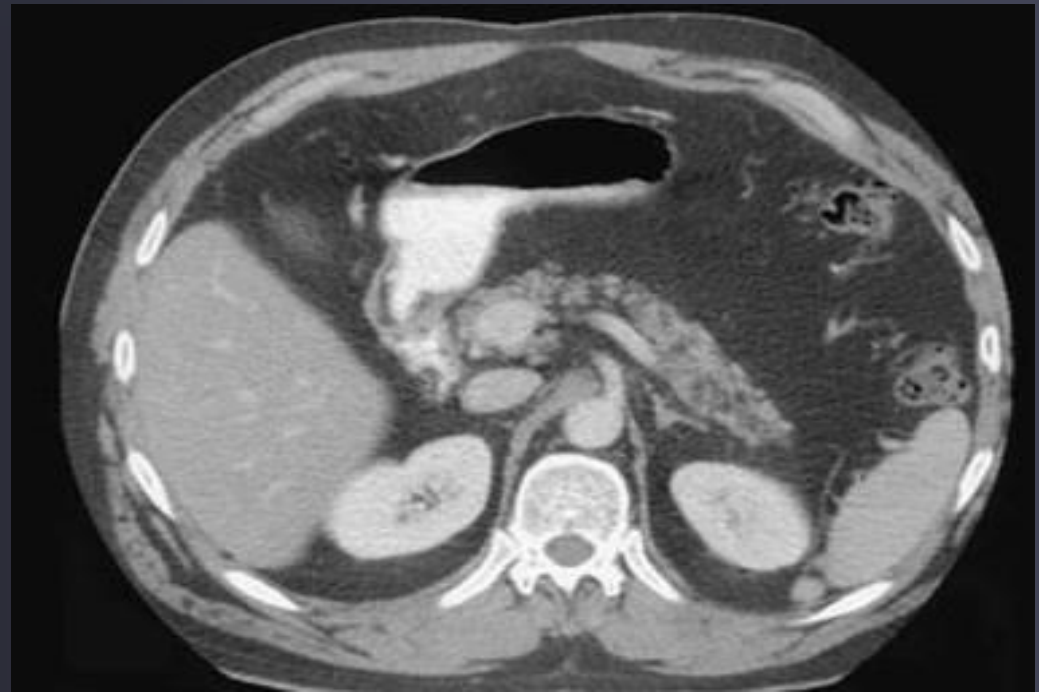


Pancreas



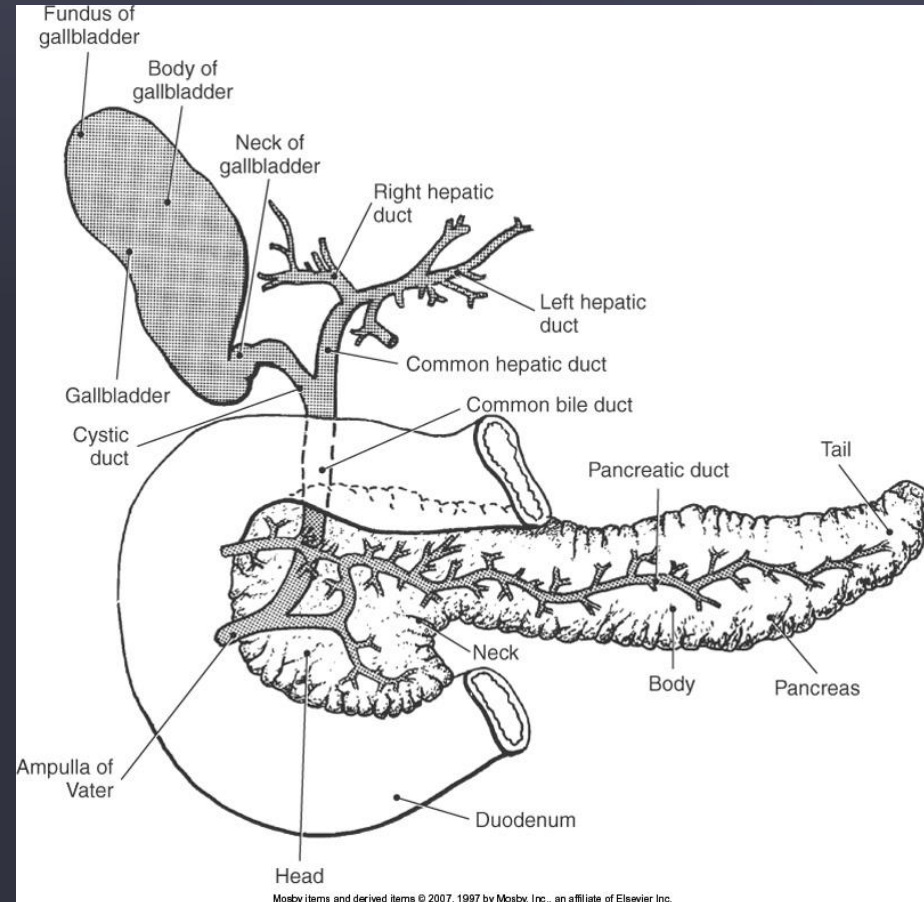
KEY: pa, pancreas; IVC, inferior vena cava; st, stomach; b, body of pancreas; t, tail of pancreas; Sp, spleen.

2 CT Views of Pancreas



PANCREAS

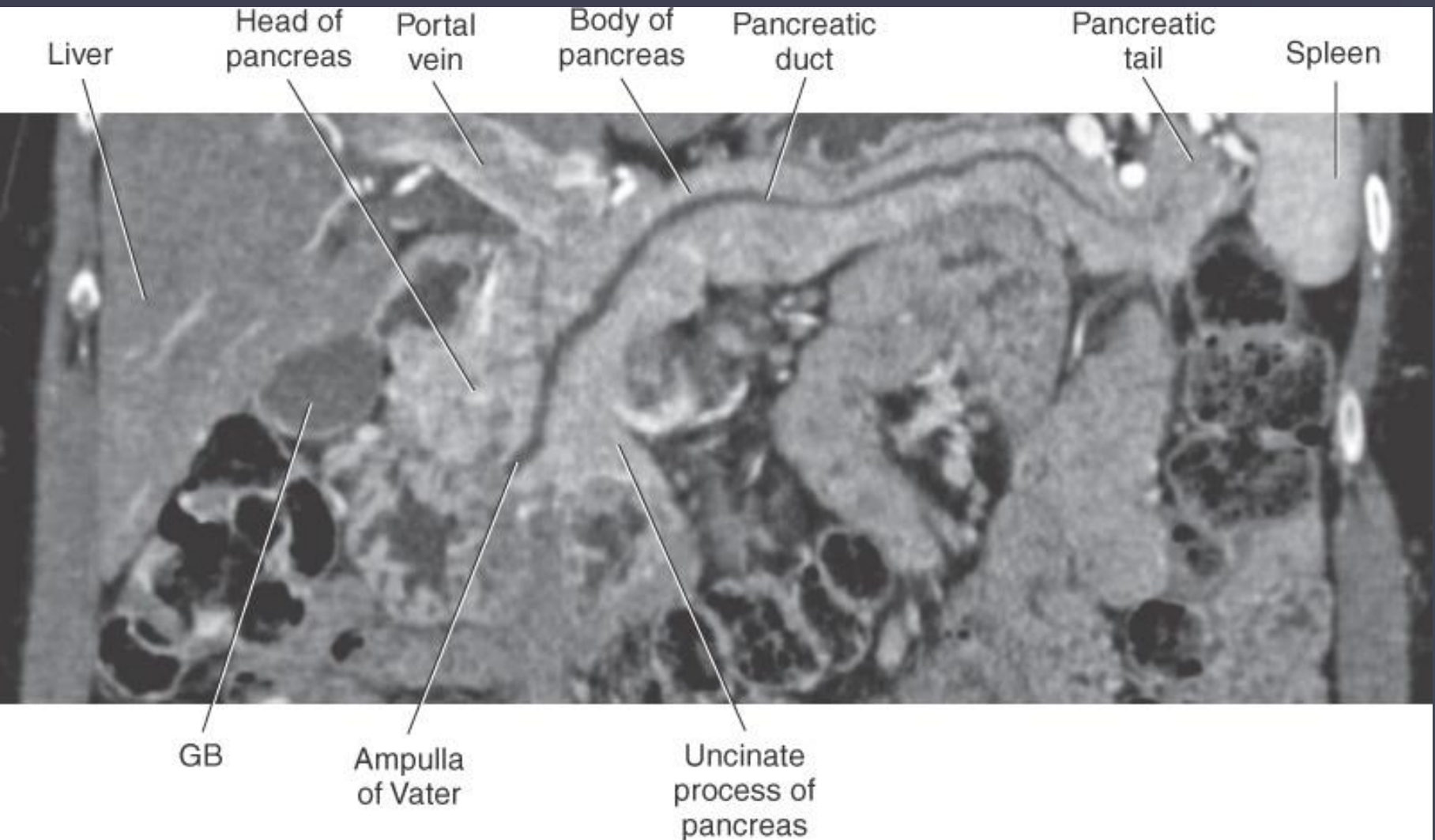
- **Has A Duct - Main Pancreatic Duct Or Duct Of Wirsung**
- **Empties Into Duodenum**
- **Both Endocrine And Exocrine Bland**
- **Produces Insulin, Glucagon And Digestive Enzymes**



PANCREATIC VESSELS

- **Pancreatic Duct Empties Into Duodenum at the Ampulla Of Vater**
- **Celiac And Superior Mesenteric Artery Supply Blood To Pancreas**
- **Superior Mesenteric and/or Splenic Veins drain the Pancreas**

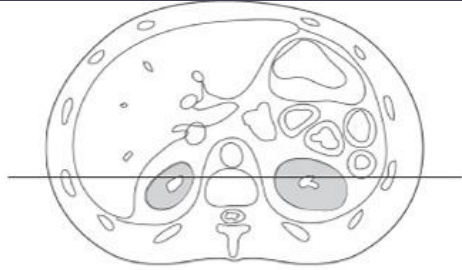
Pancreas



SPLEEN

- **Spleen is Located:**
 - In left upper quadrant
 - Posterior to the stomach
 - Protected by the 9-11 ribs
- **Highly Vascular Spongy Organ**
 - Red pulp contains large amounts of blood
 - White pulp contains lymphoid tissue and white blood cells
- **Produces white blood cells, filters abnormal red blood cells and initiates the immune system**
- **Largest Lymph Organ**
- **Blood supplied via the Splenic Artery**
- **Blood drained via the Splenic Vein**

Spleen



Gerota's
fascia

Perirenal
fat

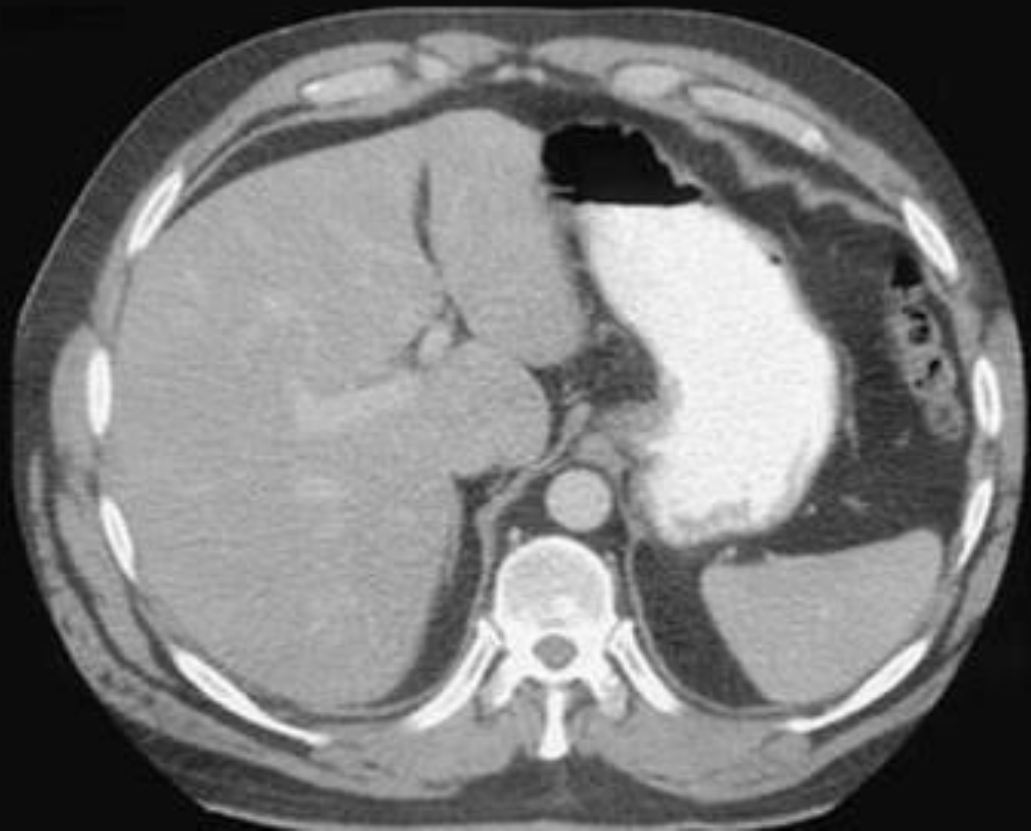
cr

li

Rad

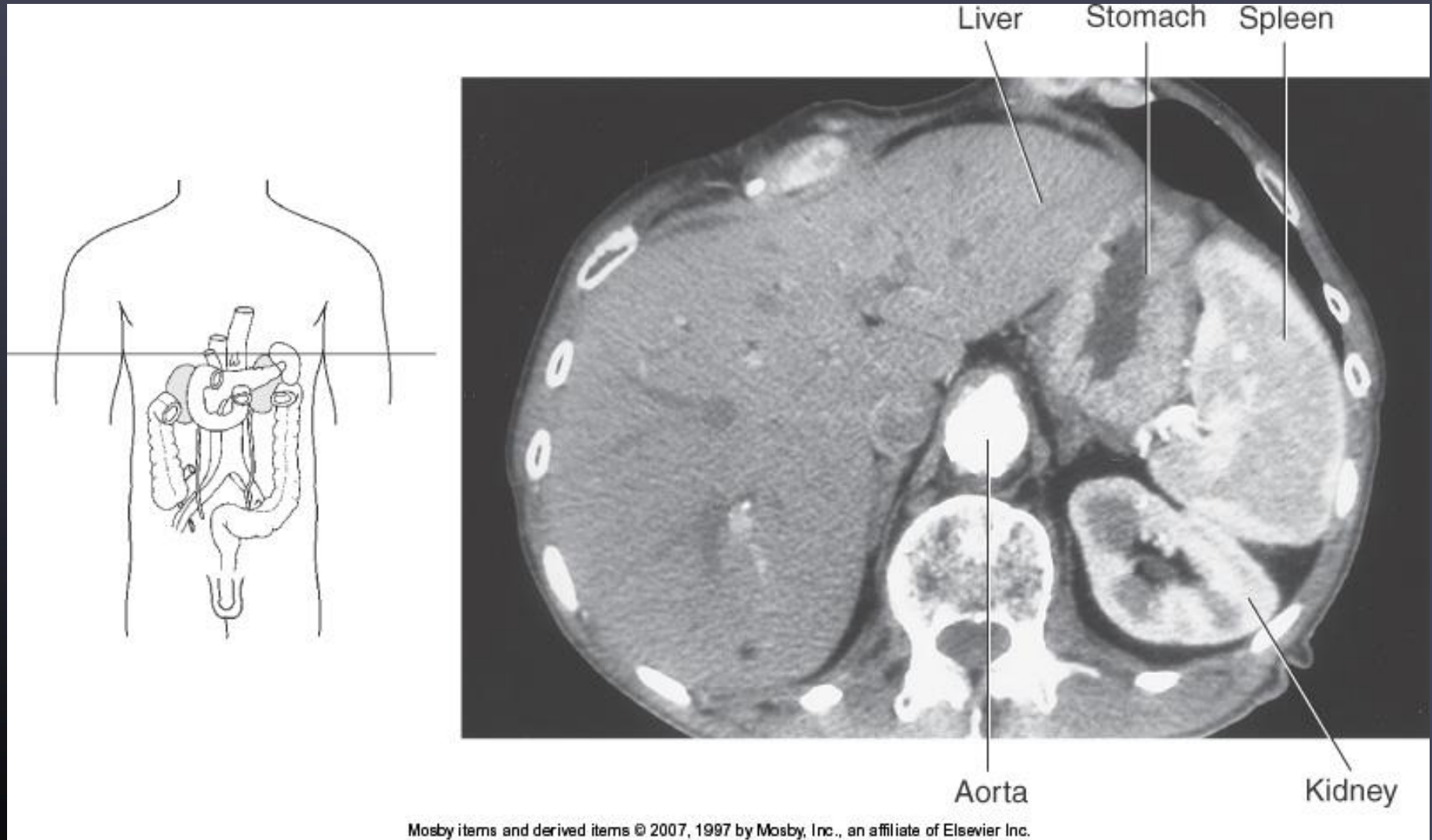
k

Lad



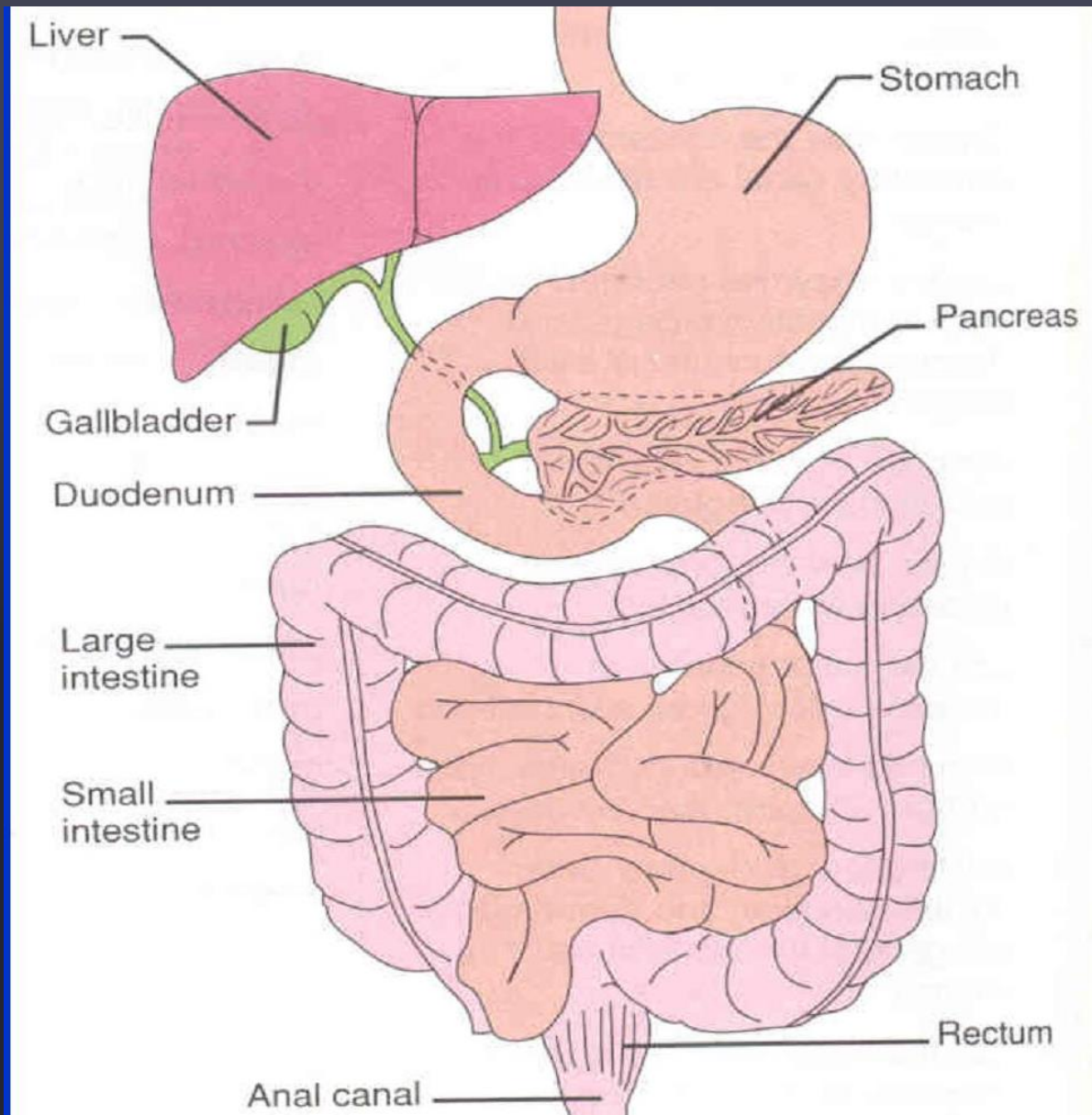
KEY: cr, Crus; li, liver; Rad, right adrenal gland; k, kidney; Lad, left adrenal gland.

Spleen



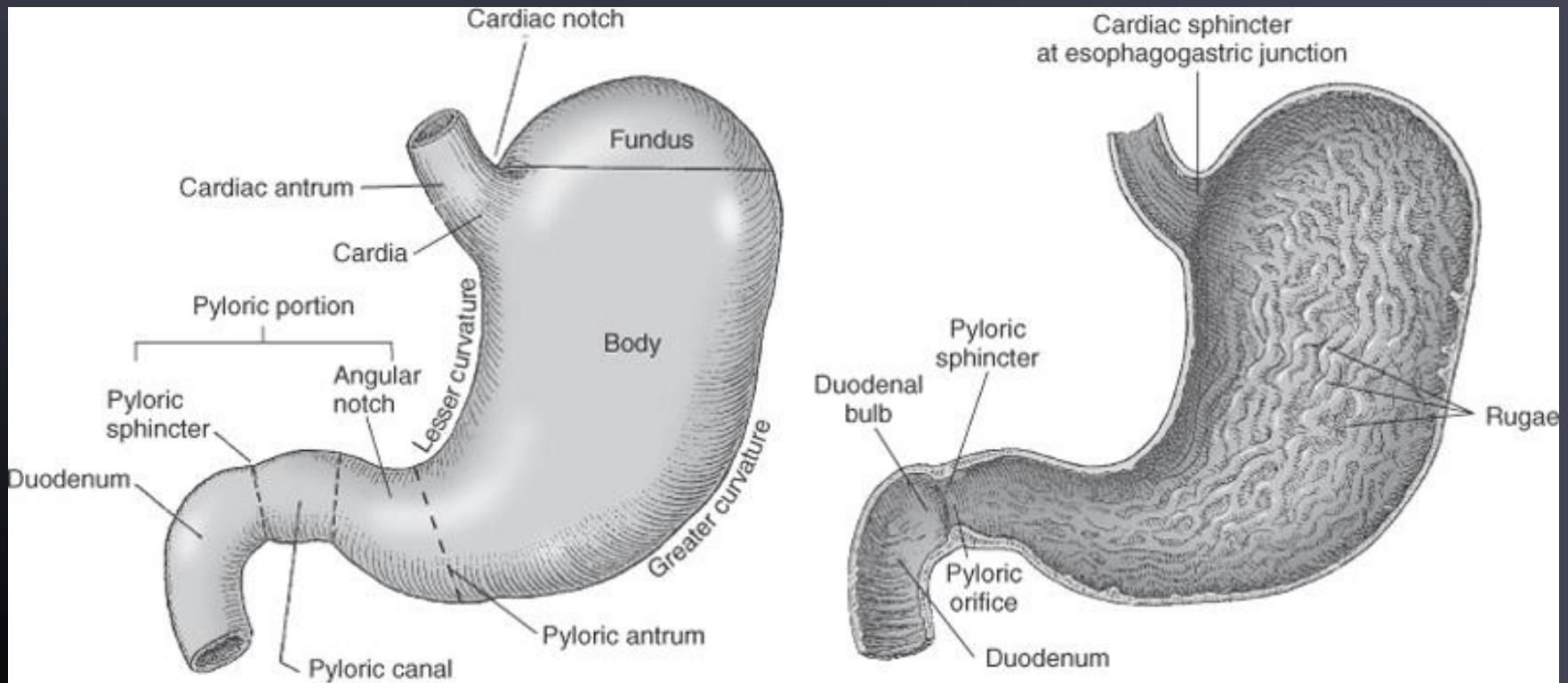
Digestive System

- Stomach
- Small Intestines
- Large Intestines

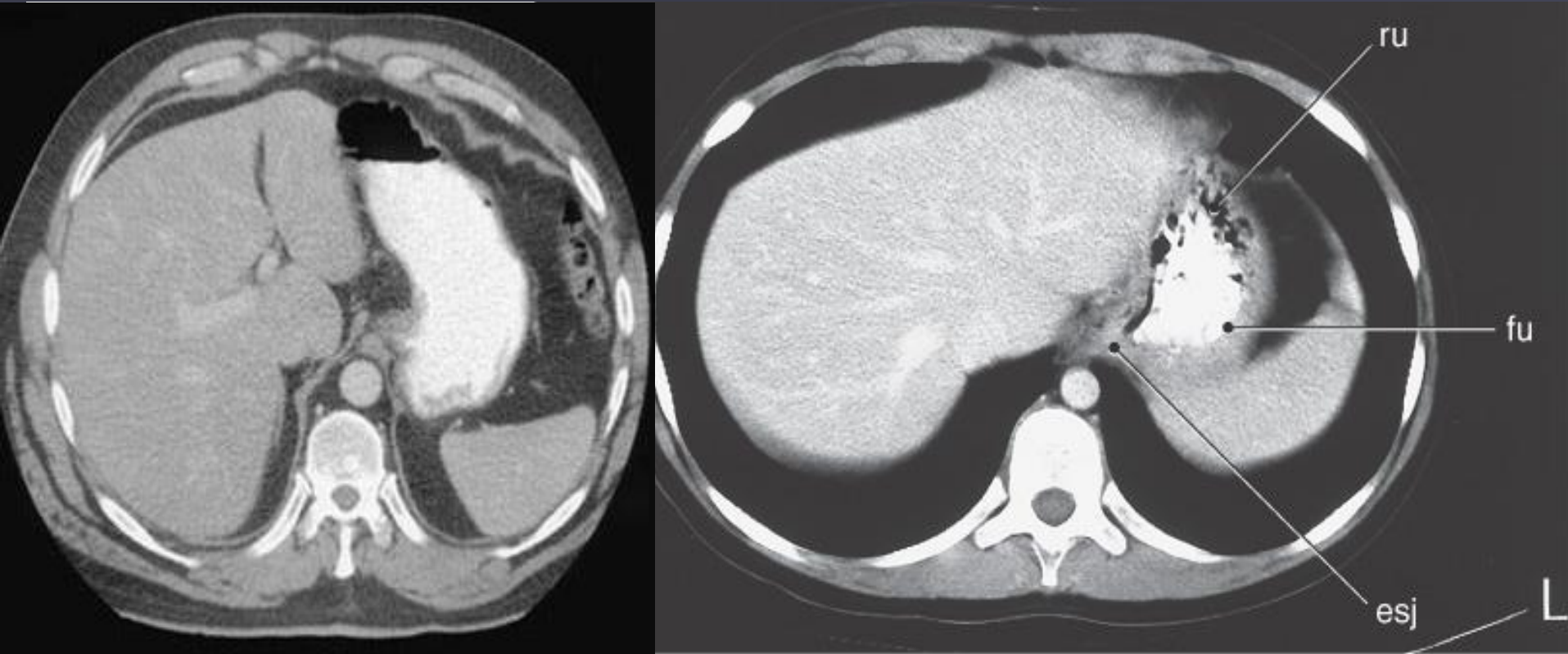


STOMACH

- Left Upper quadrant of abdomen
- Cardiac Sphincter – entry
- Pyloric Sphincter -- exit



Stomach with Barium and Air



KEY: ru, Rugae; fu, fundus of stomach; esj, esophagogastric junction.

SMALL INTESTINE

■ Duodenum

- 1st part of Small Intestines –about 12 inches
- Mostly retroperitoneal
- Forms a C Loop that holds head of pancreas

■ Jejunum

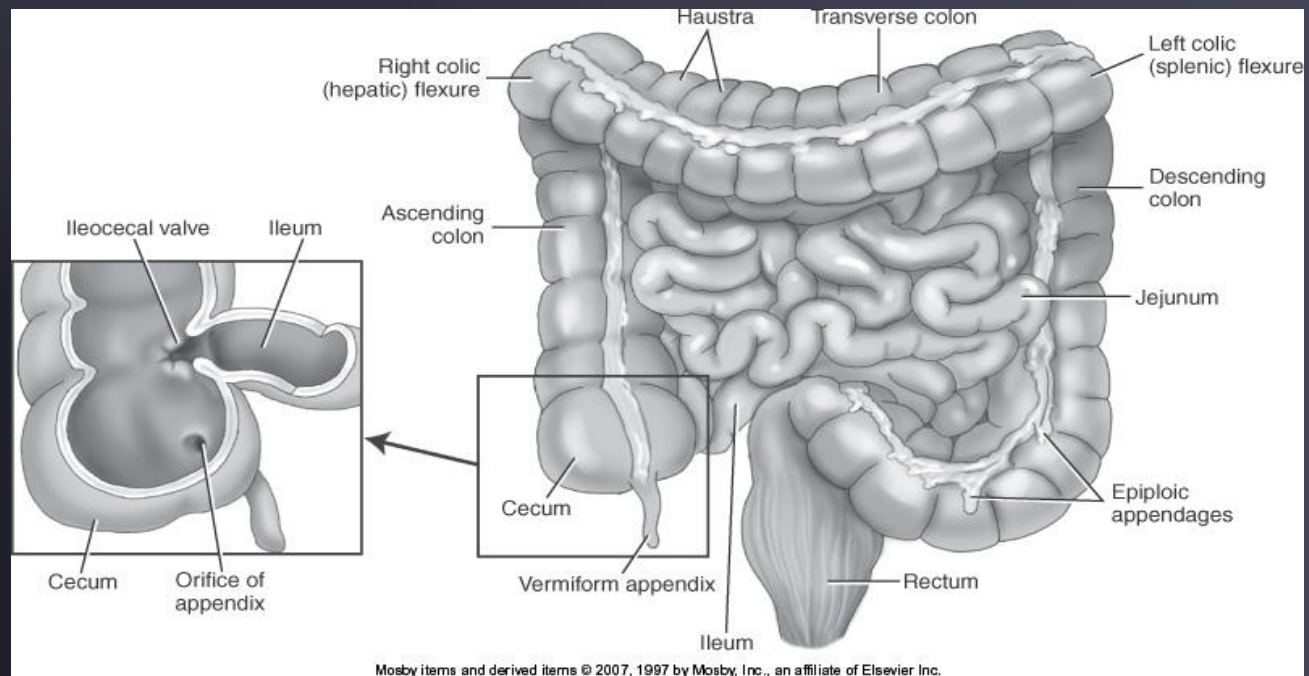
- 2nd part of Small Bowel – about 2.5 meters
- Has a feathery appearance

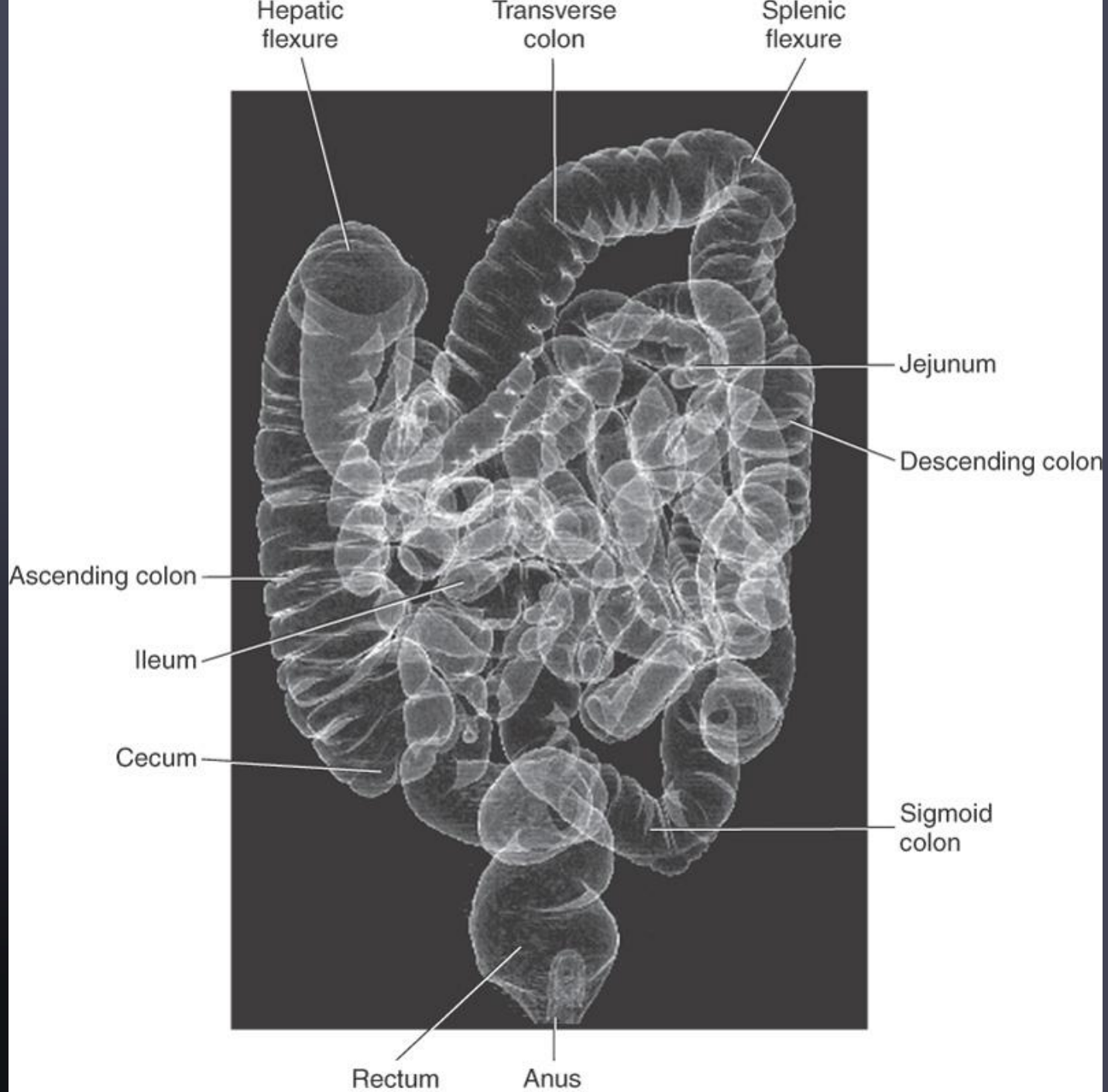
■ Ileum

- Last part of Small Bowel – longest at 3.5 meters
- Terminates at Ileocecal Valve
- Located mostly in Right lower Quadrant

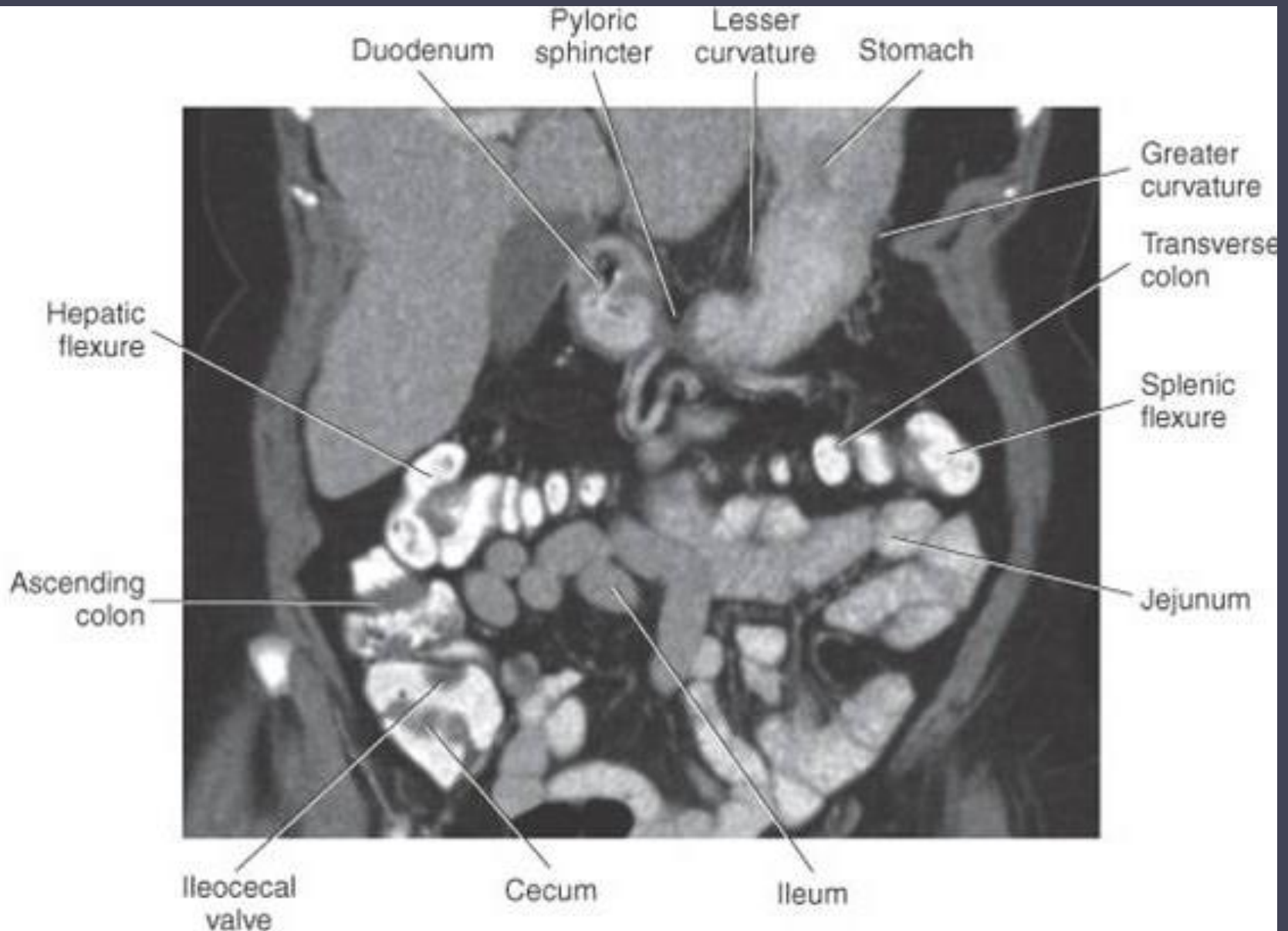
LARGE INTESTINE

- **Haustra**
 - **Folds**
- **Cecum**
 - **Pouch**
- **Vermiform Appendix**
- **Ascending**
- **Transverse**
- **Decending**
- **Sigmoid**





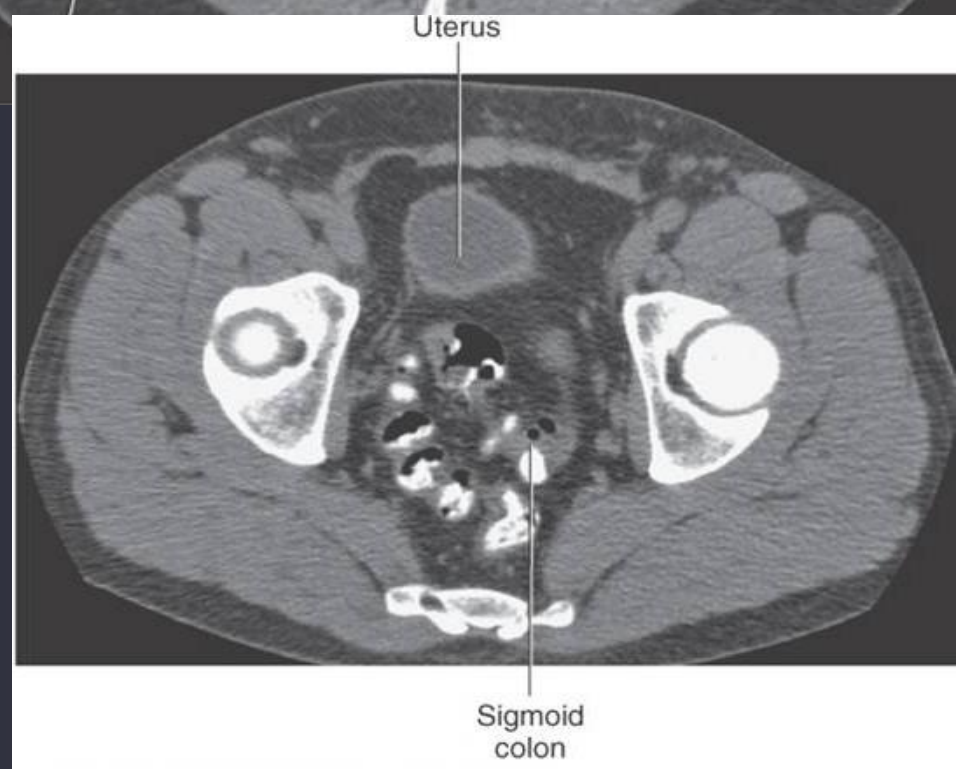
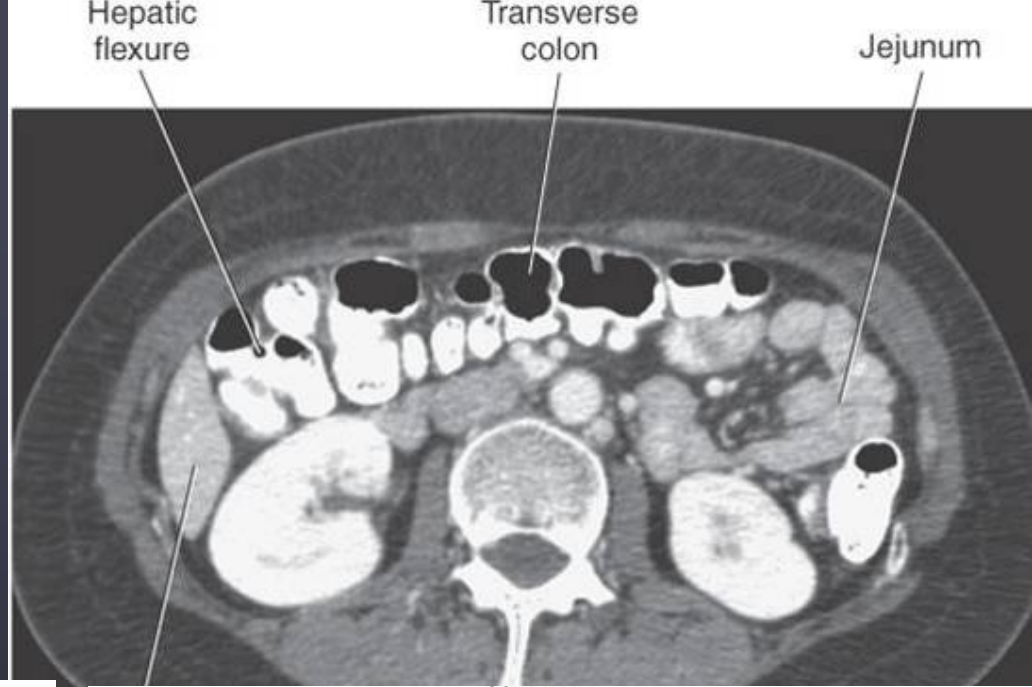
Larger and Small Intestines



Small Intestines



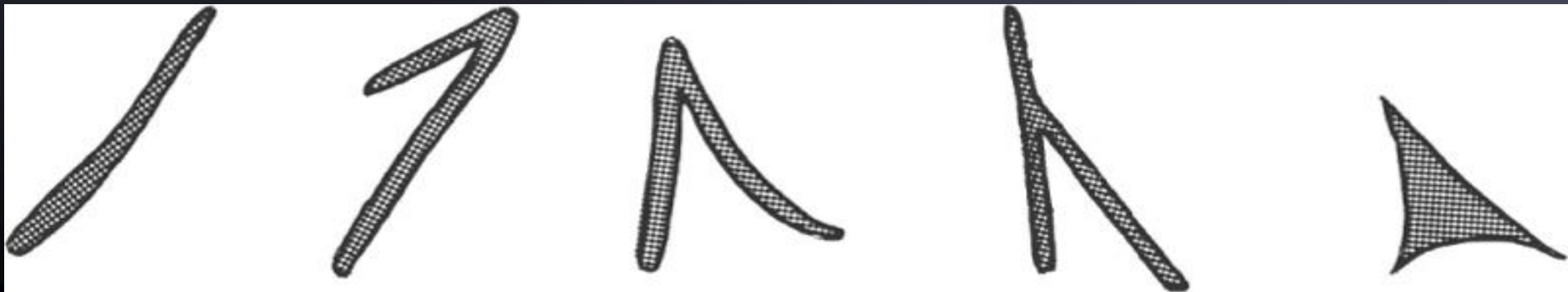
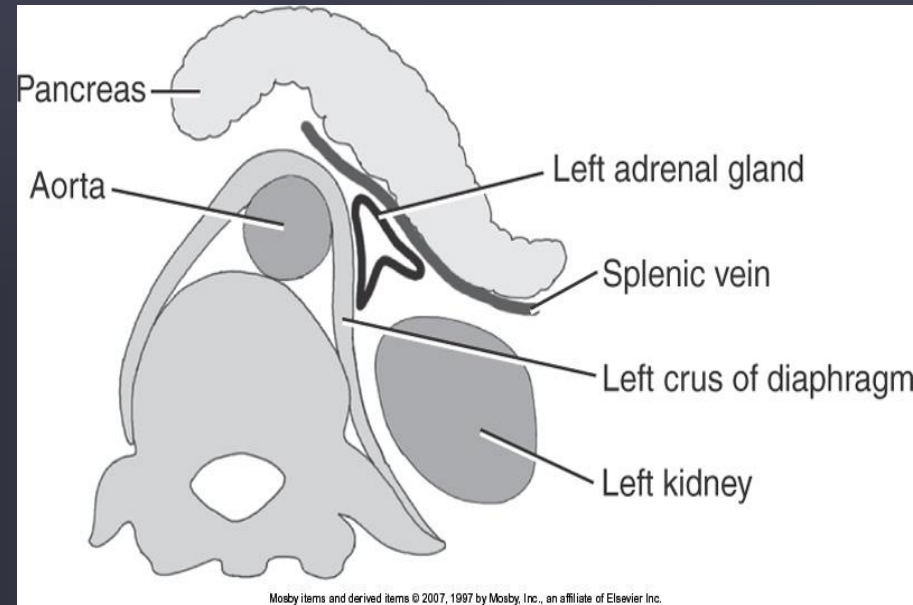
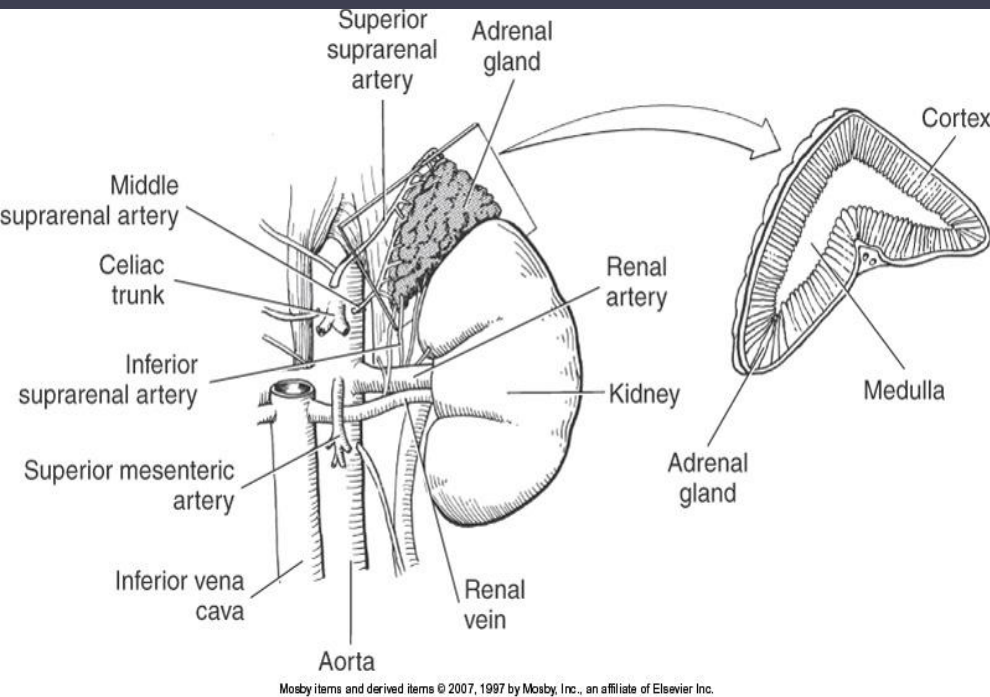
Larger Bowel



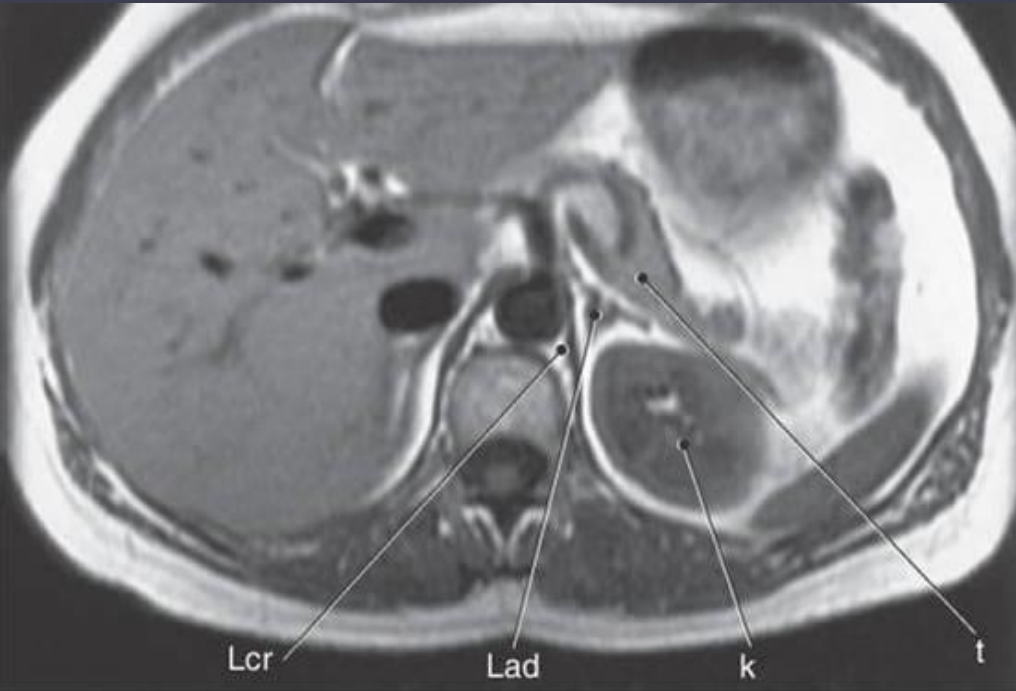
ADRENAL GLANDS

- **Pyramid Shaped**
- **Above The Kidneys**
- **Appears As V Or Y In Cross Section**
- **Produces Steroids: Corticosteroids that help regulate many body functions**
- **Produces Hormones: Epinephrine And Nor-epinephrine**

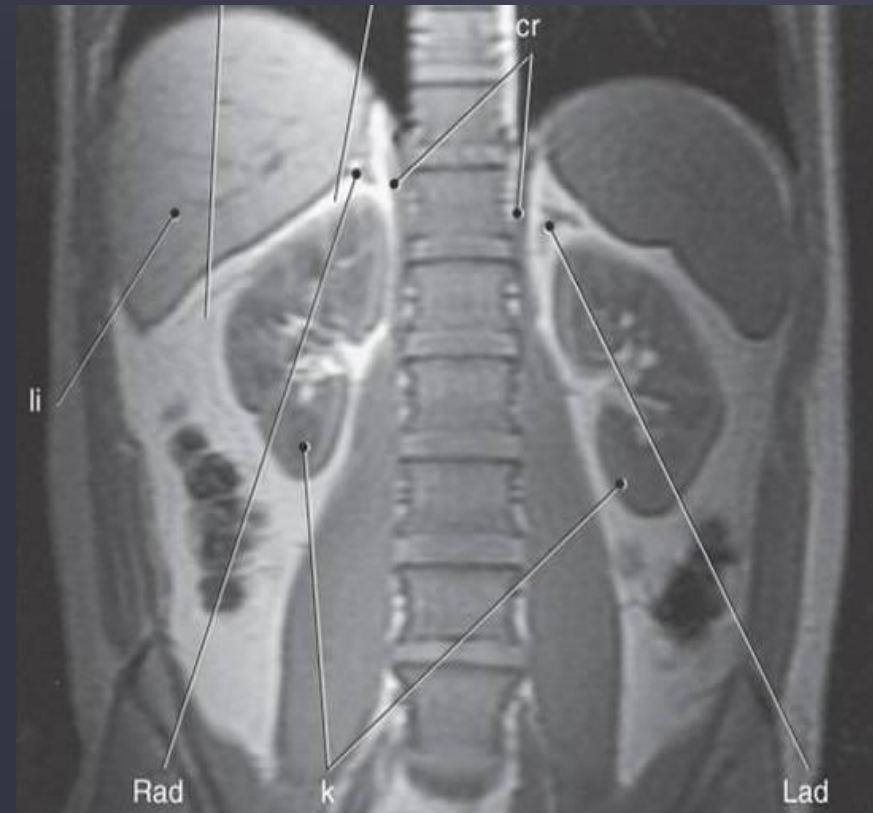
Adrenal Glands



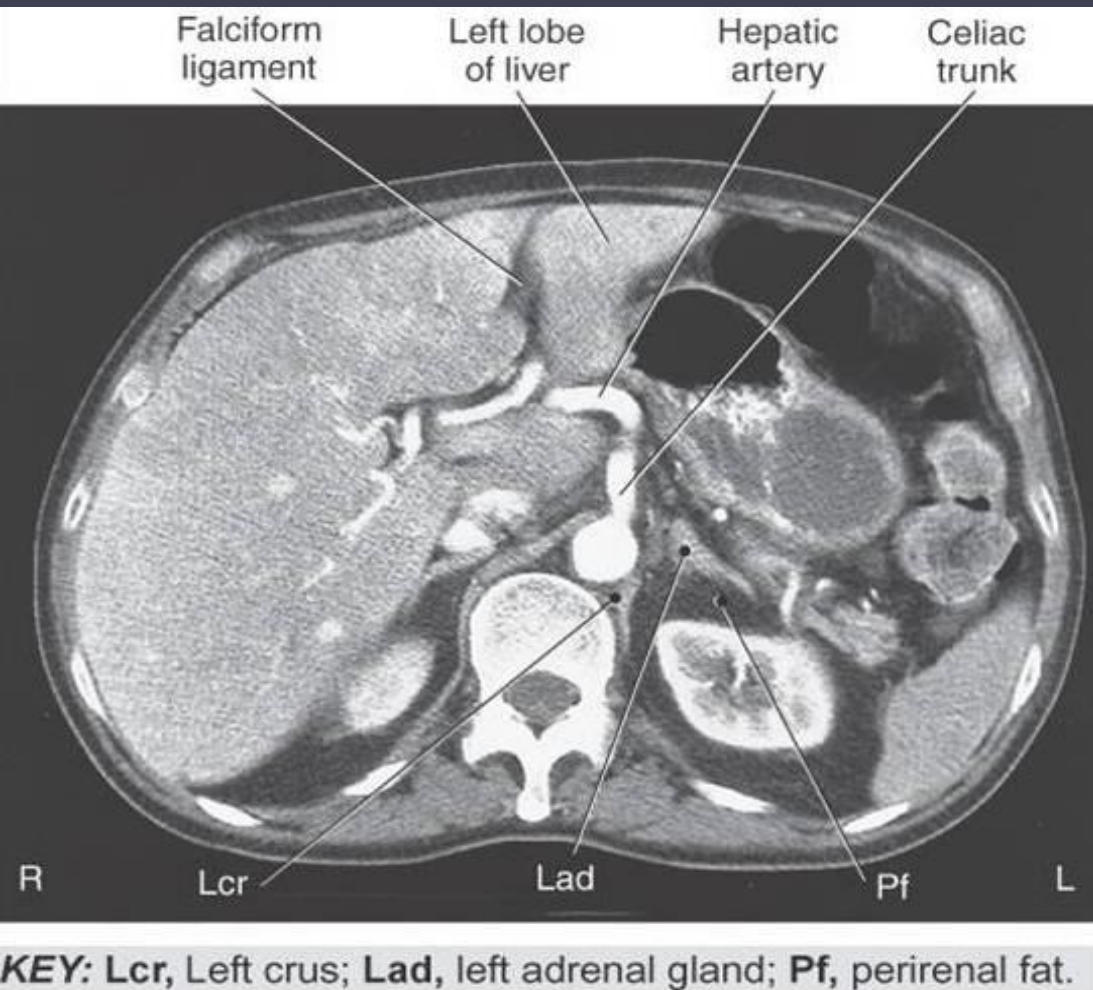
Adrenal Glands



KEY: Lcr, Left crus; Lad, left adrenal gland; k, kidney; t, tail of pancreas.



Adrenal Glands



Right

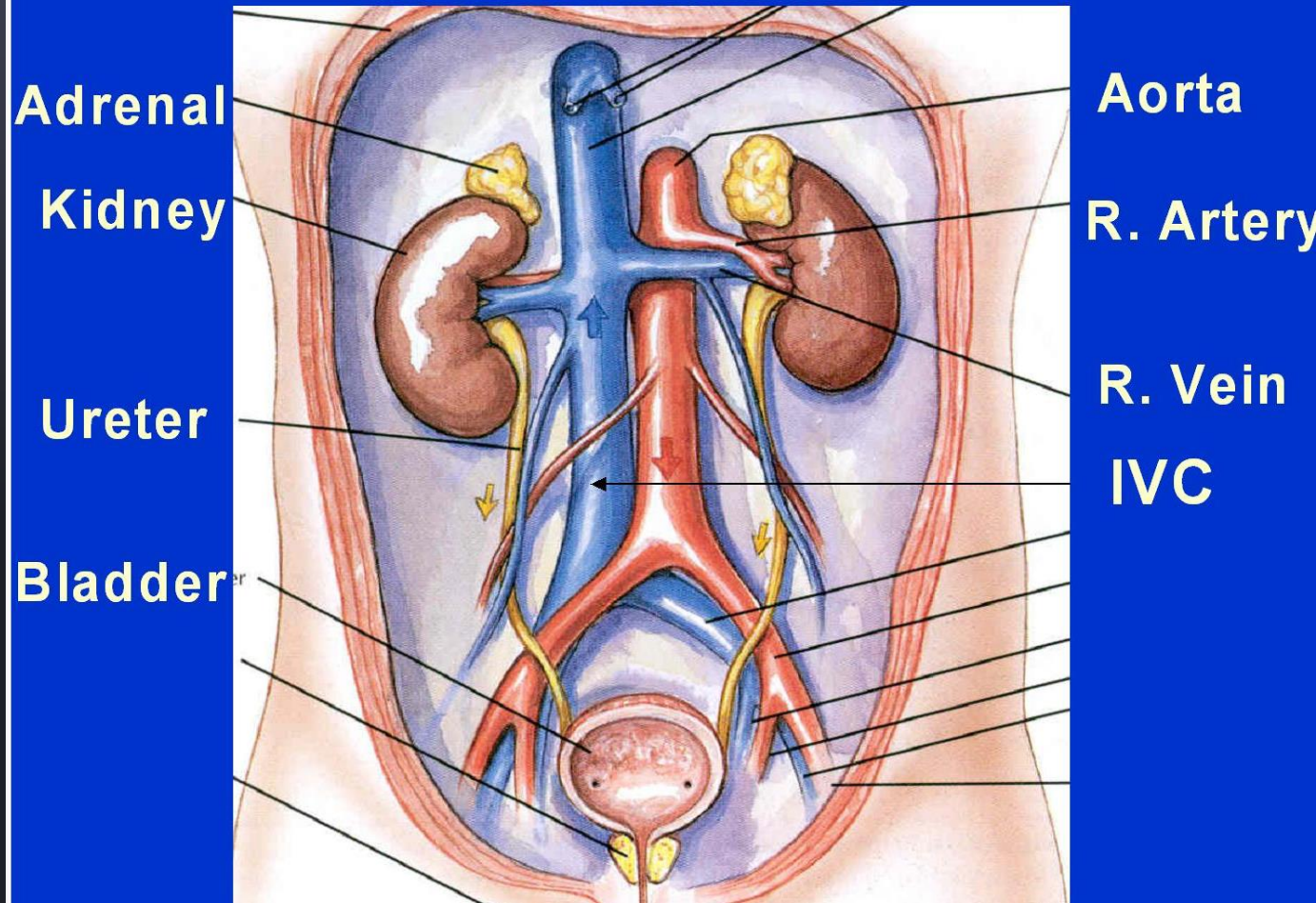
Left



URINARY SYSTEM

- Kidneys
- Ureters
- Bladder
- Urethra

Urinary System and IVC



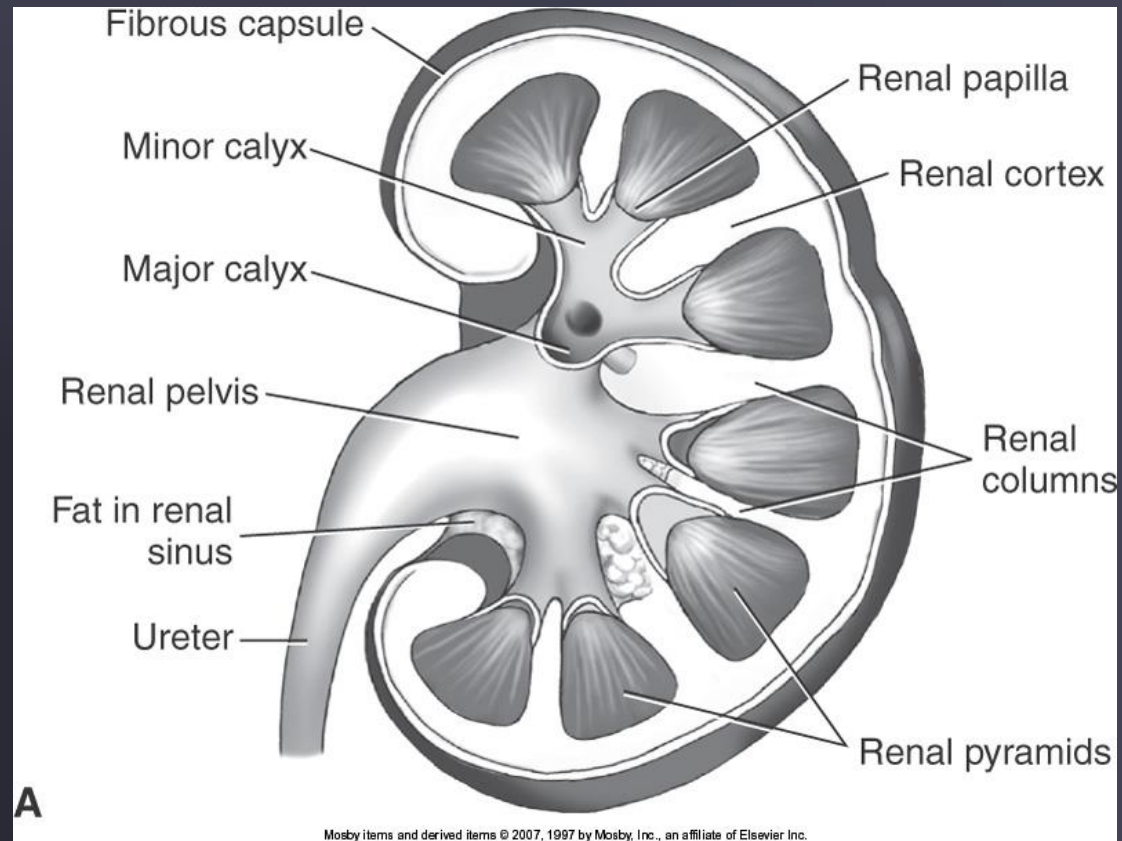
KIDNEYS

- **Bean Shaped**
- **Along each side of the spine between T-12 and L-4**
- **Upper Pole more Medial and Posterior**
- **Surrounded by Perirenal Fat**

- **Two Parts:**
 - **Cortex –outer surface with extensions between the renal pyramids**
 - contains the functional unit the Nephron
 - **Medulla – contains the renal pyramids**
 - Medulla Has Loops Of Henle and collecting tubules

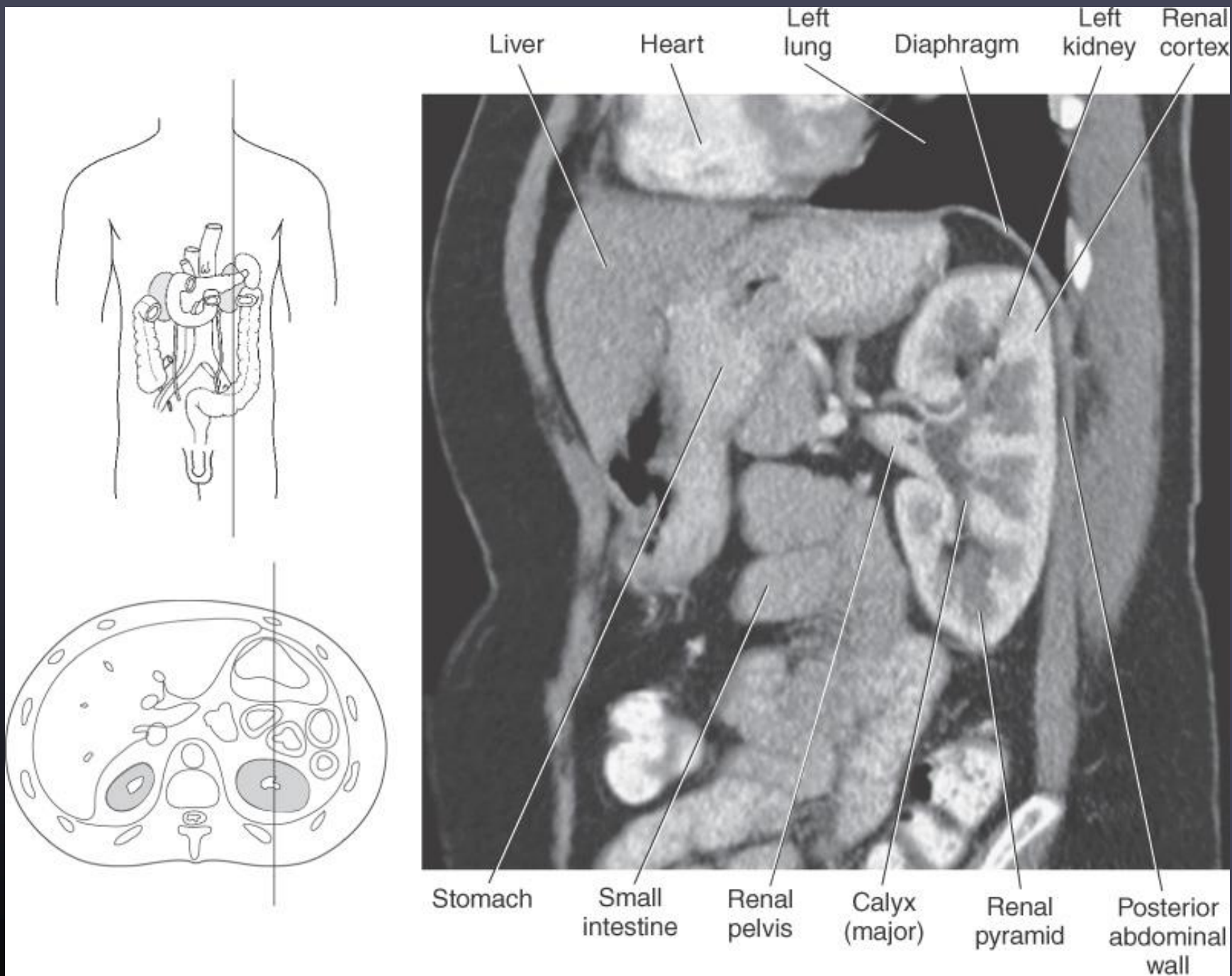
Collecting System of Kidney

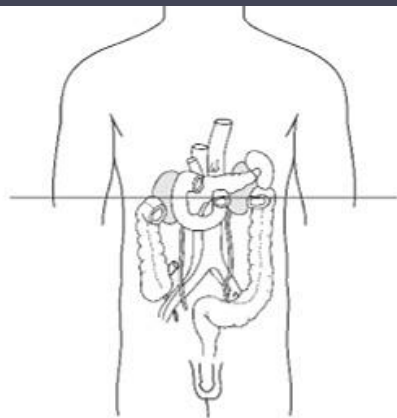
- Medulla Has Tubules
- From Medulla Arise Minor Calyces
- Minor Goes Into Major Calyces
- Goes Into Renal Pelvis



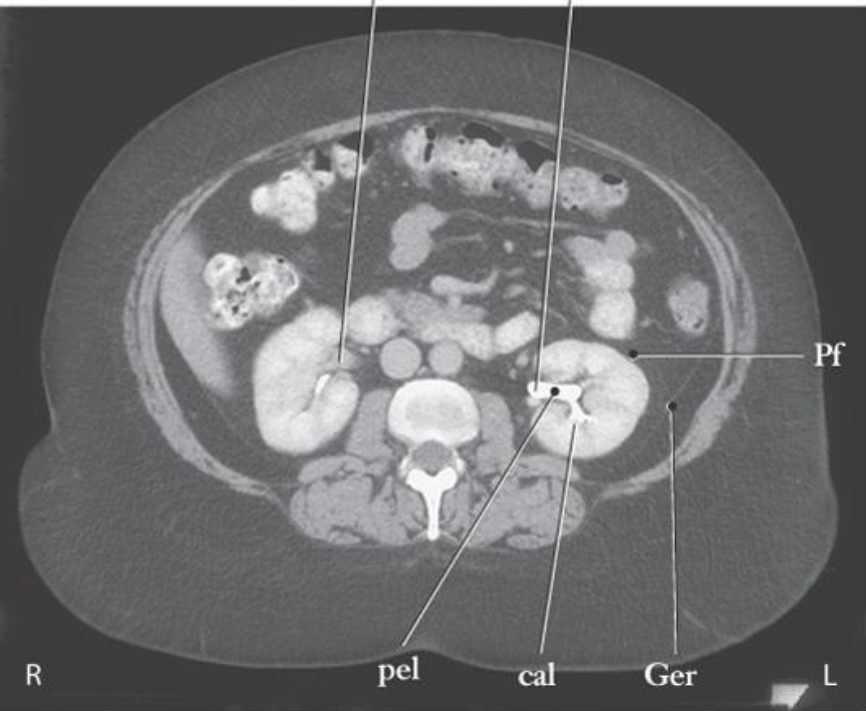
Parts of Urinary System

- **Renal (Gerota's) Fascia**
 - To anchor, protect , and serve as a barrier for kidneys
- **Hilum**
 - Medial surface of kidney for entry and exit of vessels
- **Ureters**
 - 2 Tubes for transport of urine to bladder
 - Located anterior and medial to psoas muscle
 - Enter posterior wall of bladder
- **Bladder and Urethra found in Pelvis**

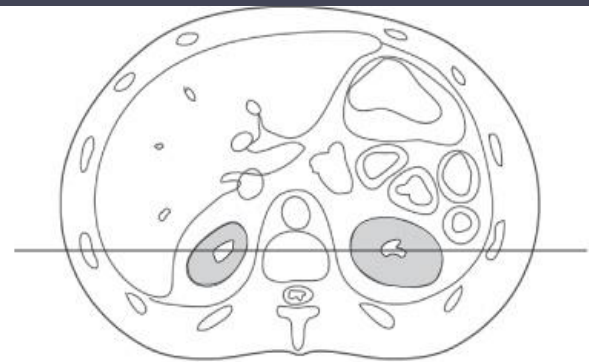




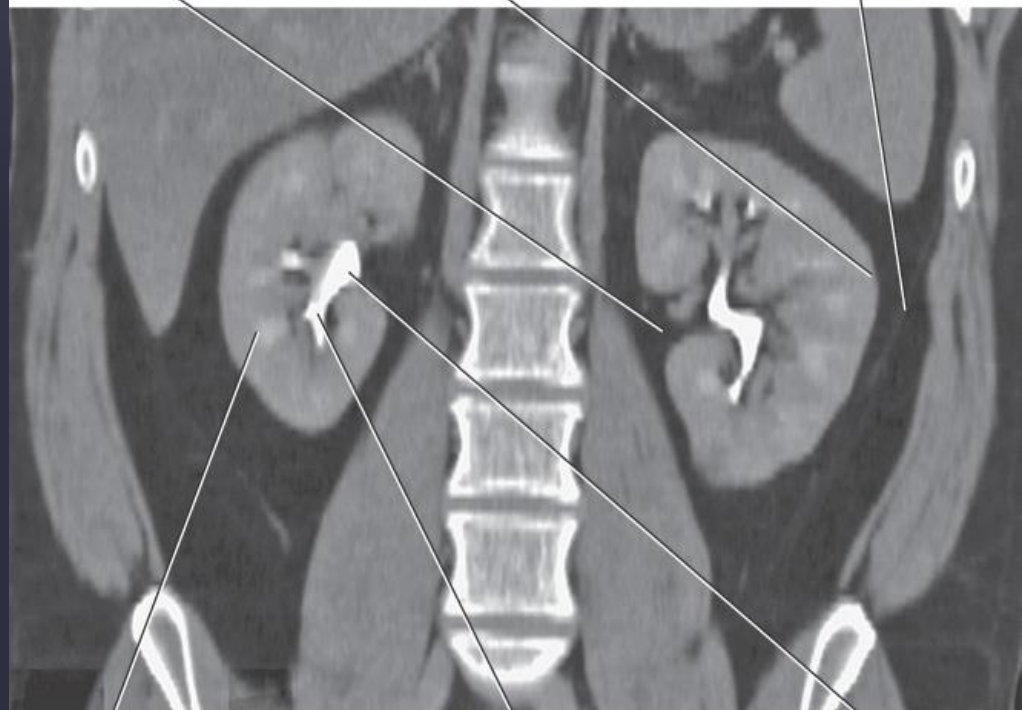
Renal hilum Left ureter



KEY: Pf, perirenal fat; **pel**, renal pelvis; **cal**, calyx; **Ger**, Gerota's fascia.



Hilum of kidney Renal cortex Gerota's fascia

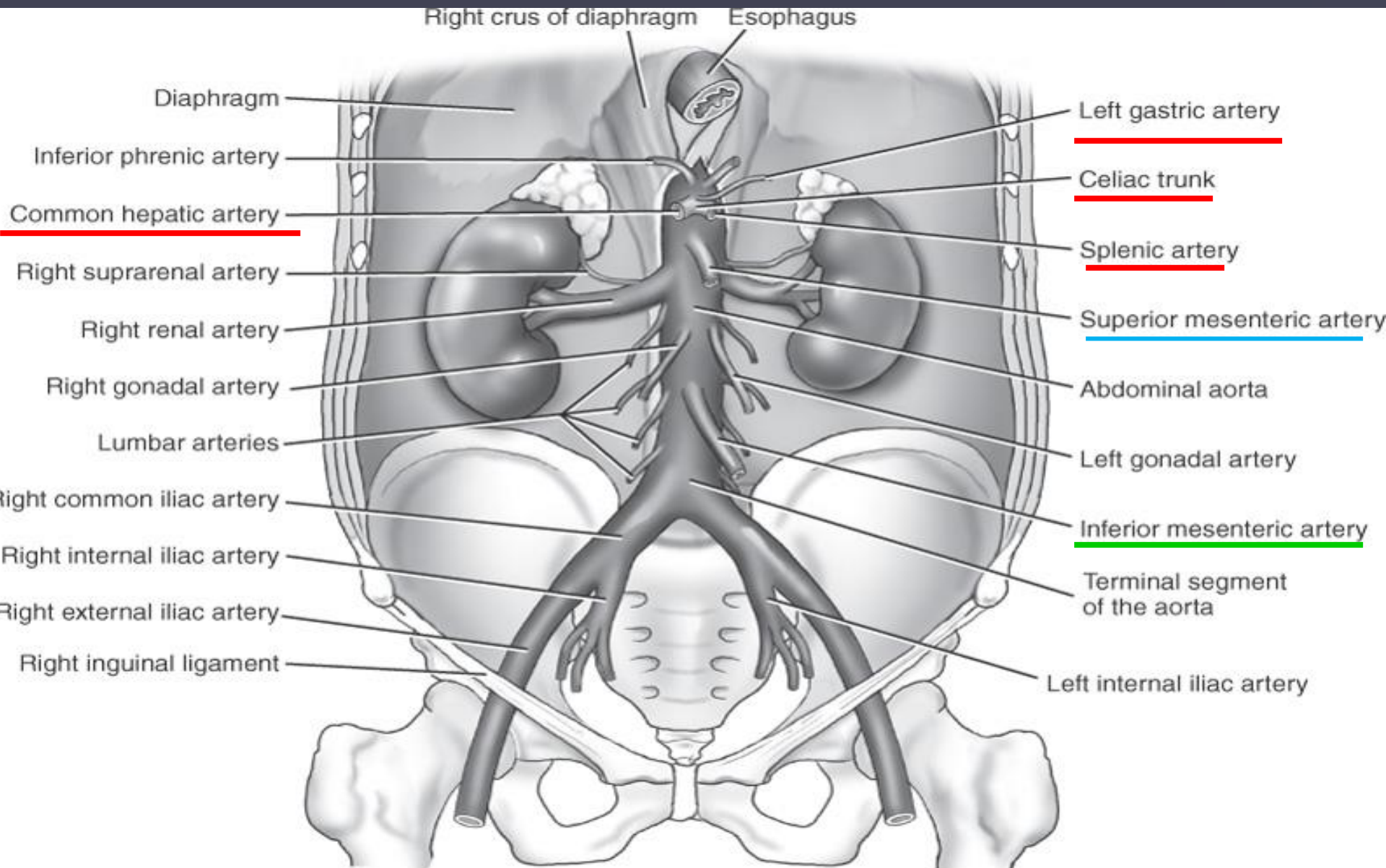


Renal pyramid Calyx Renal pelvis

ABDOMINAL AORTA

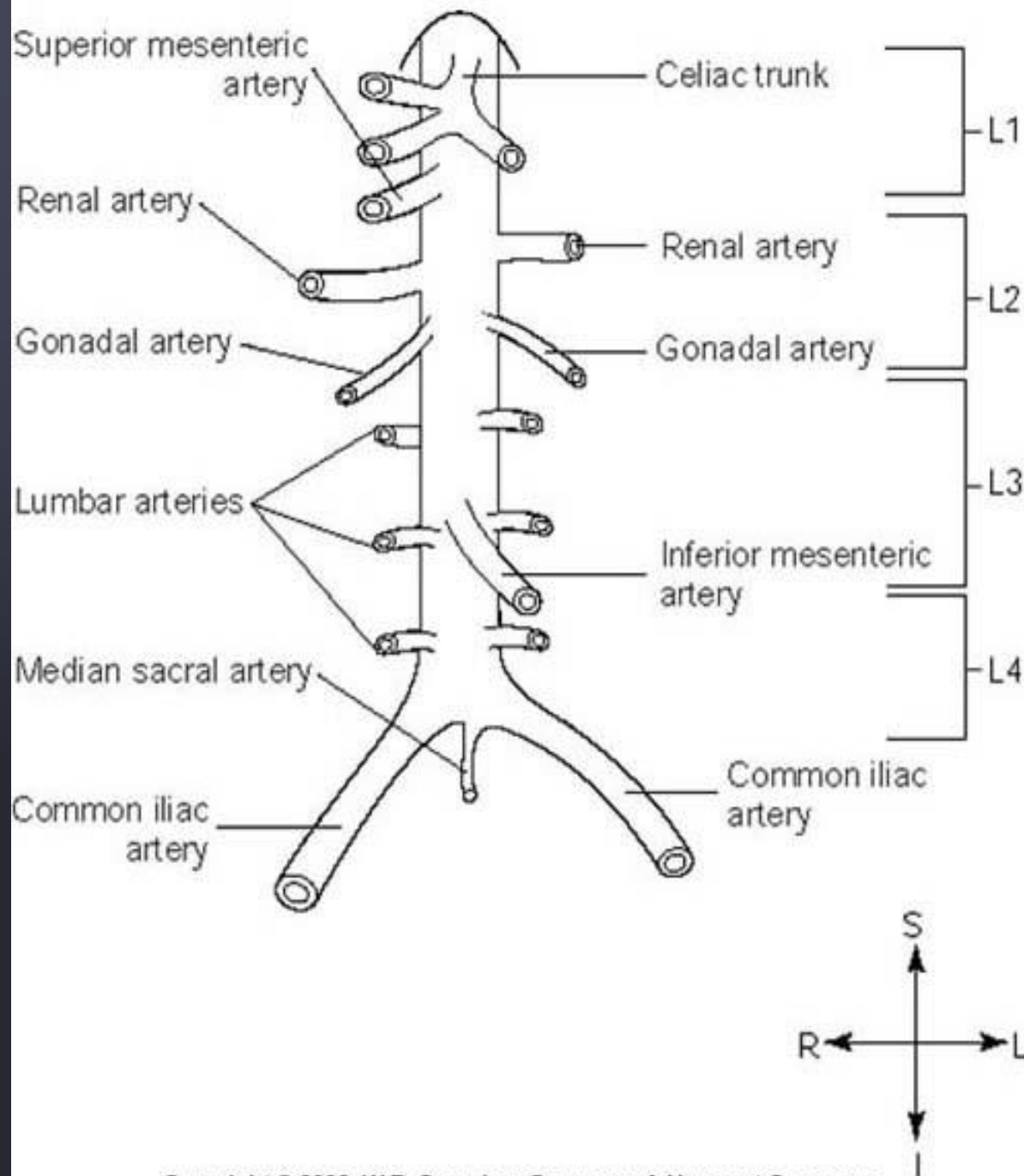
- **Retroperitoneal**
- **Anterior to and Slightly Left of Vertebral Bodies**
- **Bifurcates at L-4**
- **Becomes Common Iliac Arteries**
- **Paired Branches**
- **Unpaired Branches**

Aorta And Branches



Arteries

- **Celiac Trunk**
 - Lt. Gastric
 - Hepatic
 - Splenic
- **SMA**
- **Renals**
- **Gonadals**
- **IMA**
- **Iliacs**

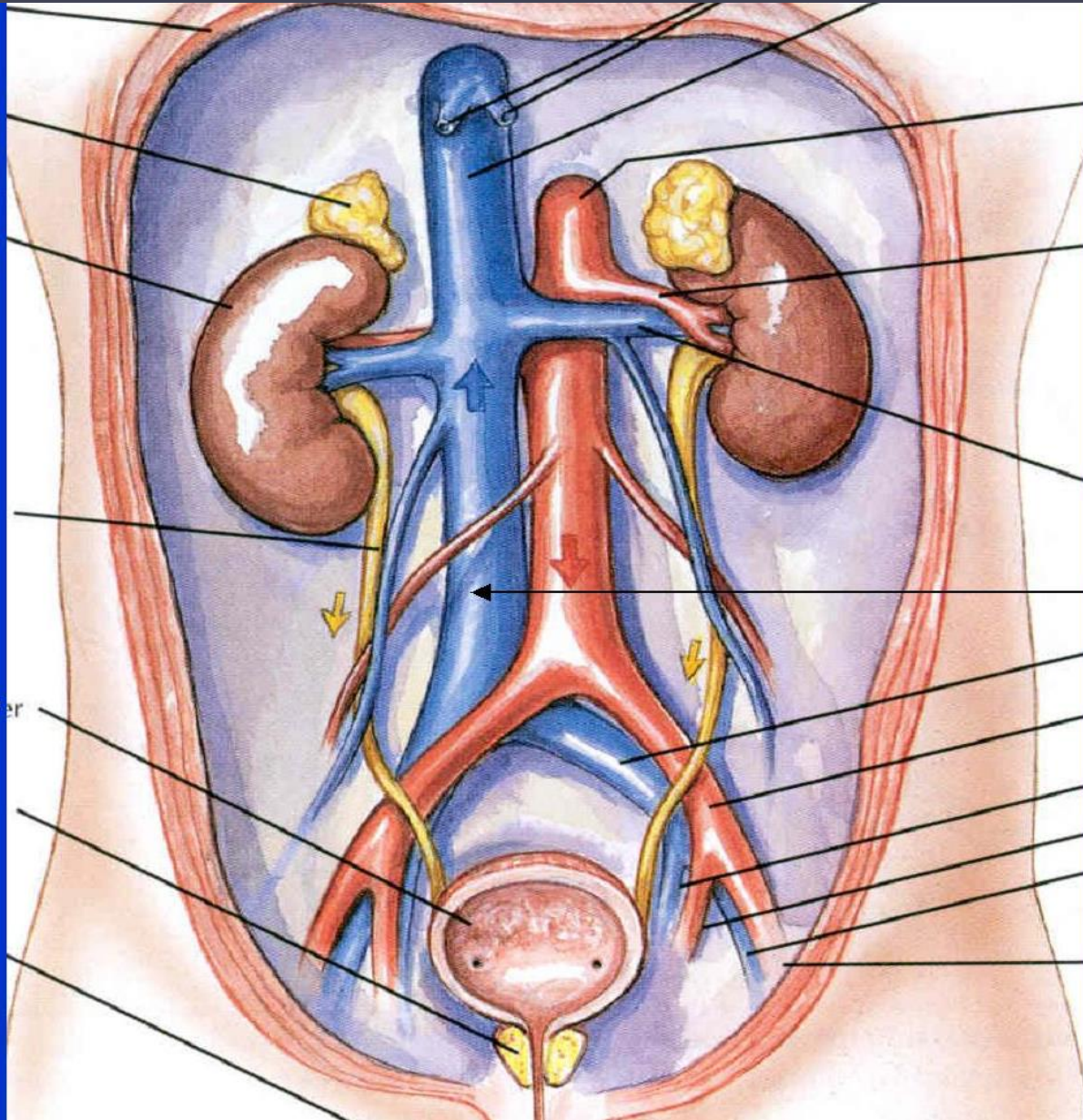


Aorta and IVC with Branches

Adrenal
Kidney

Ureter

Bladder



Aorta

R. Artery

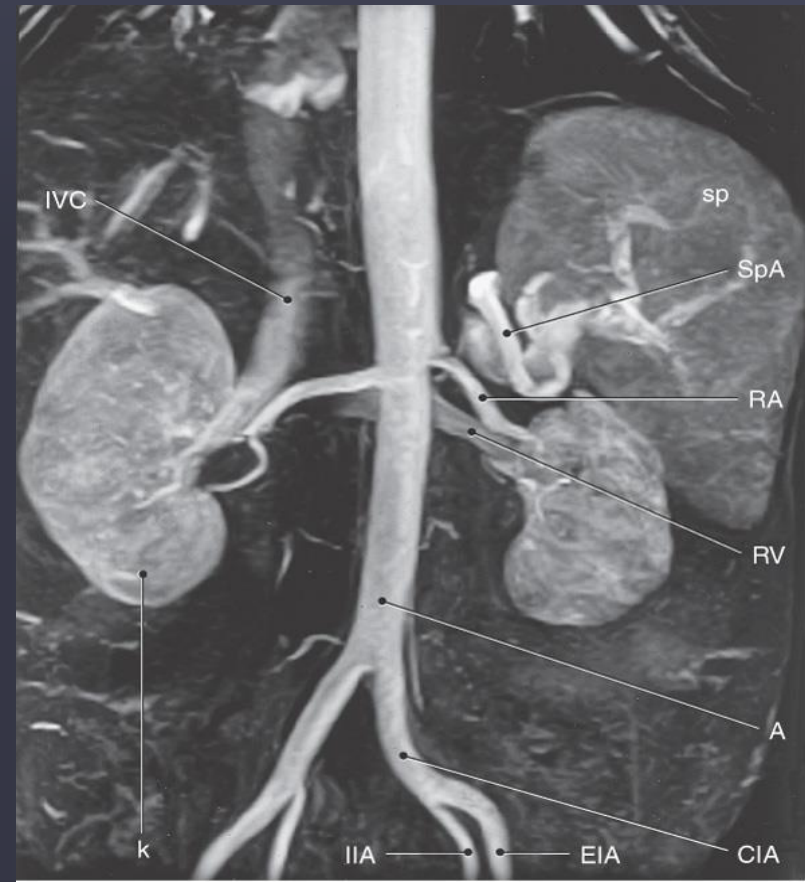
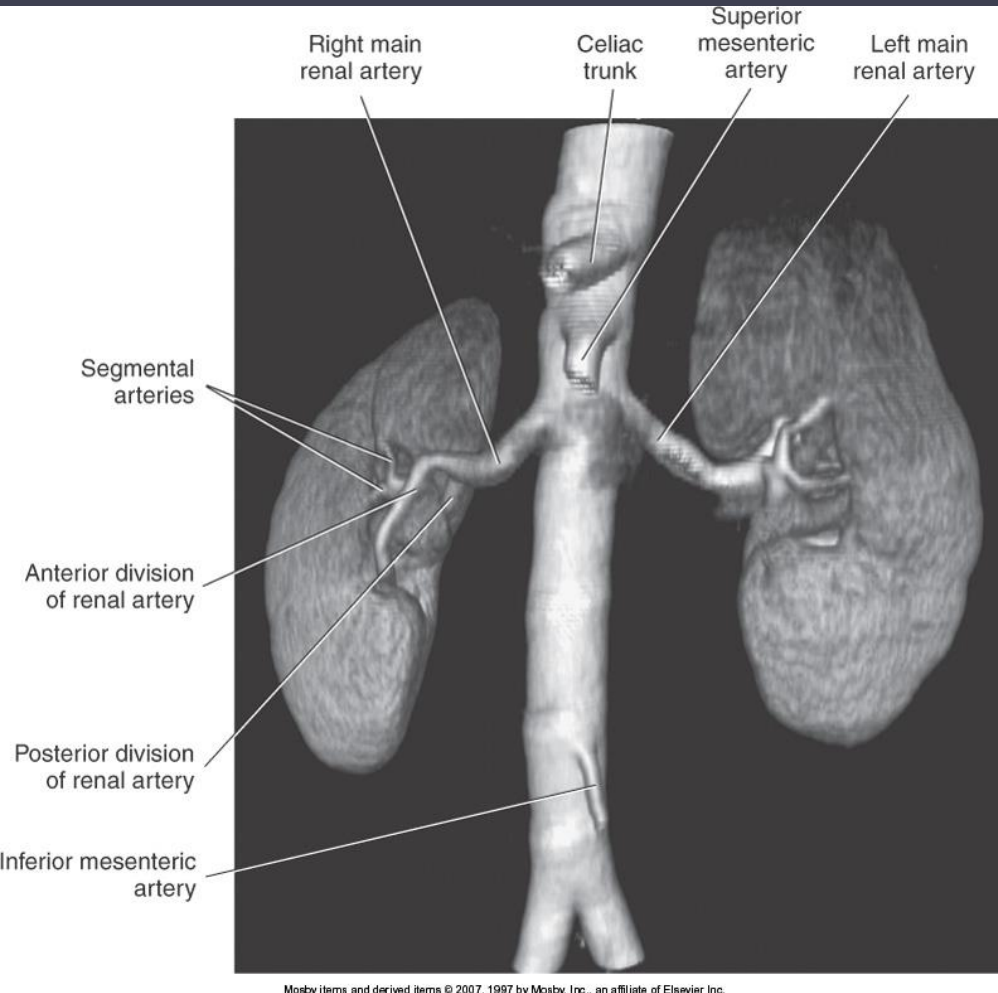
R. Vein

IVC

Paired Arteries

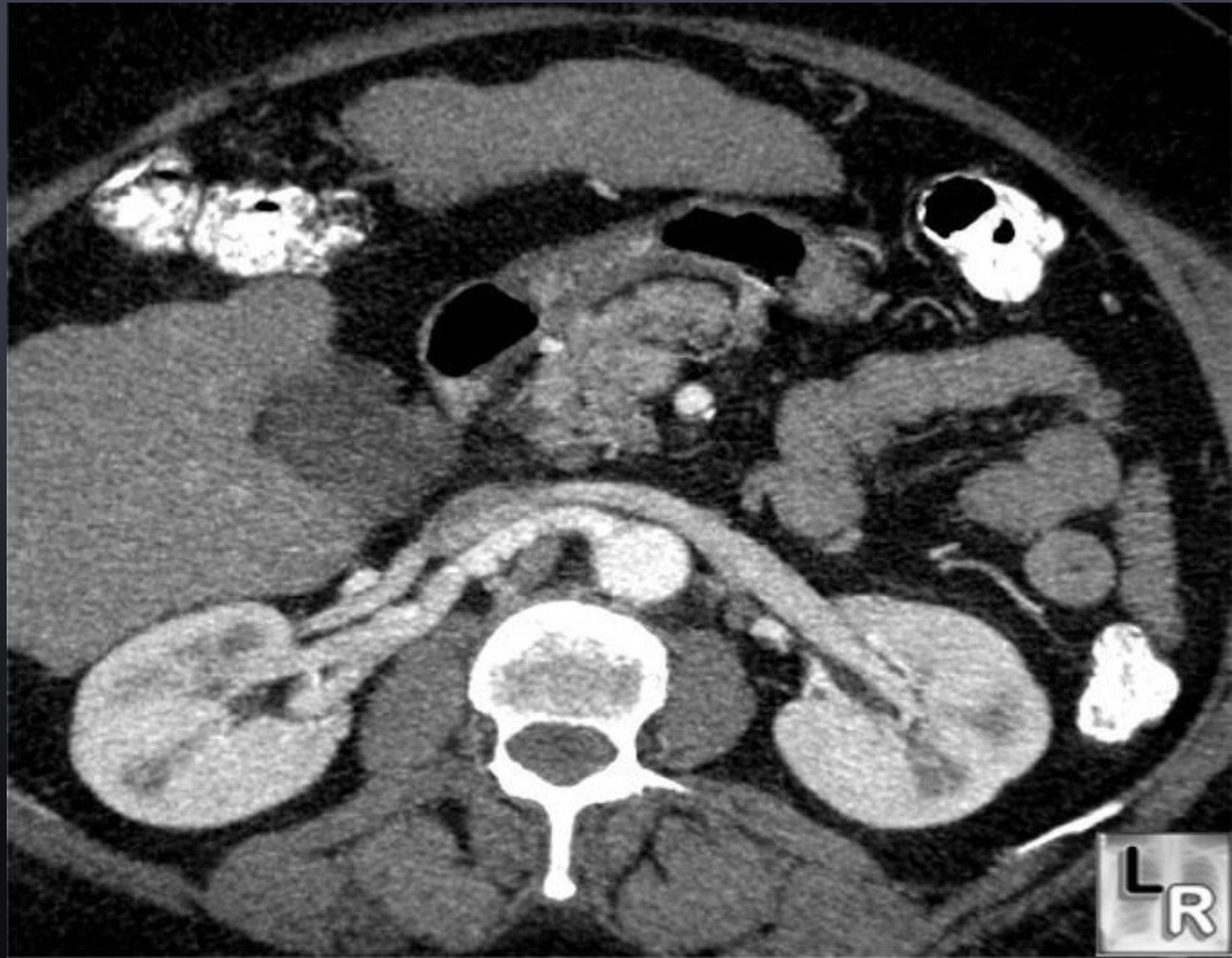
- **Suprarenal – Adrenal**
 - **1st Paired Branches**
- **Renal – Kidneys**
 - **Right Renal is posterior to vena Cava and lightly longer**
 - **Left Renal is usually slightly higher**
- **Gonadal – Reproductive Organs**
 - **Originate inferior to the renals and more anterior on aorta**

Paired Renal Arteries



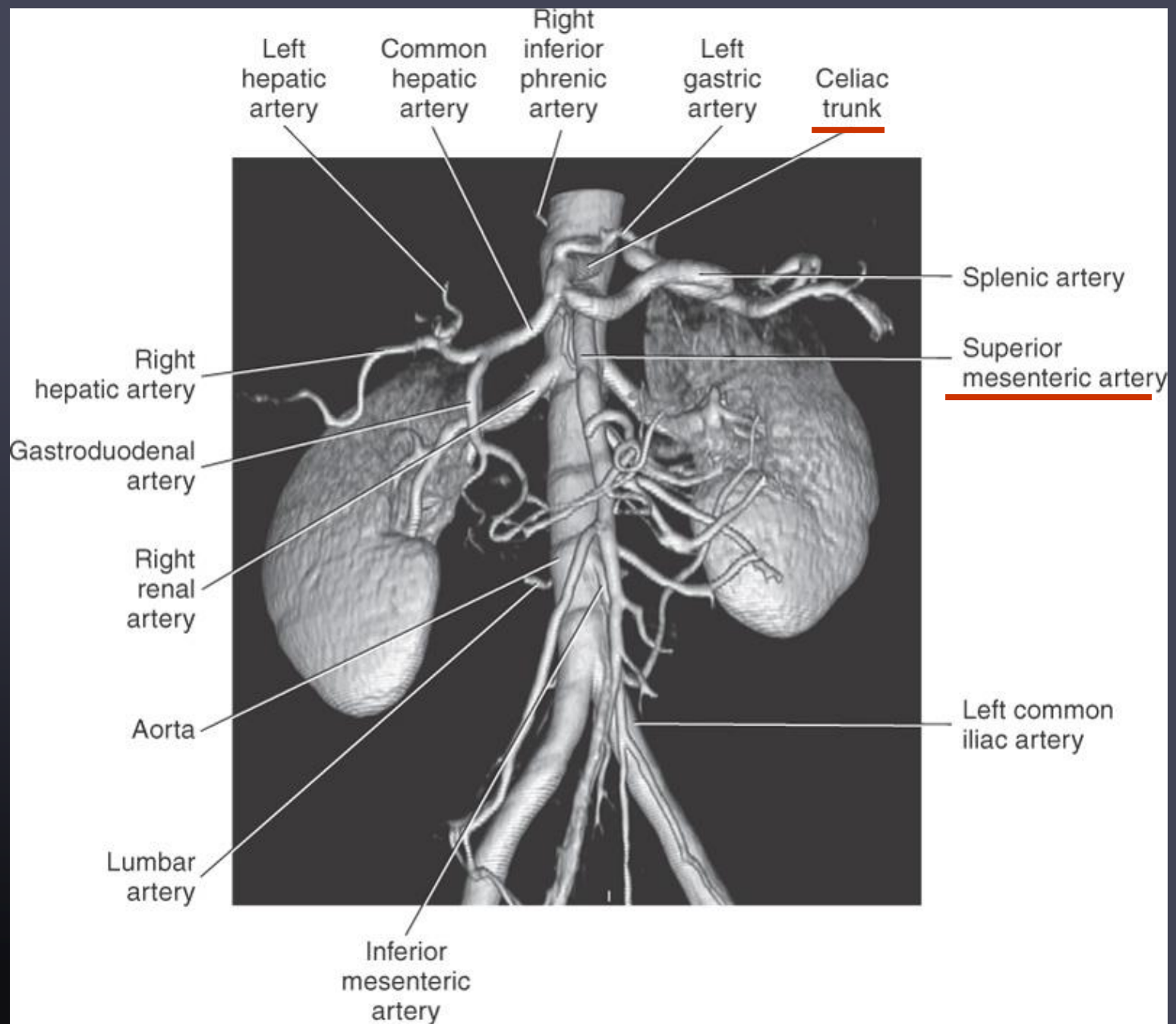
KEY: IVC, Inferior vena cava; k, kidney; IIA, internal iliac artery; EIA, external iliac artery; CIA, common iliac artery; A, aorta; RV, renal vein; RA, renal artery; SpA, splenic artery; sp, spleen.

Right Renal Artery



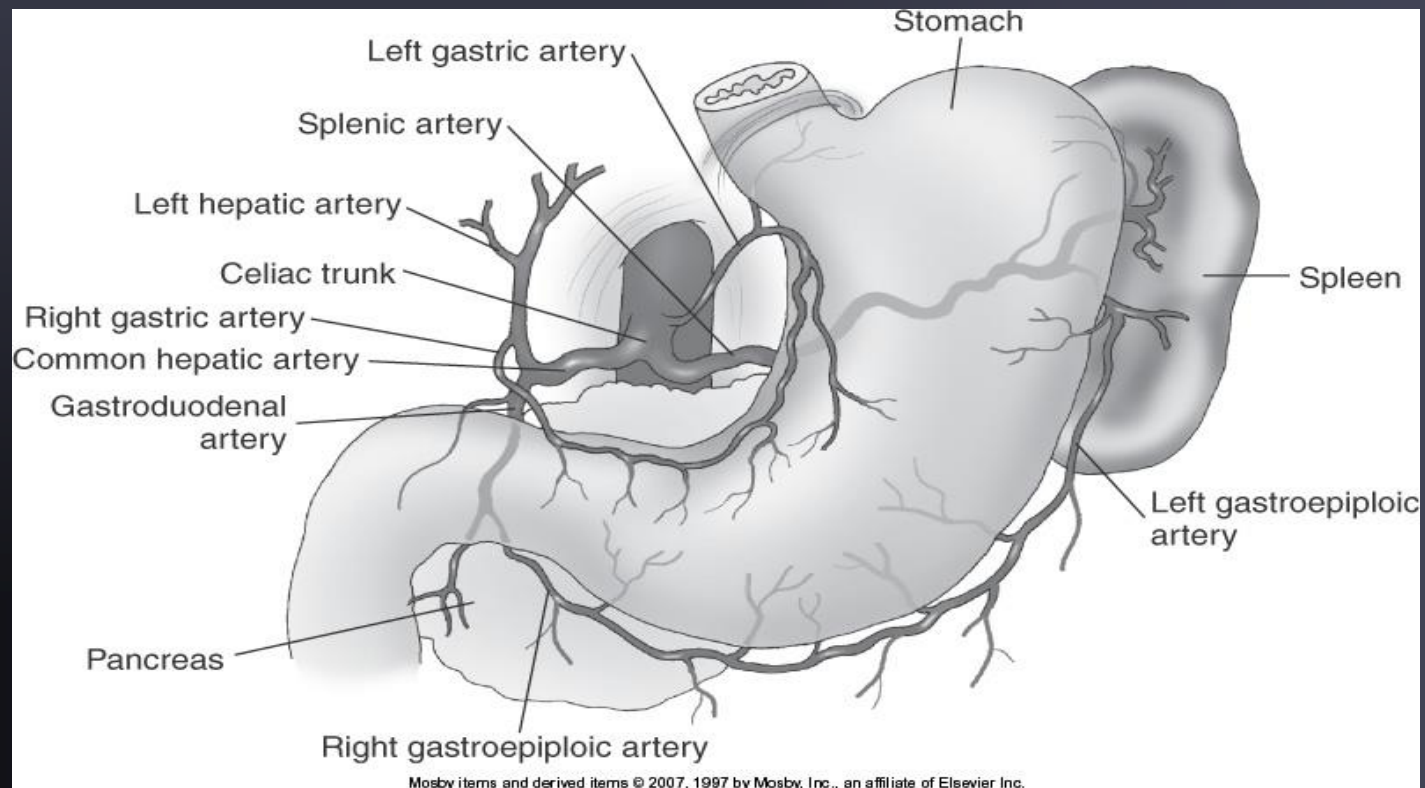
UNPAIRED BRANCHES

- Celiac Trunk
- Superior Mesenteric
- Inferior Mesenteric

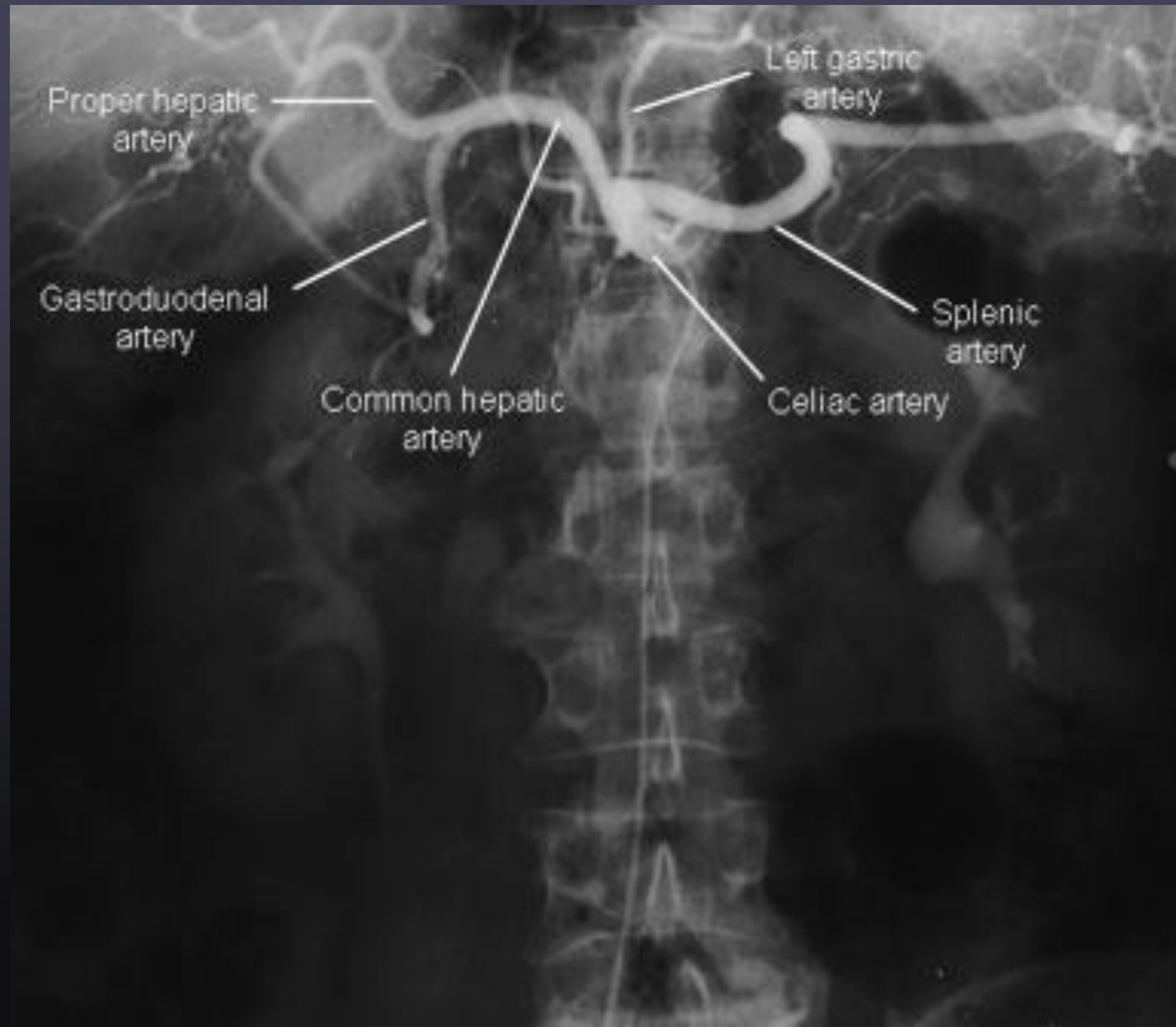


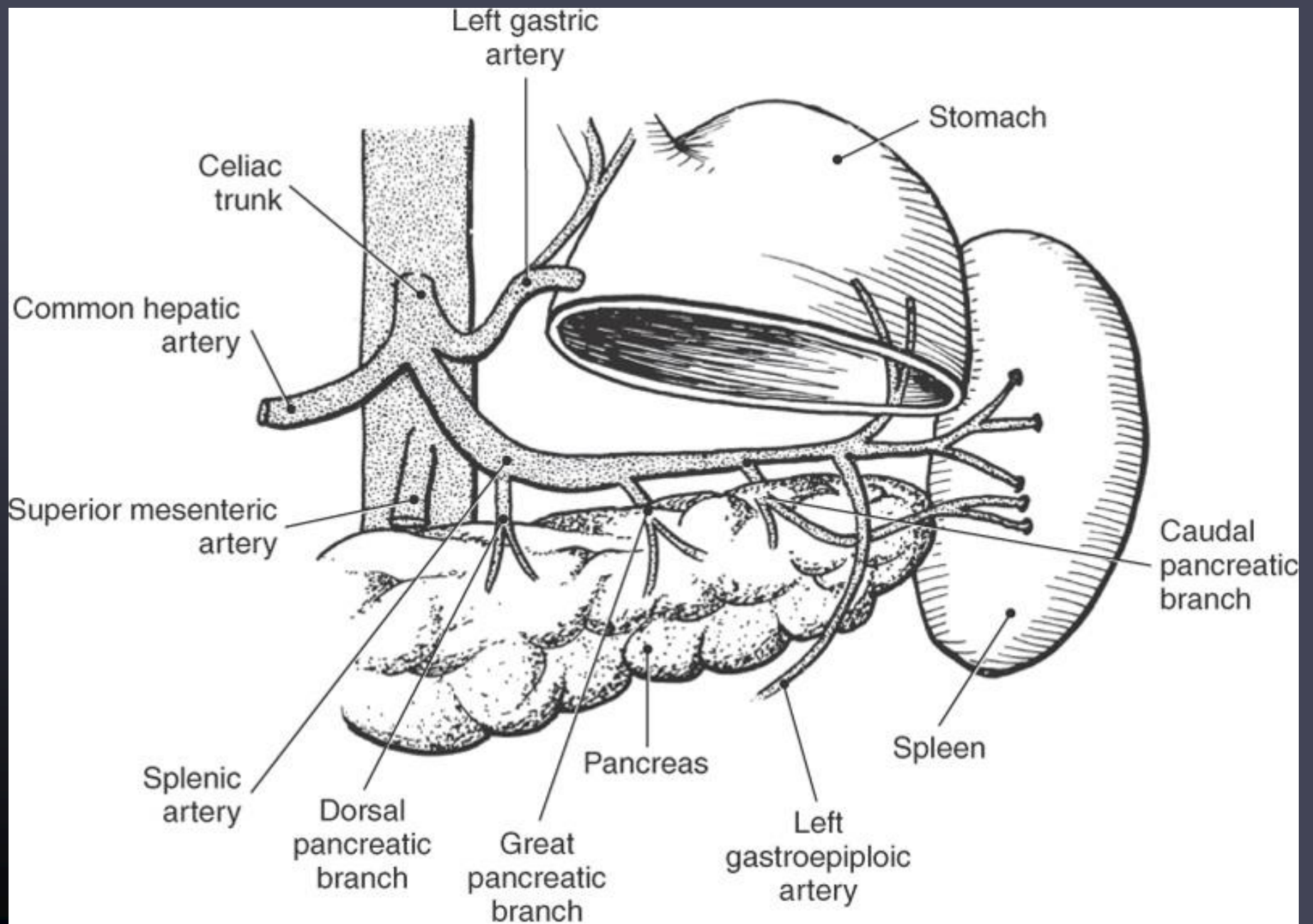
CELIAC TRUNK

- First Major Branch Of Aorta Divides Into:
 - Left Gastric Artery
 - Common Hepatic Artery
 - Splenic Artery



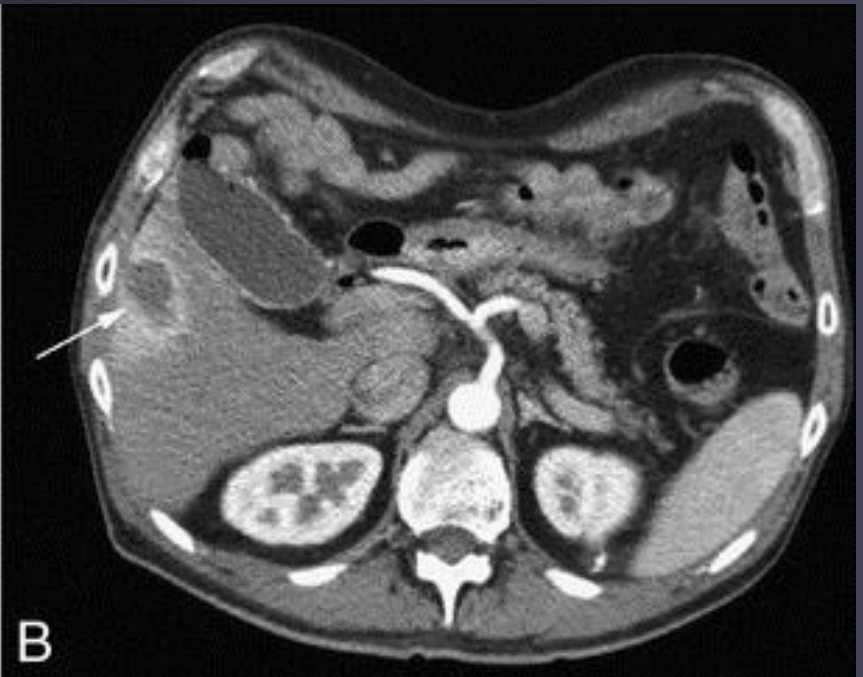
Celiac and Branches



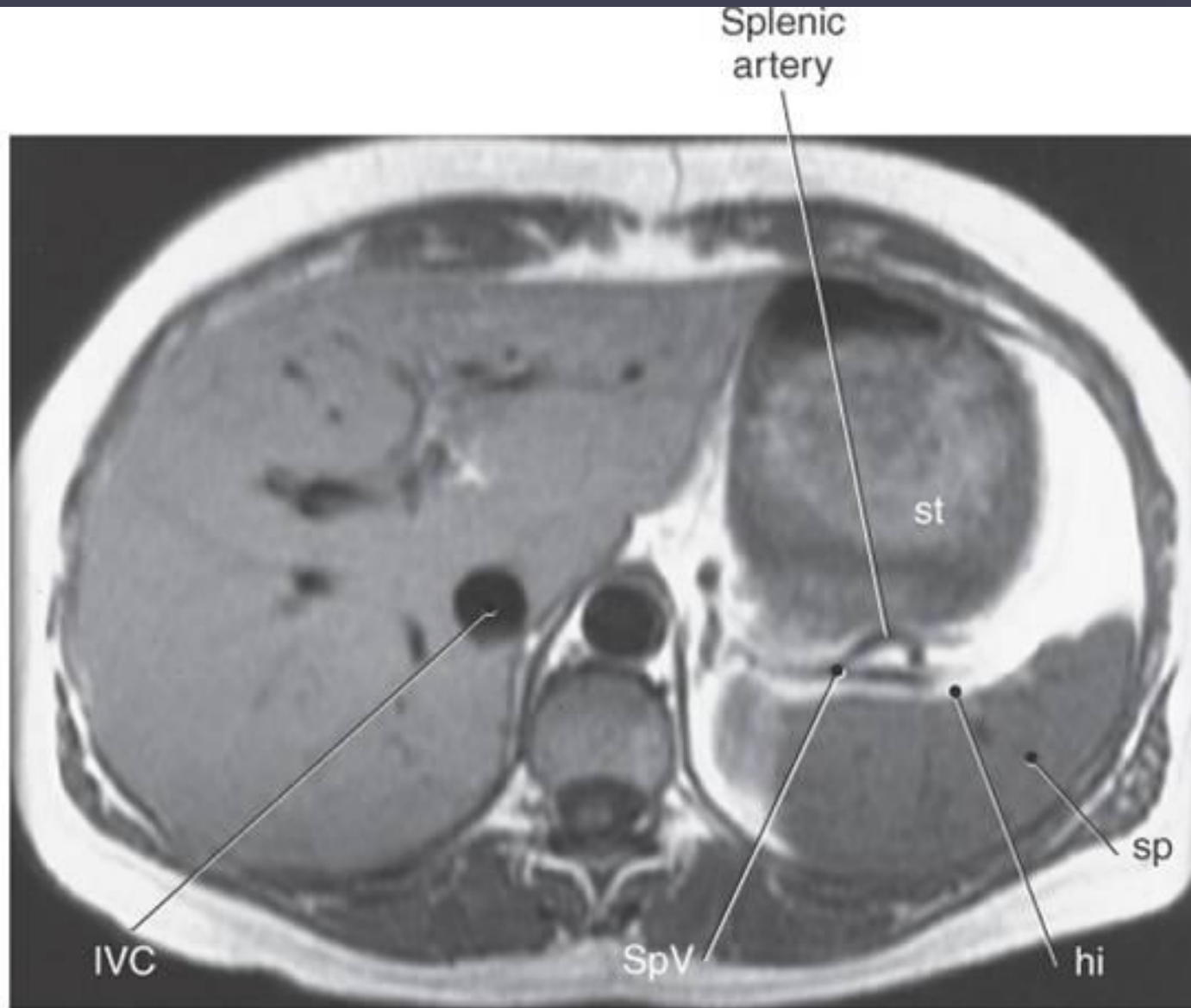


Celia Artery Branching

- A – celiac trunk
- B – branching to hepatic & splenic



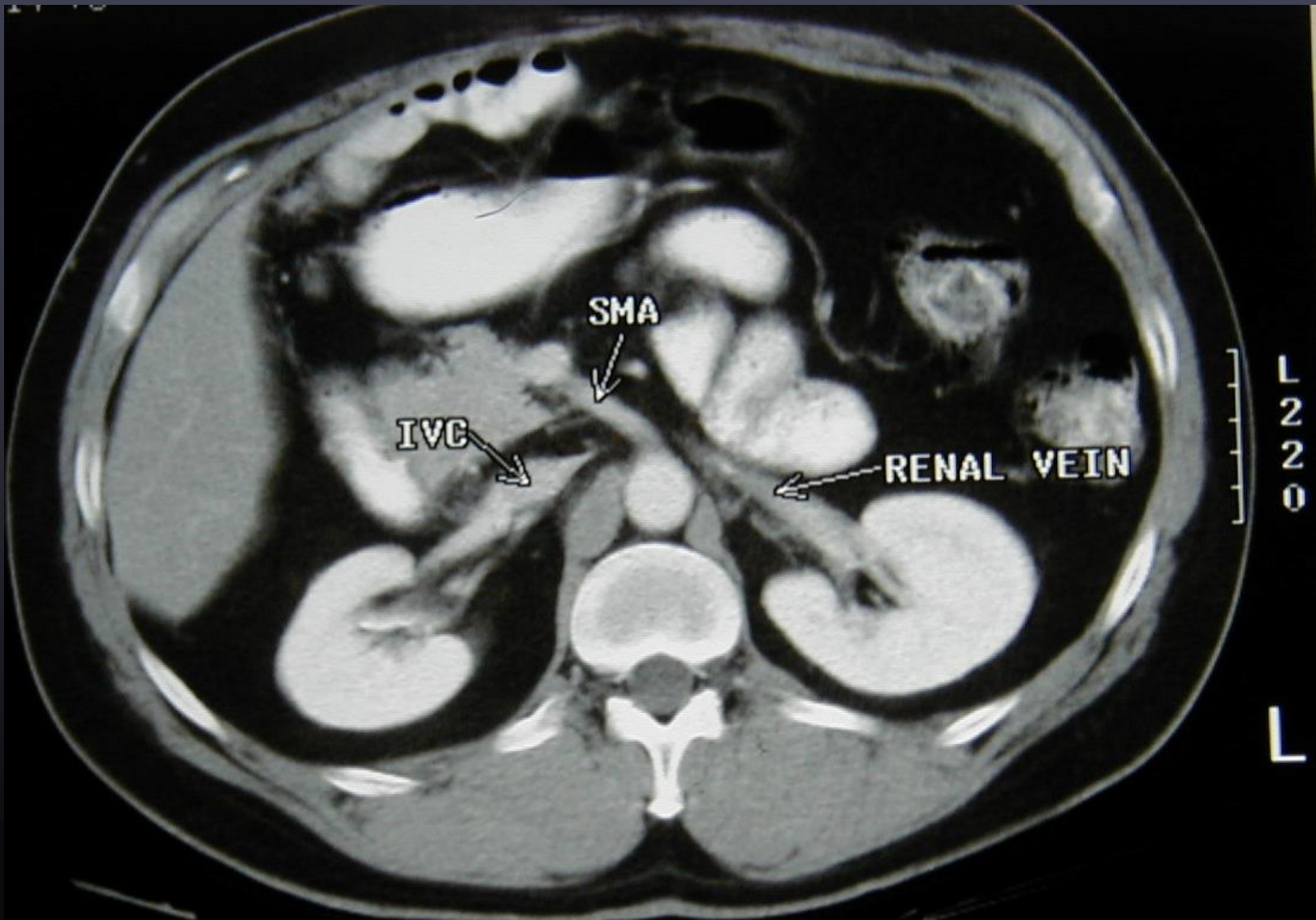
Splenic Artery and Vein



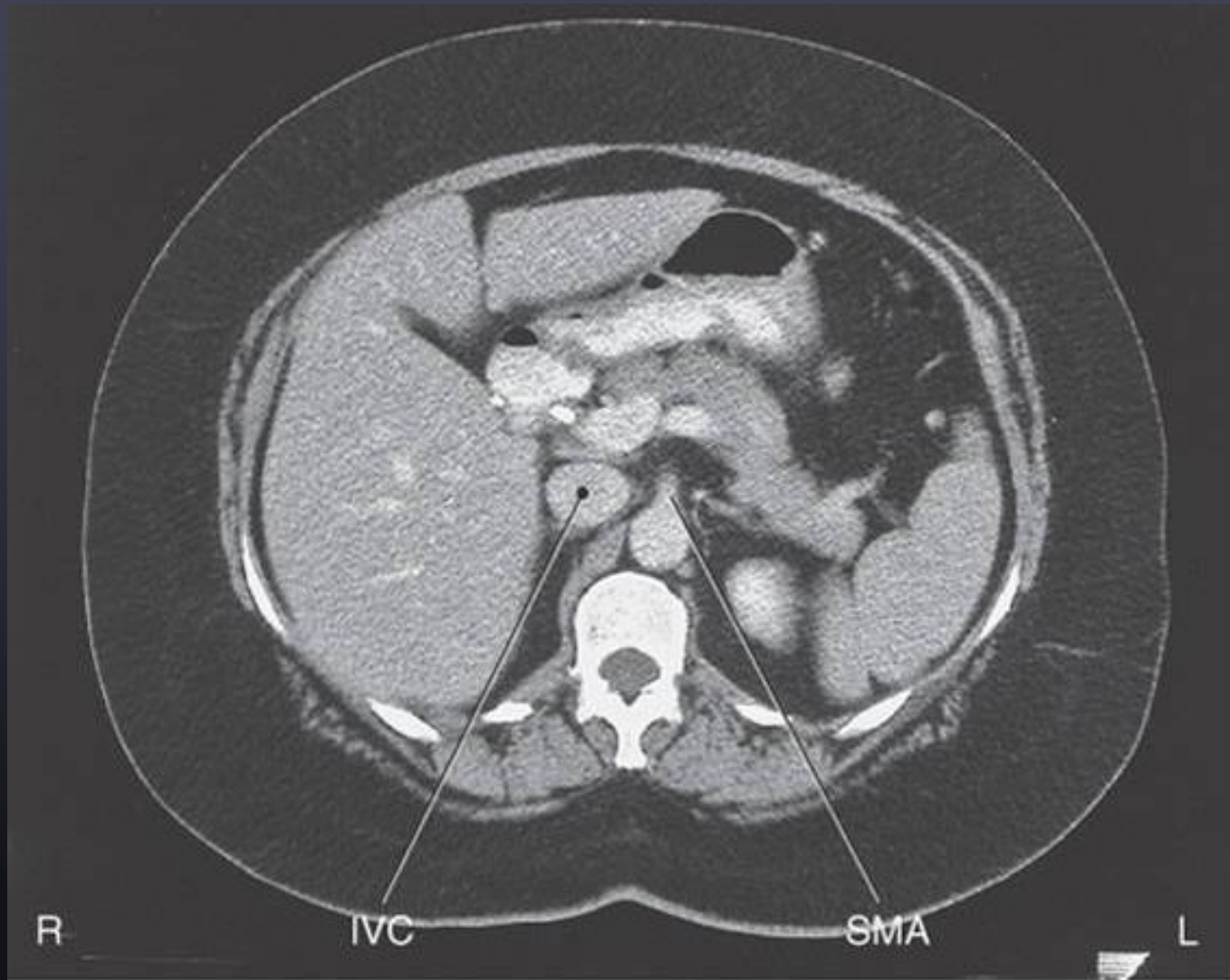
Mesenteric Arteries

- **Superior Mesenteric**
 - 2nd unpaired artery off aorta
 - Supplies blood to Small Intestine, Ascending And Transverse Colon
- **Inferior Mesenteric**
 - 3rd unpaired artery off aorta
 - Supplies blood to Transverse, Descending , Sigmoid And Rectum

Superior Mesenteric Artery

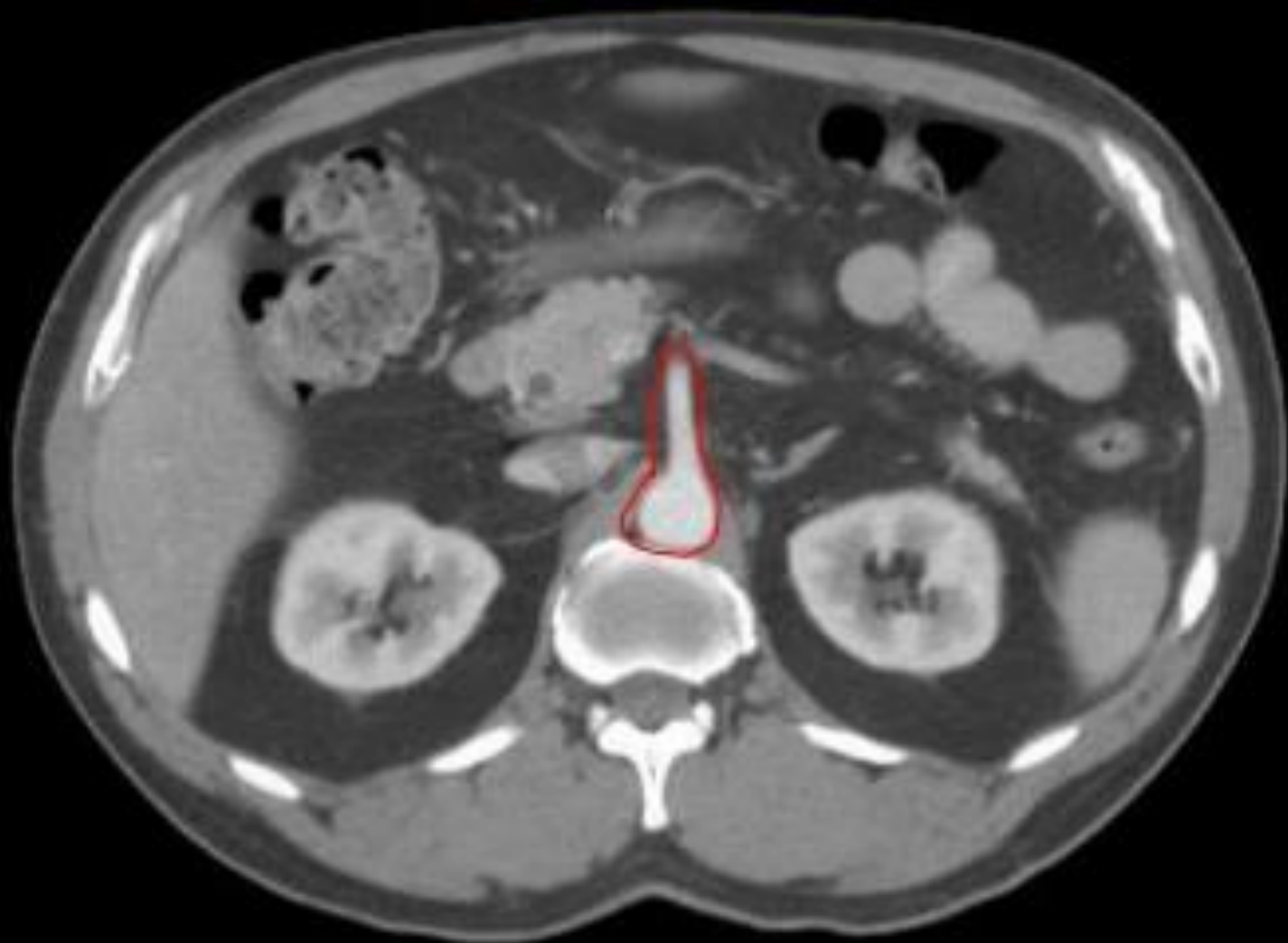


Another View of Superior Mesenteric



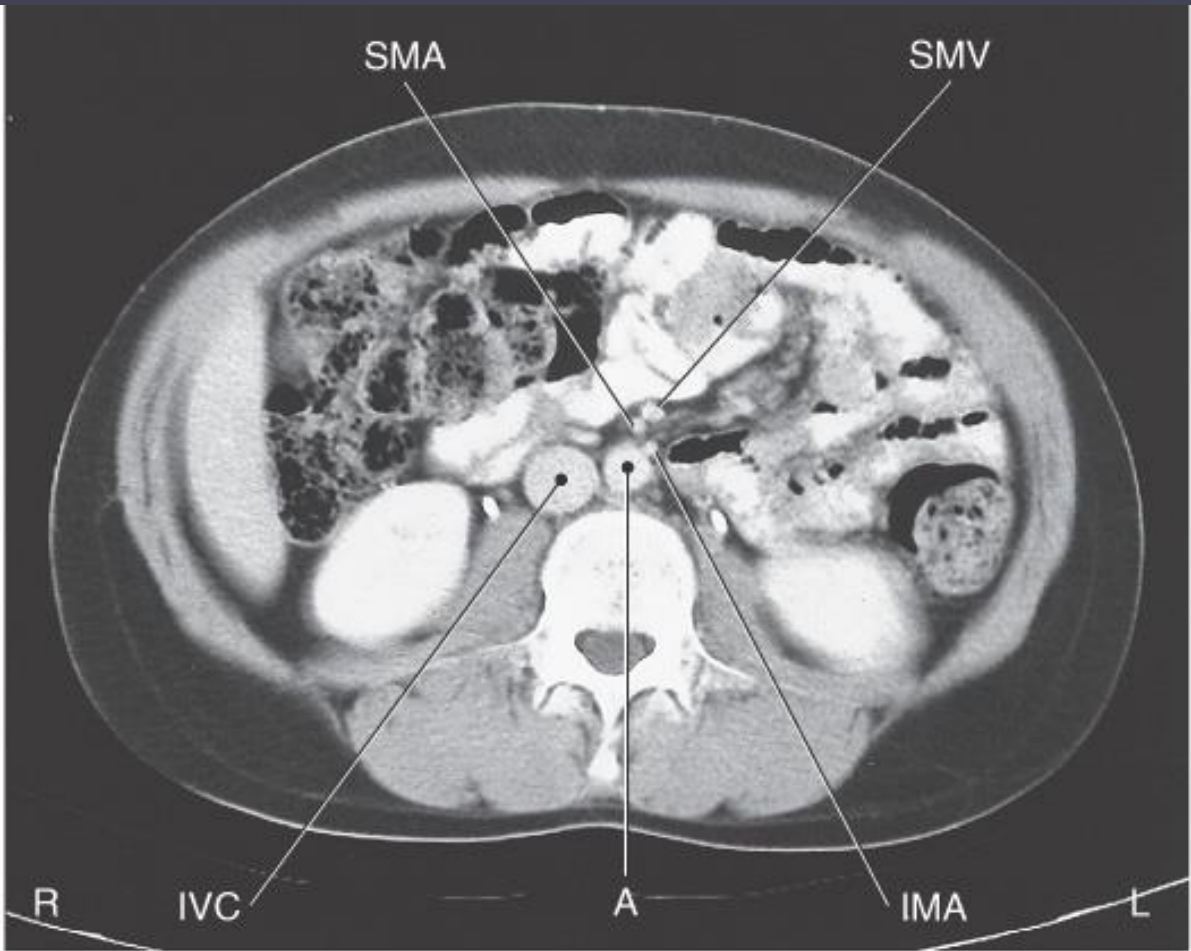
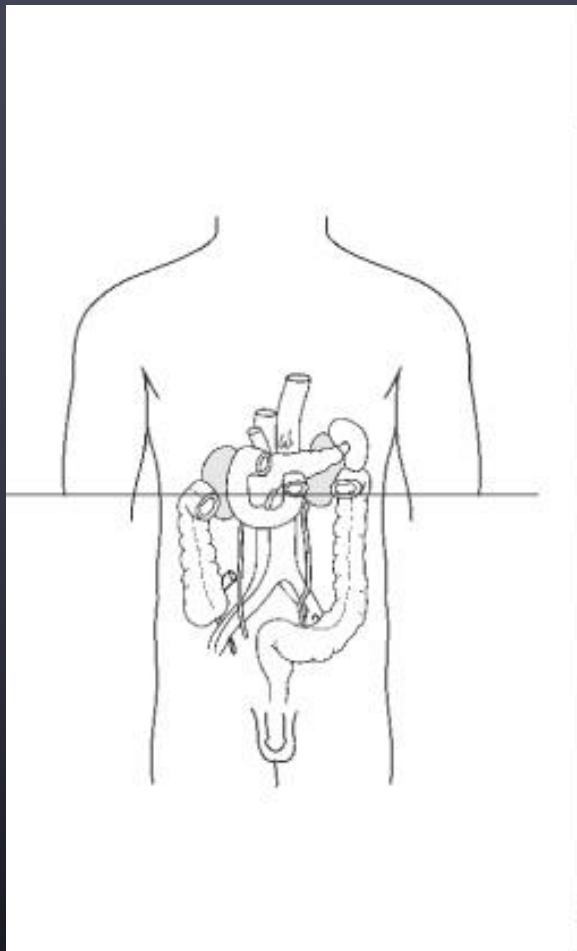
KEY: IVC, Inferior vena cava; **SMA**, superior mesenteric artery

This is the **Superior Mesenteric Artery** branching off the Aorta.



INFERIOR VENA CAVA

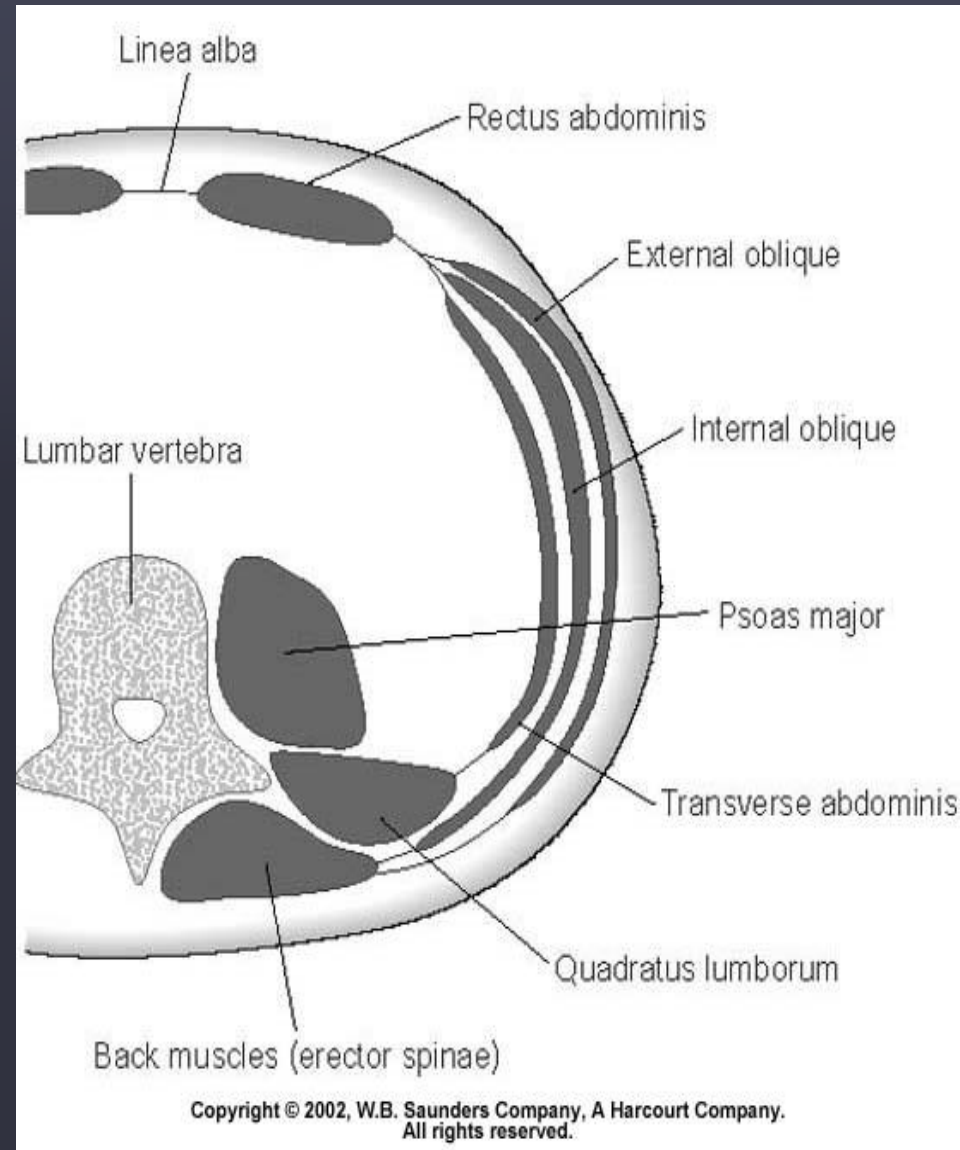
- **Formed By**
 - **Iliac Veins**
 - **Lumbar Vein**
 - **Gonadal Vein**
 - **Renal Vein**
 - **Hepatic Vein**



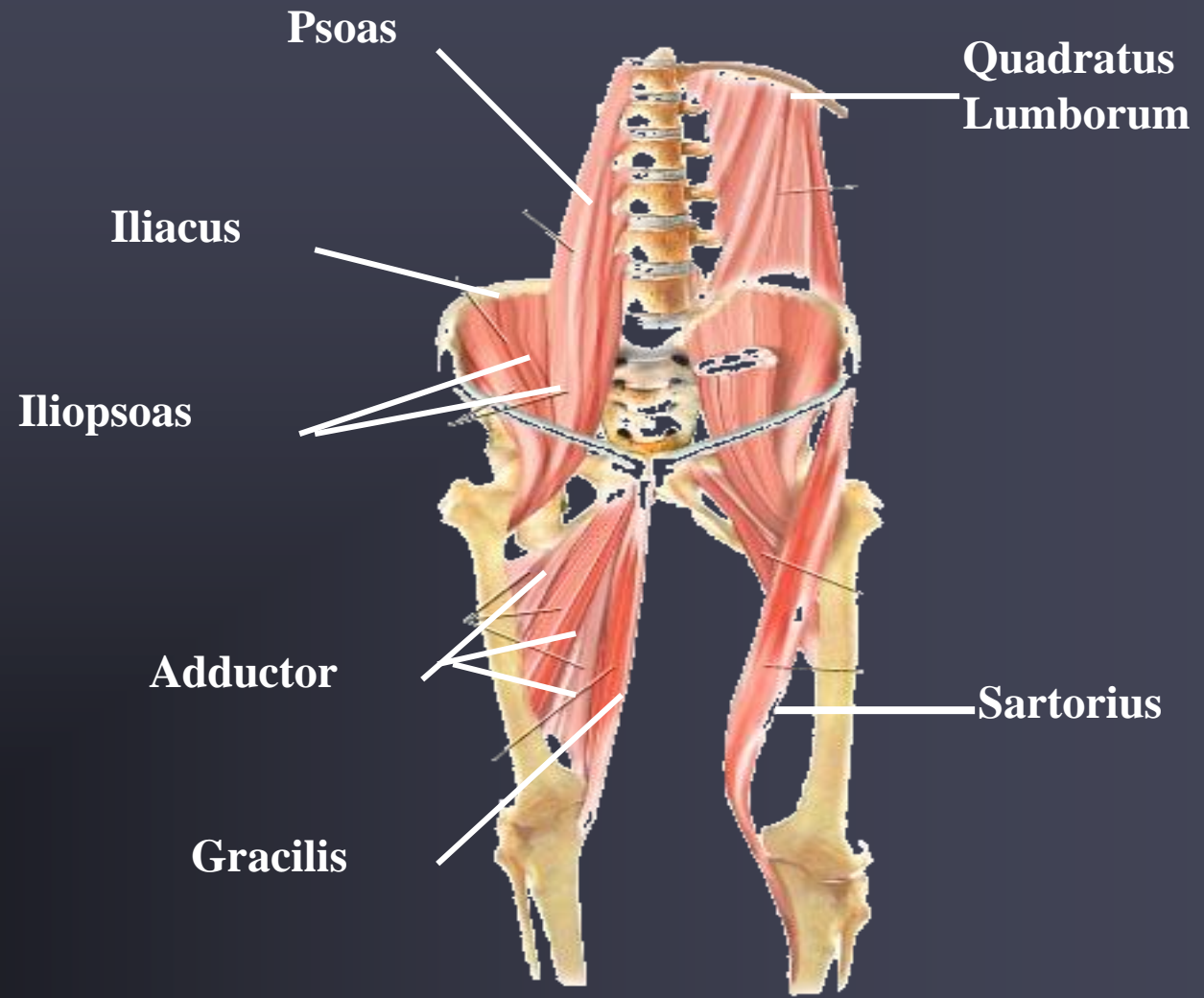
KEY: **SMA**, Superior mesenteric artery; **SMV**, superior mesenteric vein; **IVC**, inferior vena cava; **A**, aorta; **IMA**, inferior mesenteric vein.

Abdominal Muscles

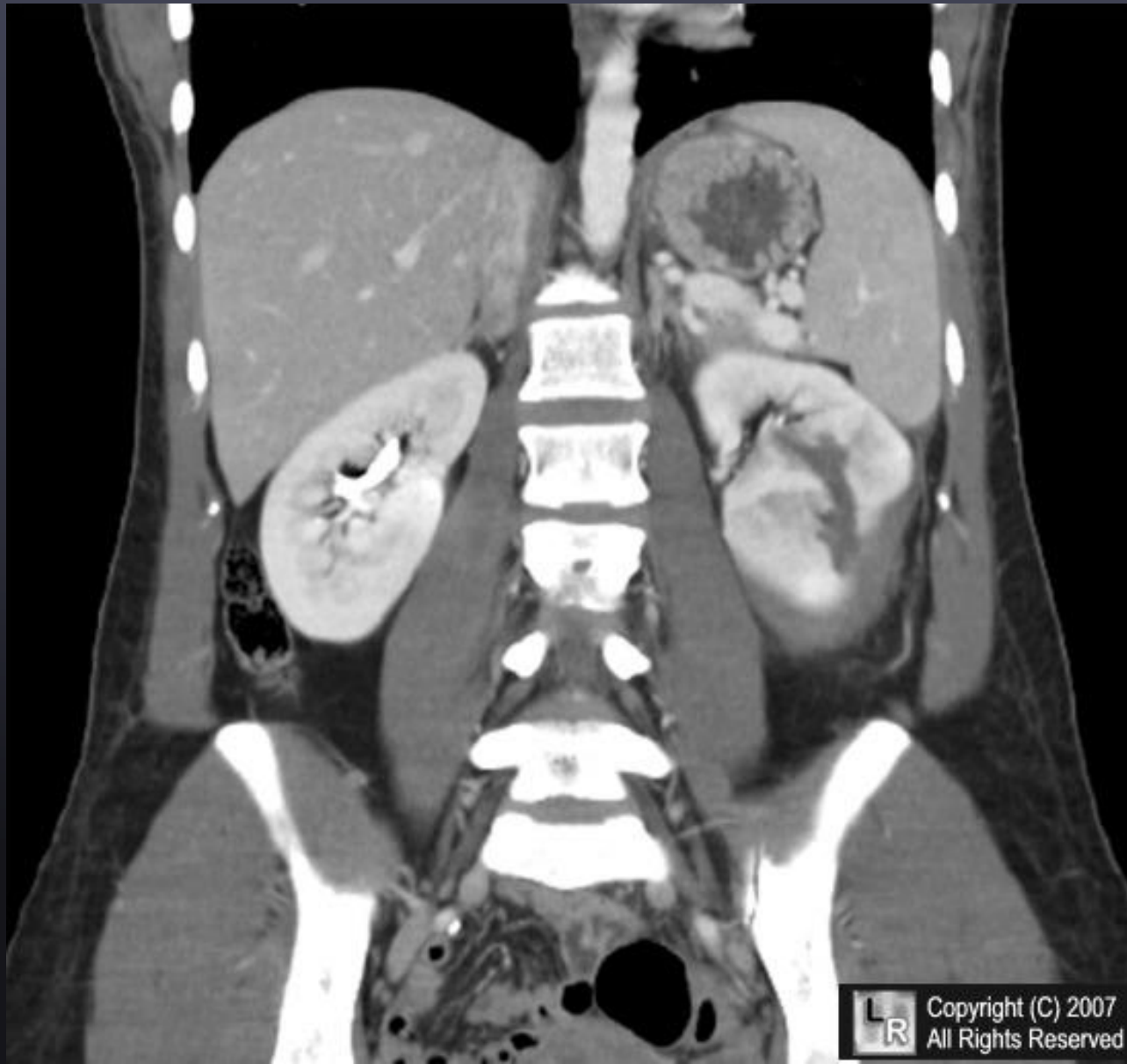
- External Oblique
 - Most External
- Transverse
 - Most Internal
- Psoas
 - Originates from L1-5, Inserts at lesser Trochanter
- Quadratus Lumborum
 - Lateral to Transverse process from T12 to Crest
- Rectus Abdominis
 - From xiphoid to symphysis pubis



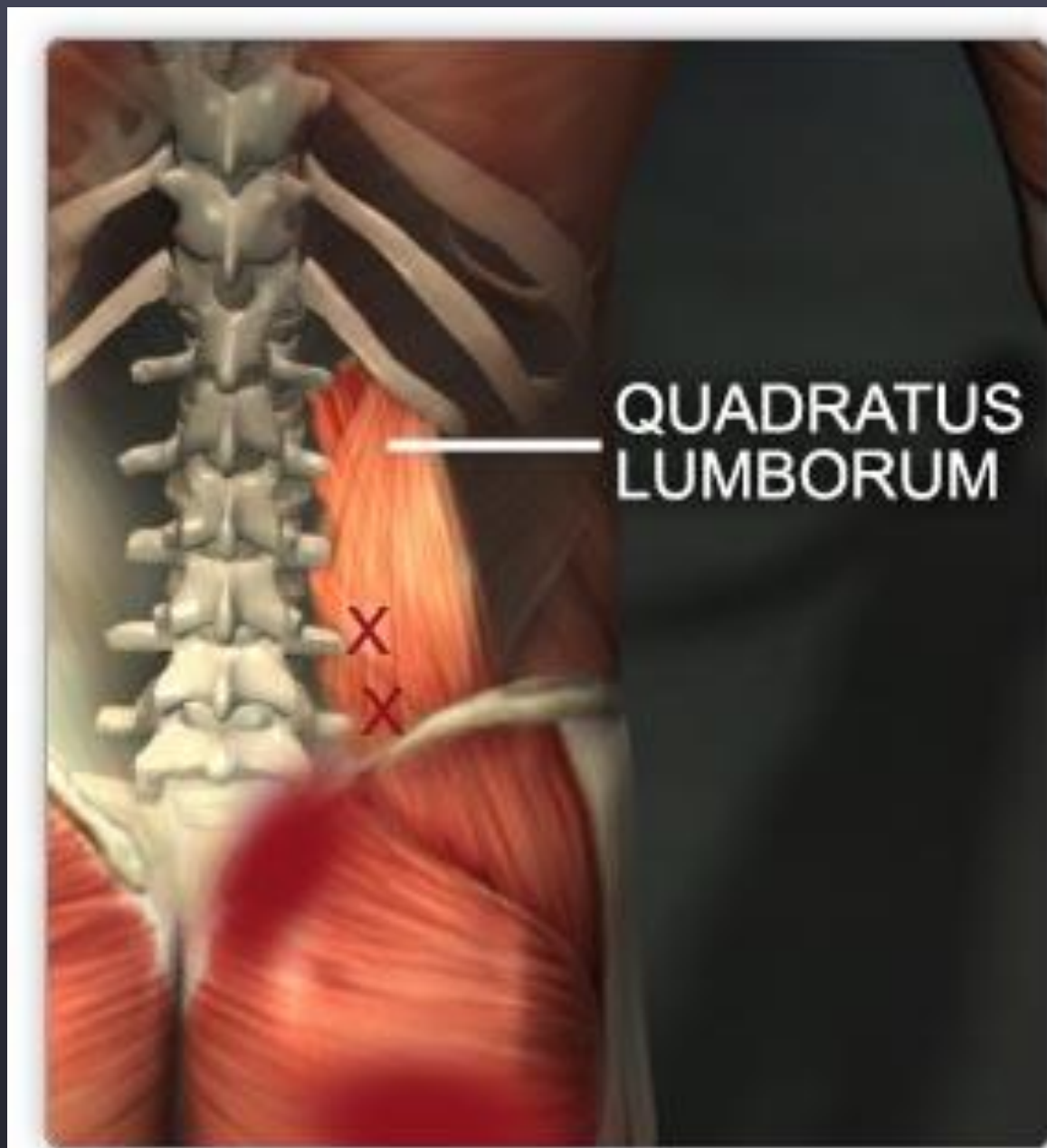
Abdominopelvic Muscles



Coronal of Abdominal Muscles



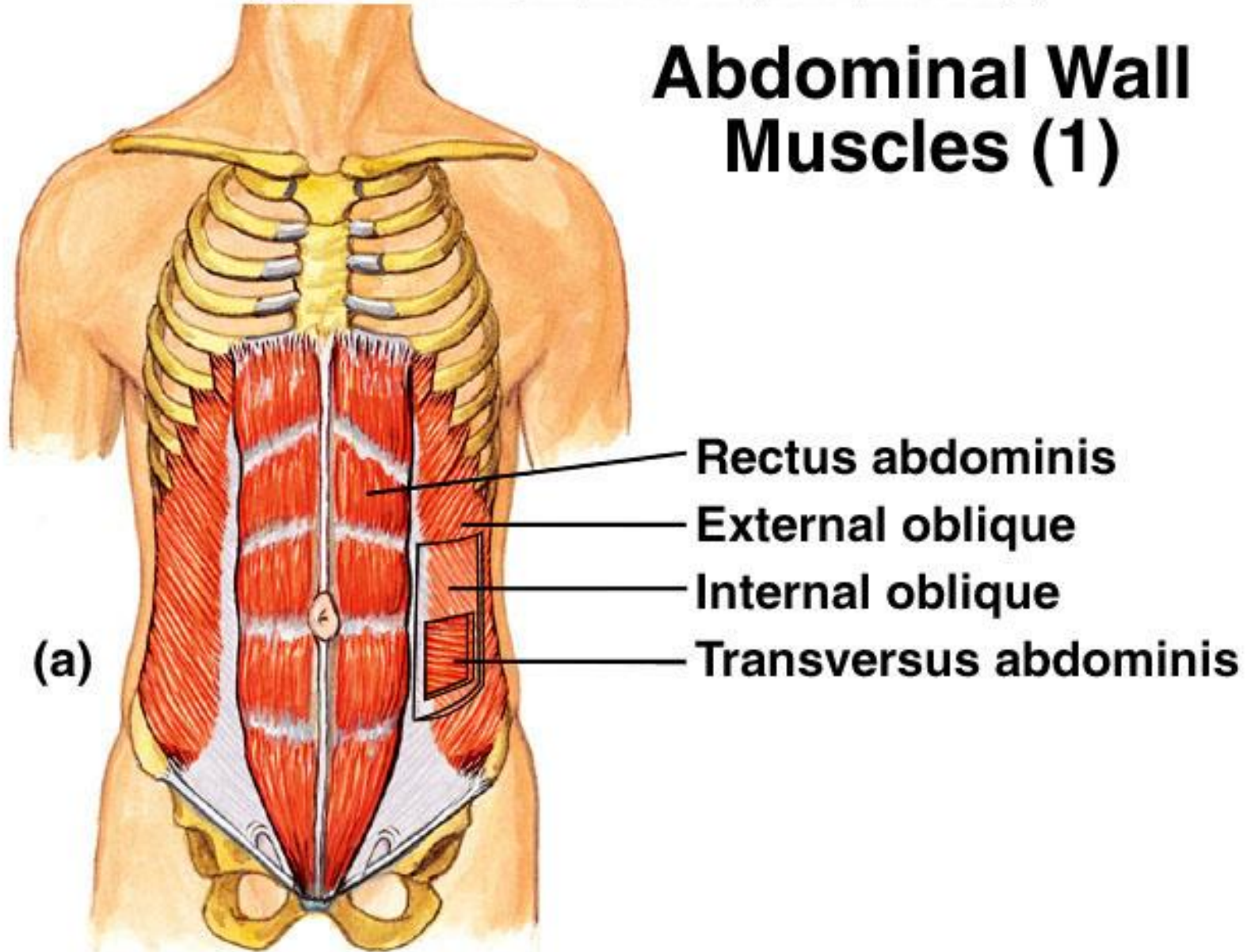
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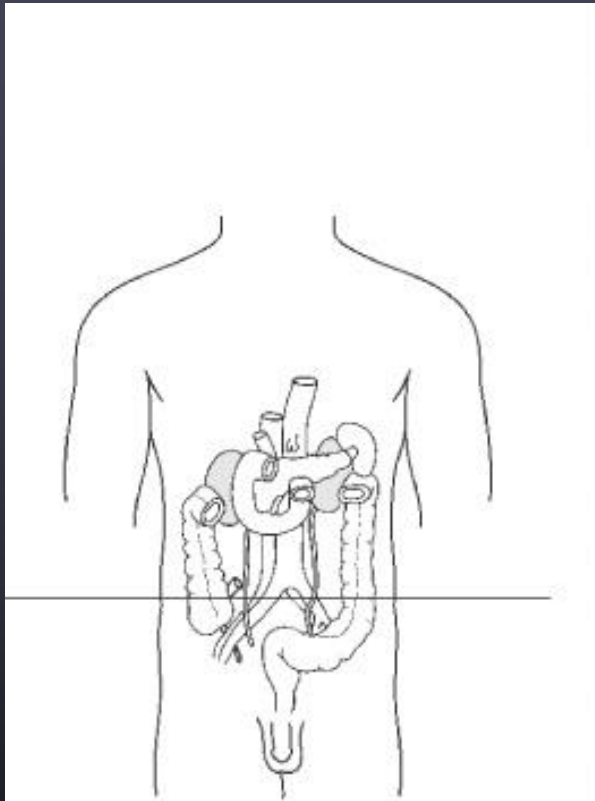
Abdominal Muscles

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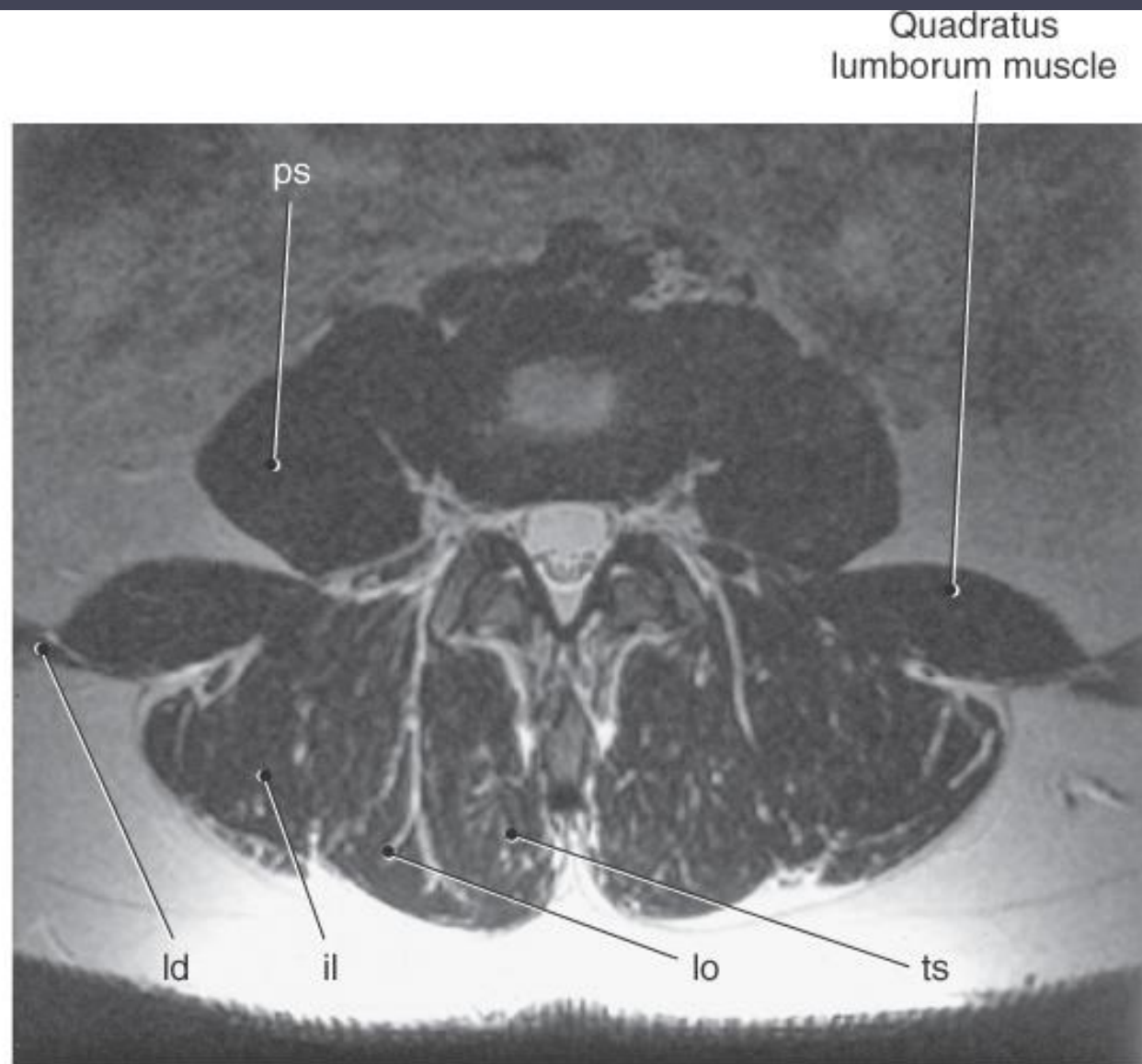
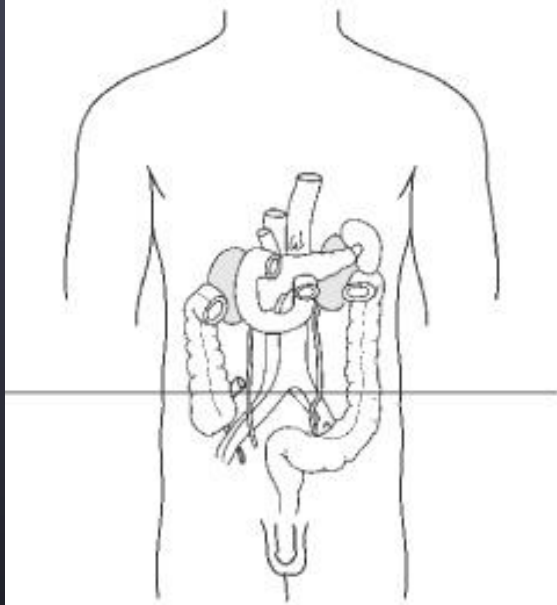
Abdominal Wall Muscles (1)



Abdominal Muscles



KEY: **ps**, psoas muscles; **reab**, rectus abdominis; **la**, linea alba; **trab**, transverse abdominis; **iob**, internal oblique; **eob**, external oblique; **quad**, quadratus lumborum.

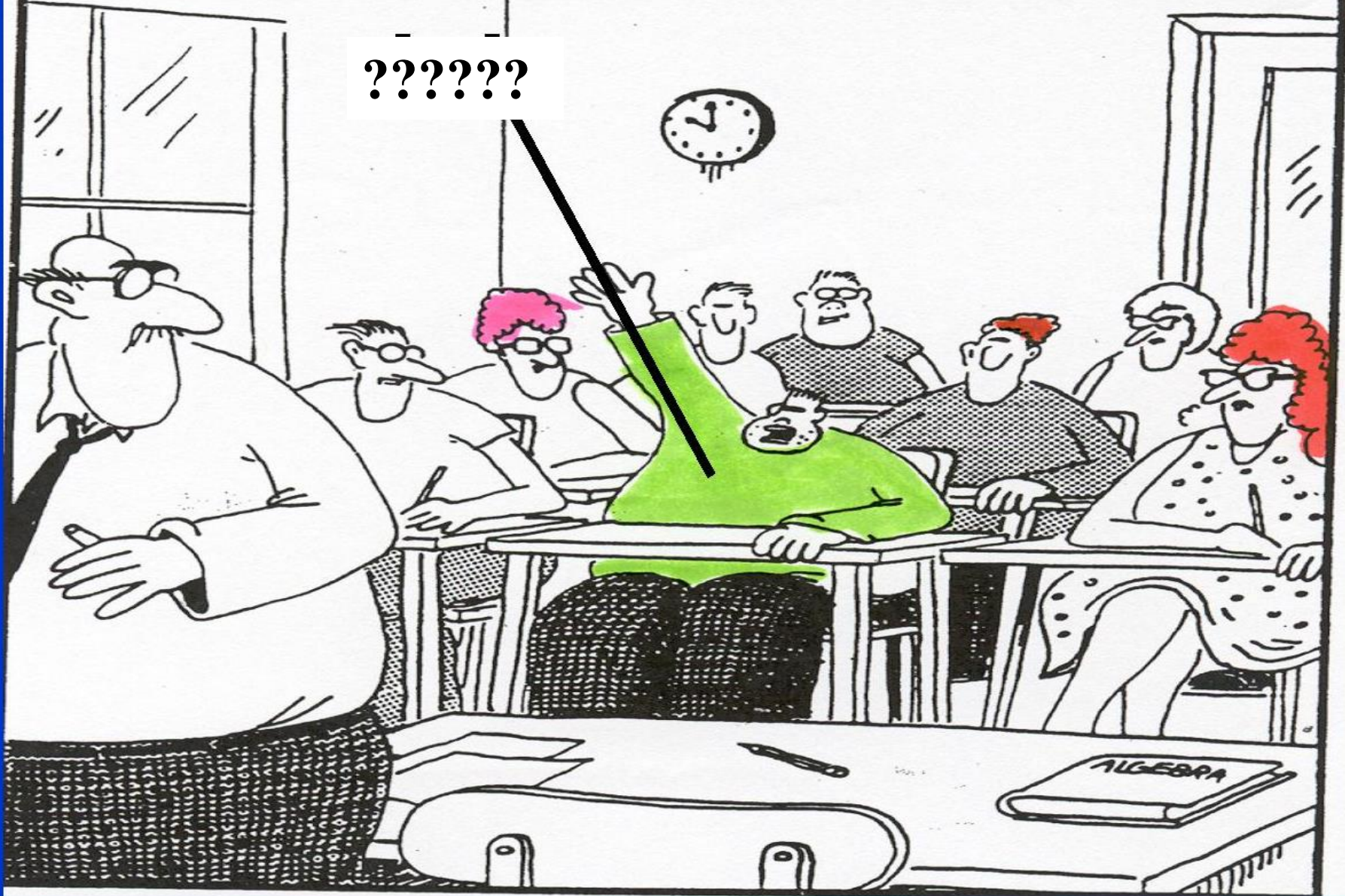


KEY: **ps**, psoas muscles; **ld**, latissimus dorsi; **il**, iliocostalis muscle; **lo**, longissimus muscle; **ts**, transversospinal muscles.

1986

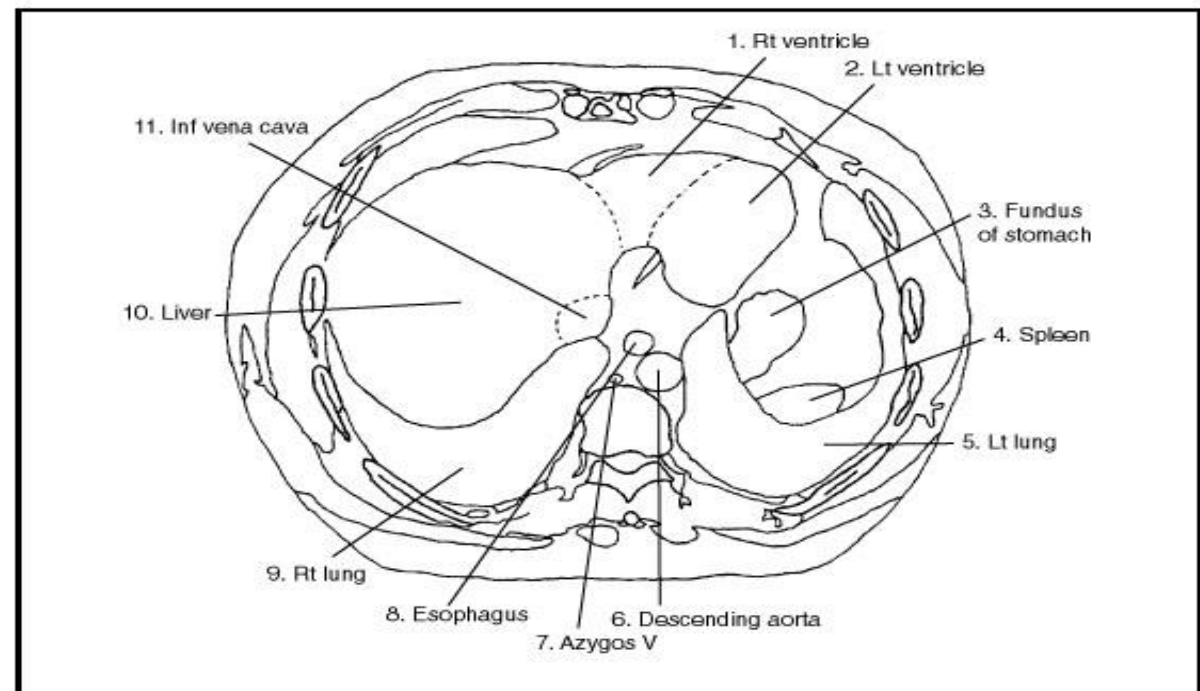
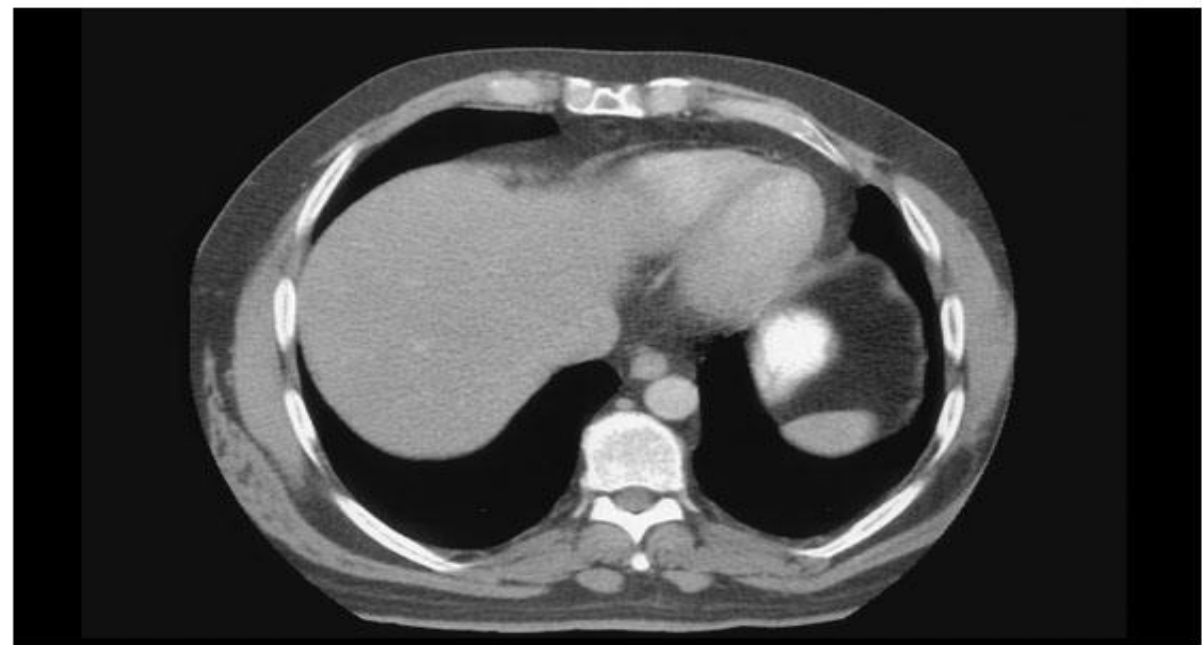
London

??????



May I be excused, my brain is FULL

Figure 3-18



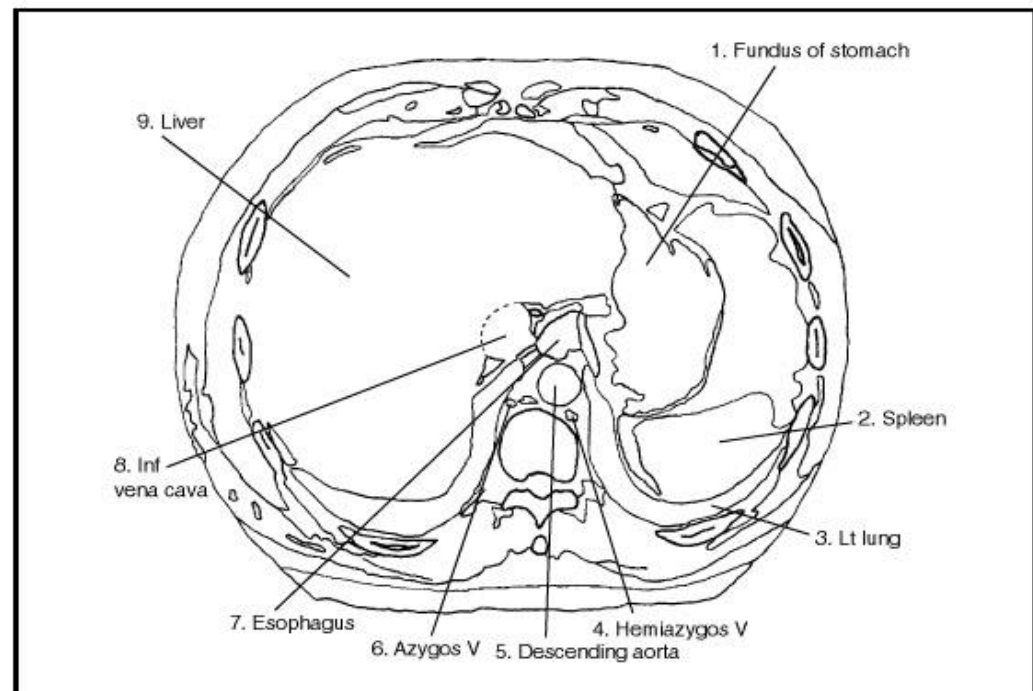
- **Body of Liver
and base of
heart**

- **Fundus of
Stomach with
barium**

- **Small part of
spleen**

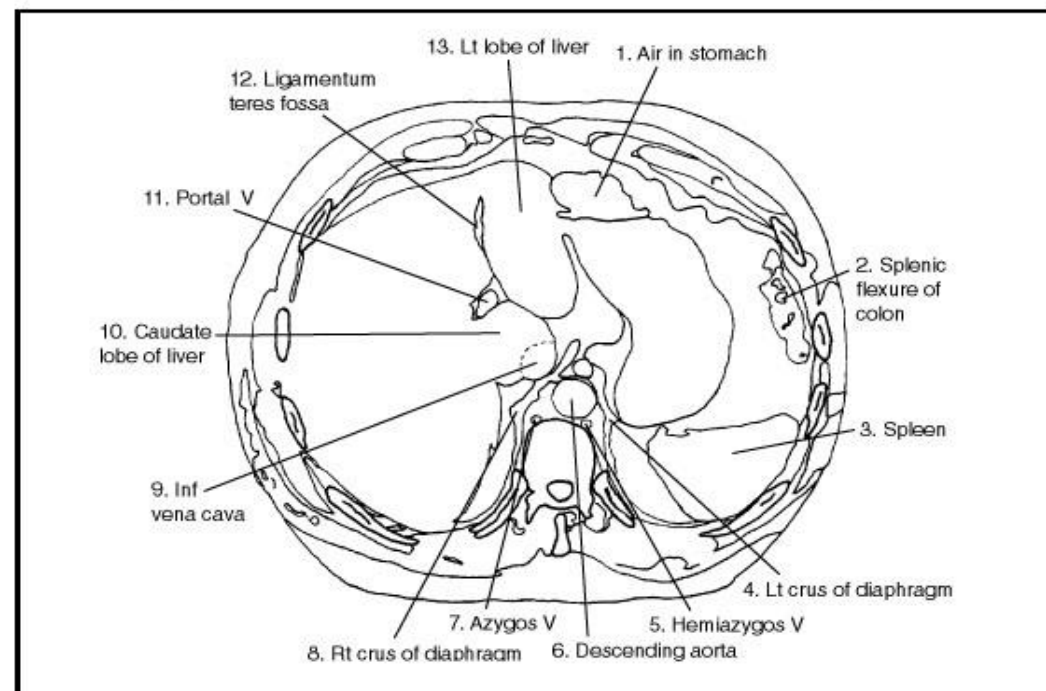
- **Esophagus
anterior to
Aorta**

Figure 3-20



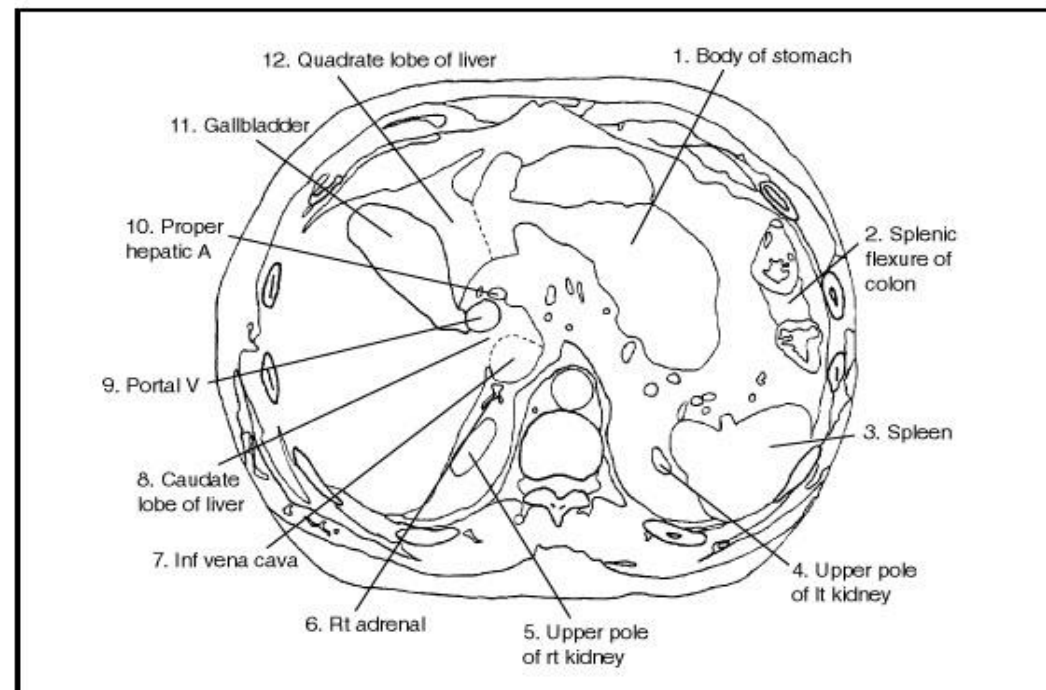
- Liver on right and to midline
- Esophagus near stomach
- Azygos and hemiazygos veins

Figure 3-22



- Liver divided into Rt. And Left lobes by ligamentum teres
- Caudate lobe between Portal V. and IVC
- Crus of Diaphragm
- Splenic Flexure

Figure 3-23



■ Gallbladder

■ GB forms border of quadrate lobe

■ Caudate lobe between the IVC and Portal

■ Right Adrenal Gland

■ Splenic Flexure

■ Large Portal Vein

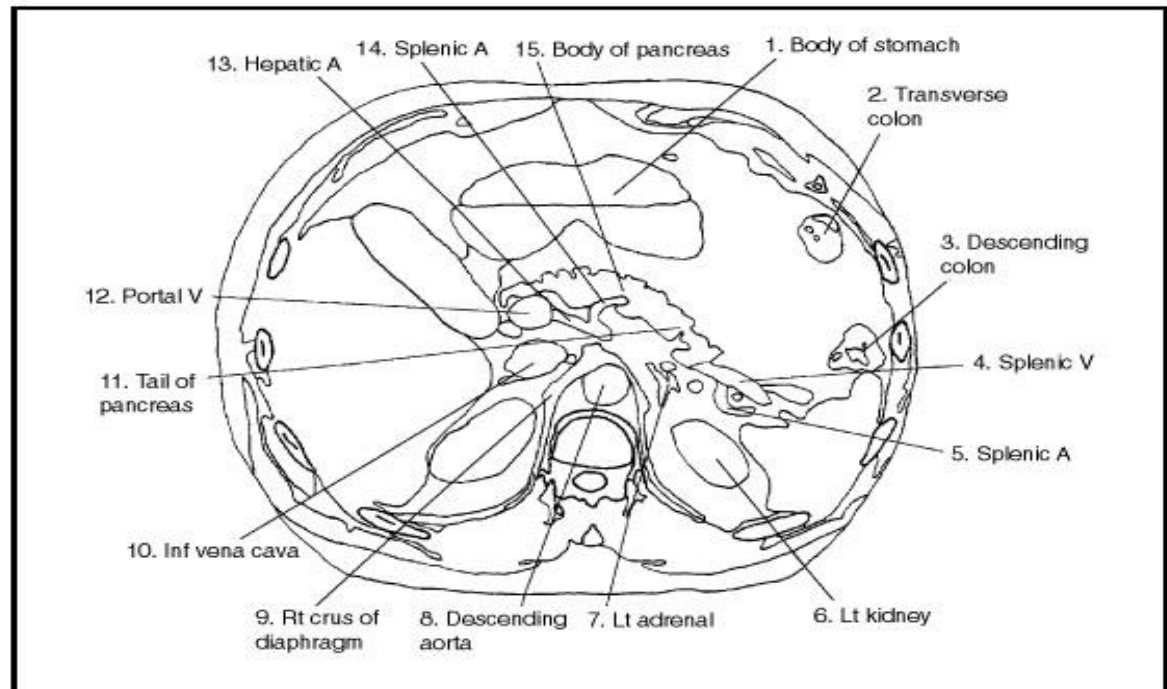
■ Celiac Artery with hepatic and splenic arteries

■ Pancreas

■ Splenic Vein – larger and more linear than artery

■ Left Adrenal

Figure 3-25



- Pyloric antrum around head of pancreas, portal vein & common bile duct

- Celiac Trunk
- Splenic Vein
- Left Adrenal
- What Else?

Figure 3-26

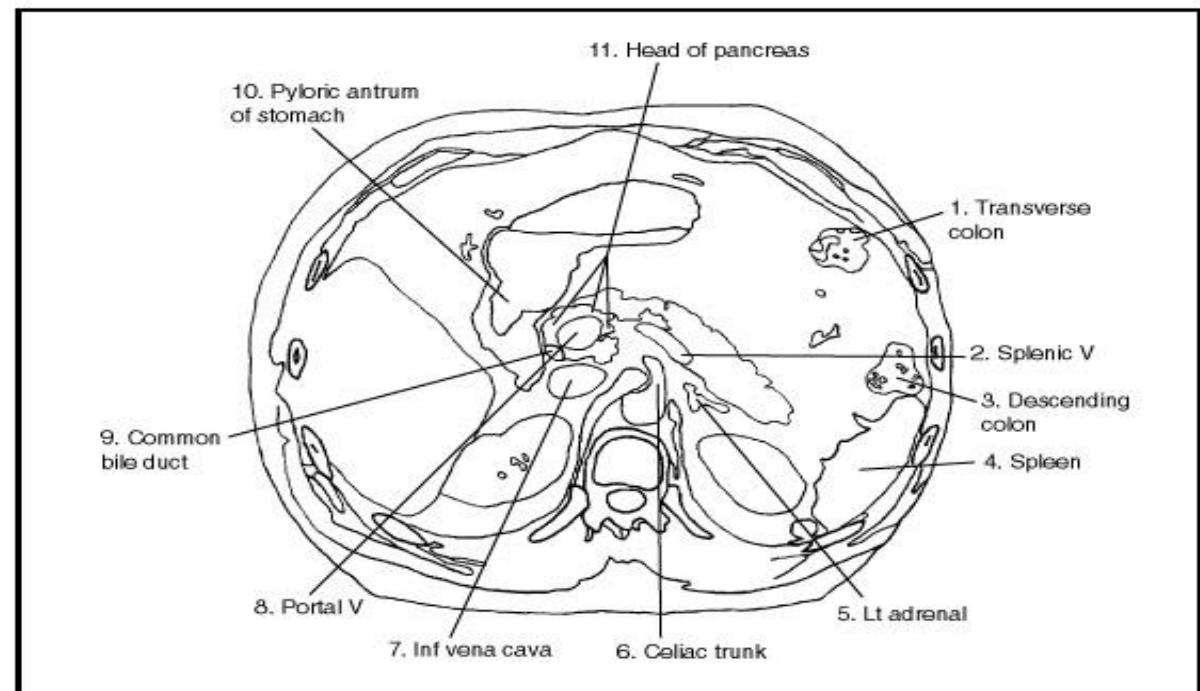
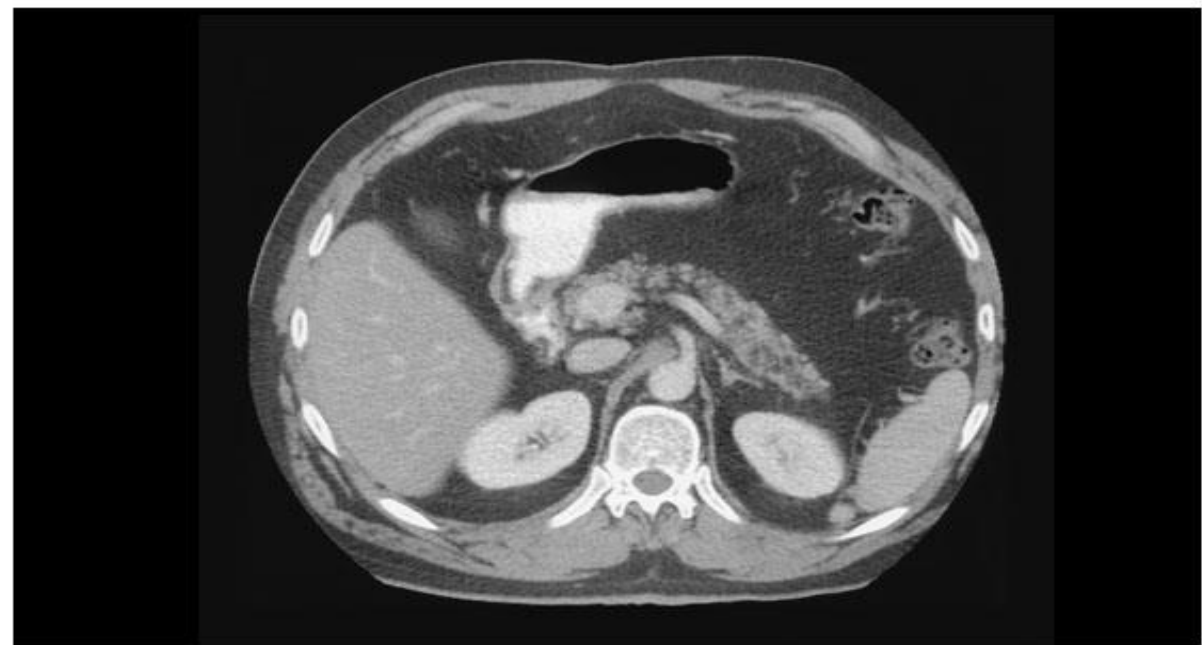
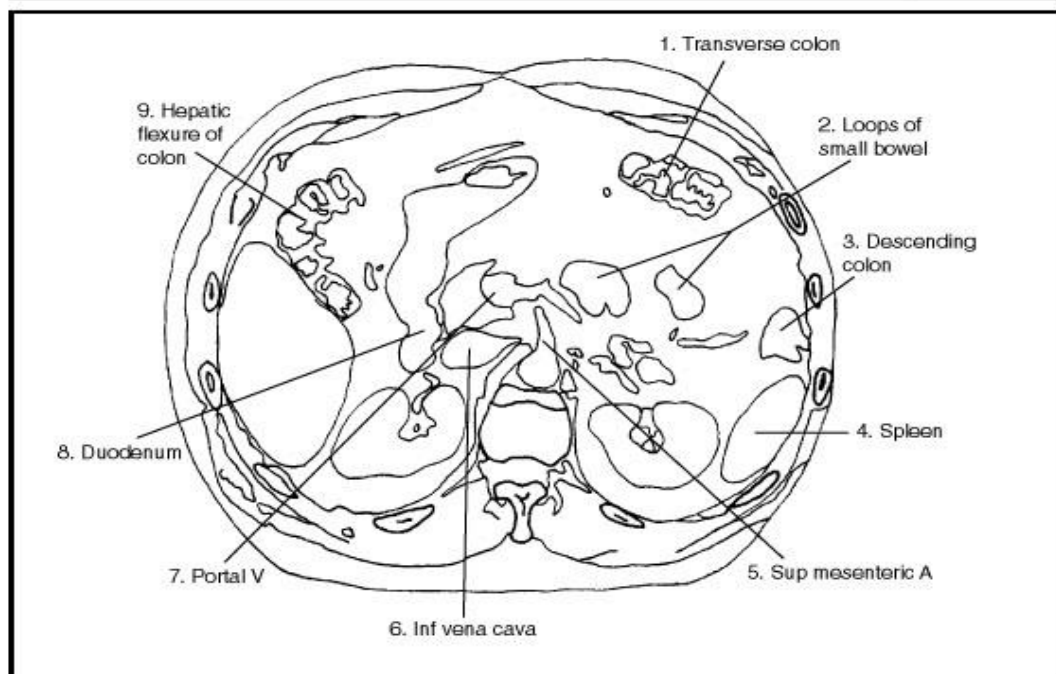
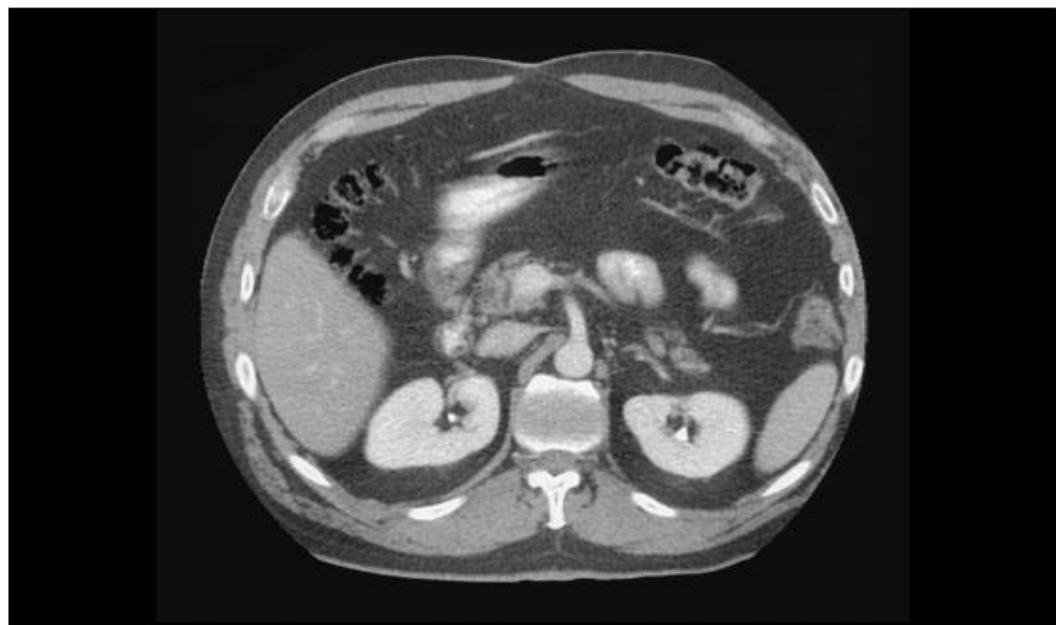


Figure 3-28



- Duodenum next to head of pancreas

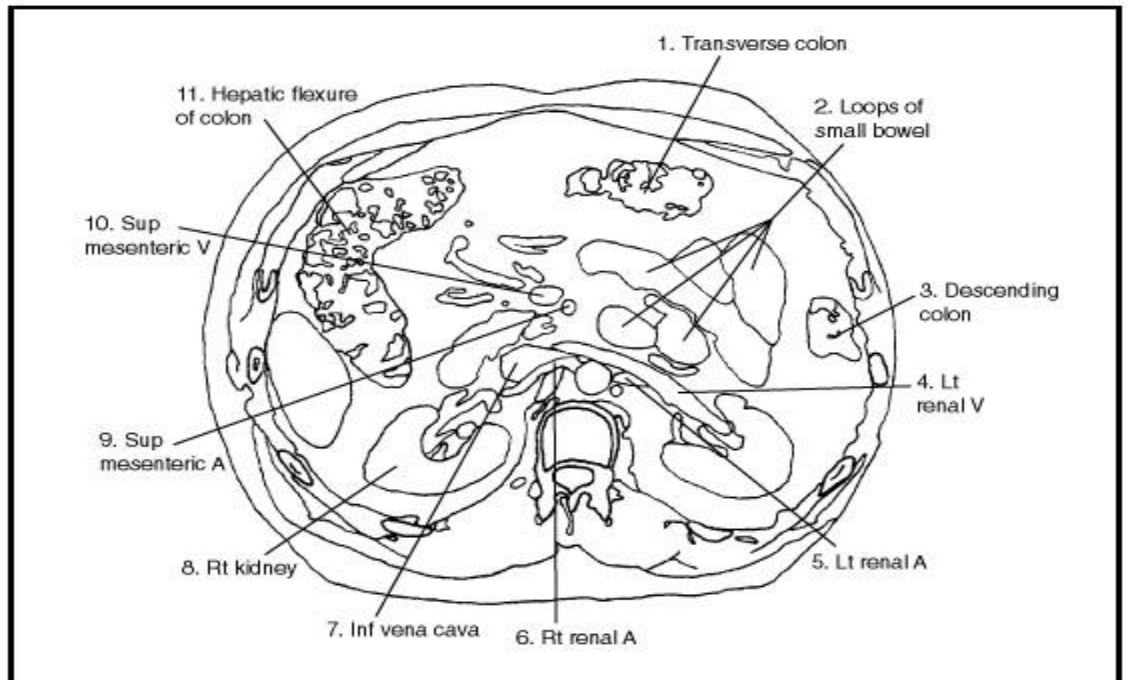
- Portal Vein

- SMA off the aorta

- At mid-kidney level

- On next images the SMV is to the right

Figure 3-30



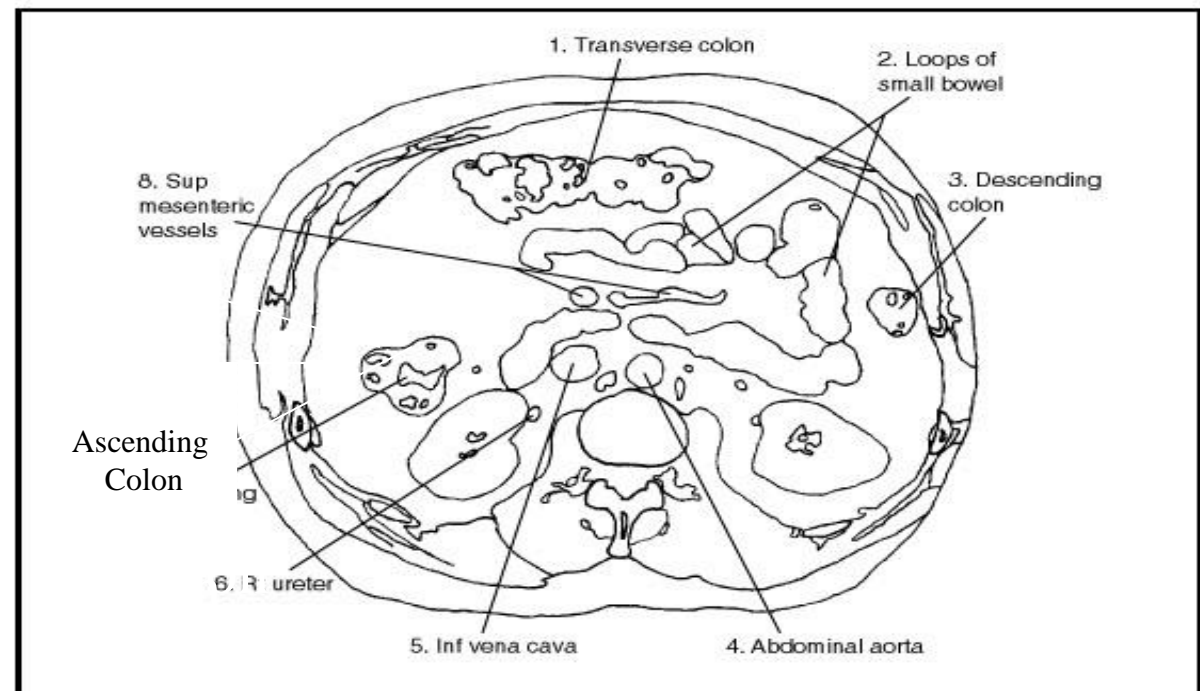
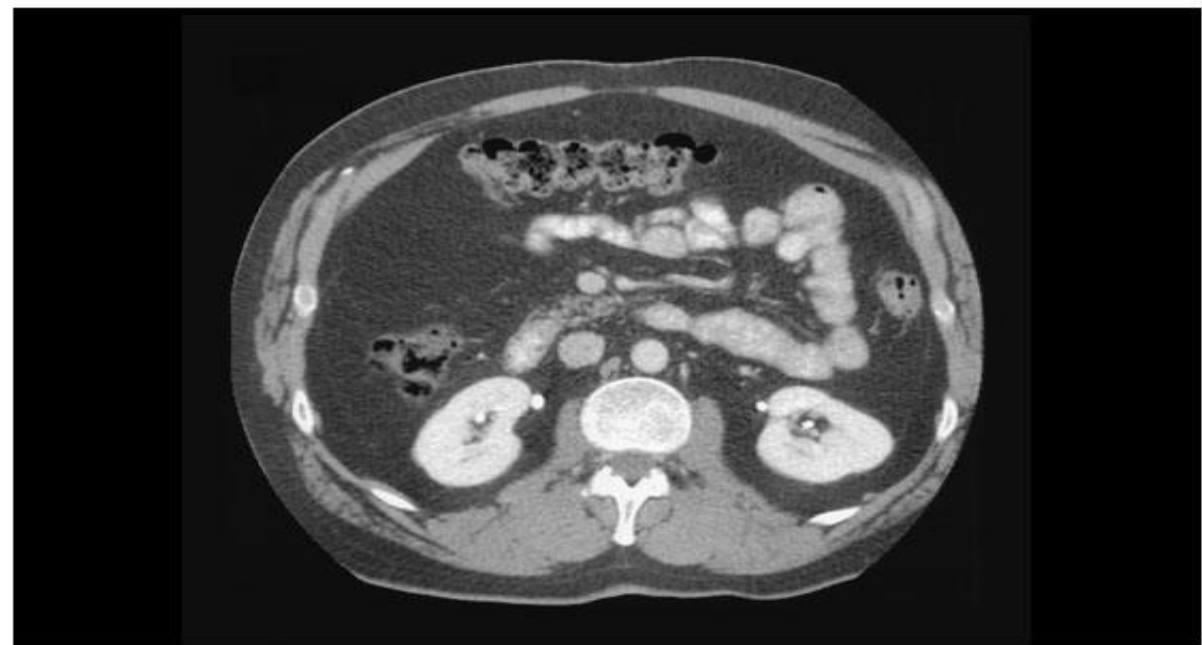
- Transverse Colon along anterior abdominal wall

- SMA and SMV are thru head of pancreas

- Loops of small intestine

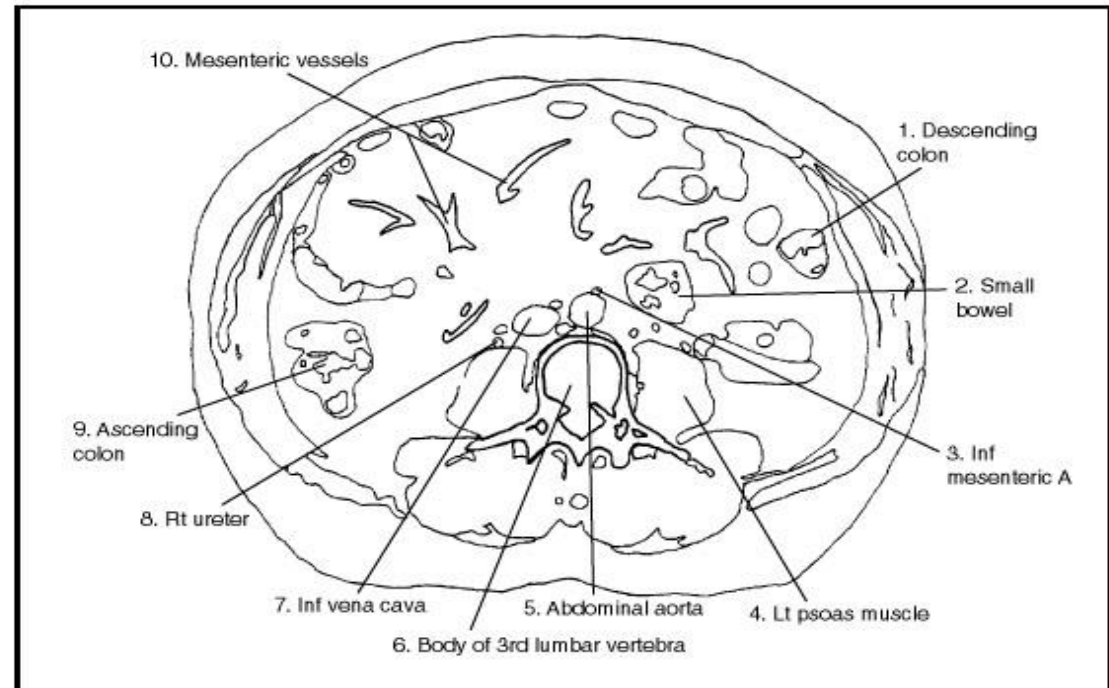
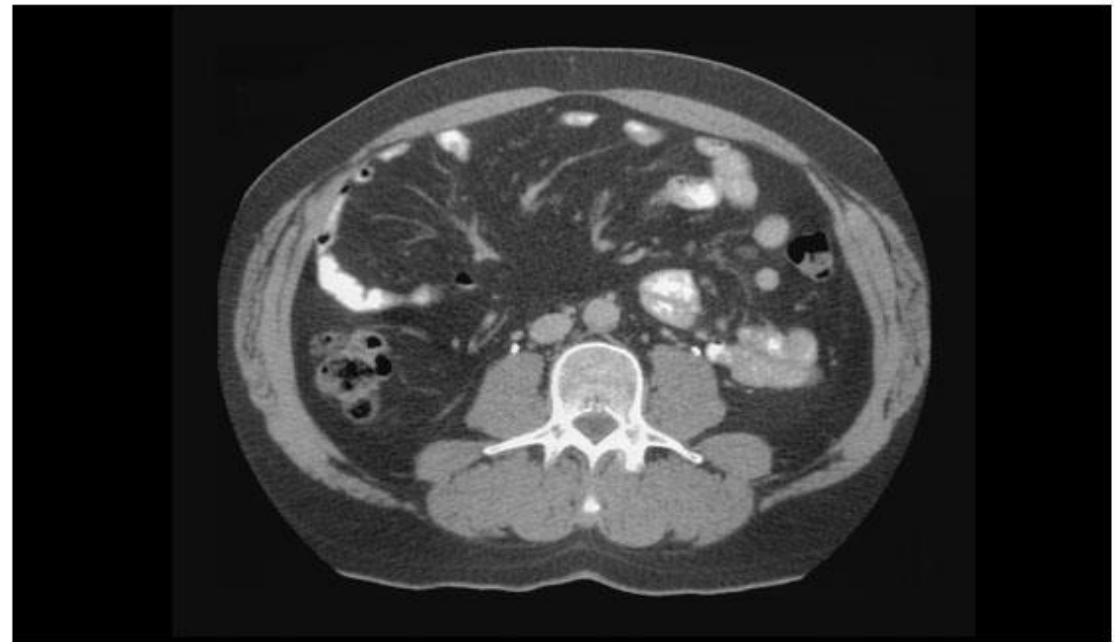
- Left renal vein

Figure 3-32



- Ureters in peri-renal fat
- Mesentery around loops of small bowel
- Mesenteric vein and artery
 - Artery has branches into mesentery

Figure 3-35

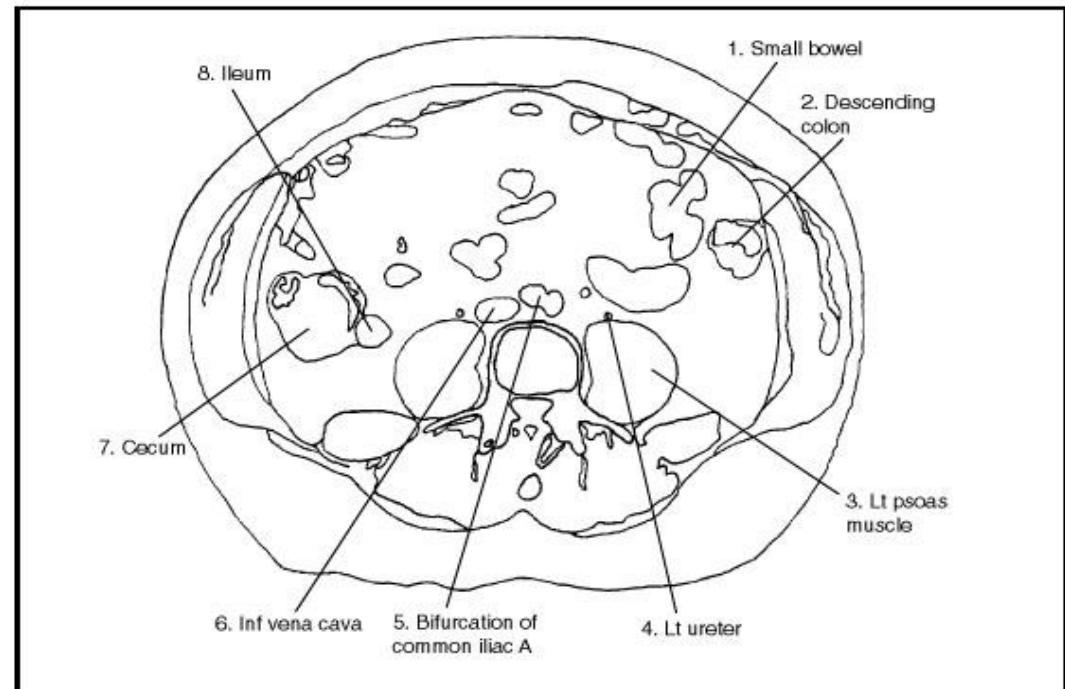
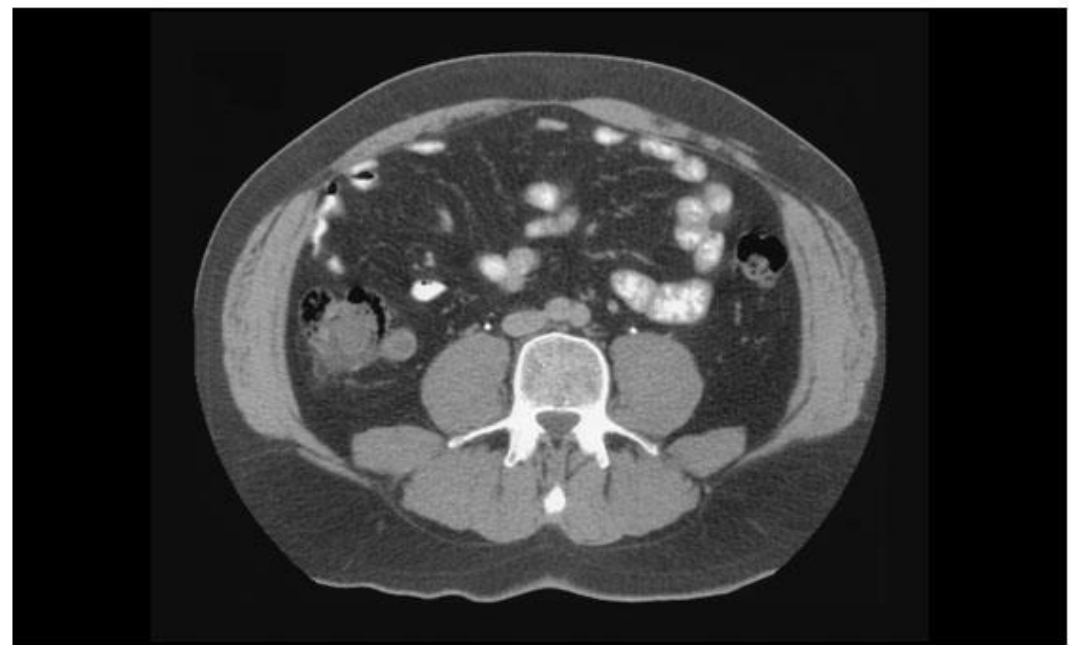


■ Muscles

- Psoas
- Quadratus Lumborum
- External Obl.
- Internal Obl.
- Transversus abdominis
- Rectus abdominis
- Linea alba

■ Inferior Mesenteric artery

Figure 3-37

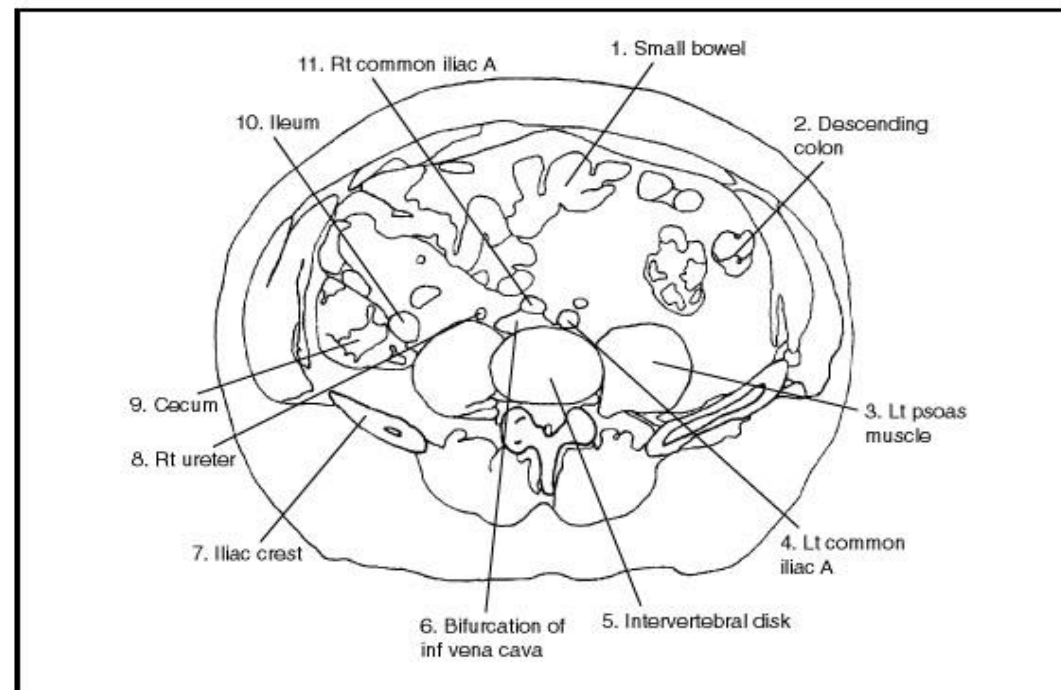


■ Cecum and
Terminal Ileum

■ Note Bifurcation
of the Aorta

■ IVC is to the
right

Figure 3-39



Iliac Crest

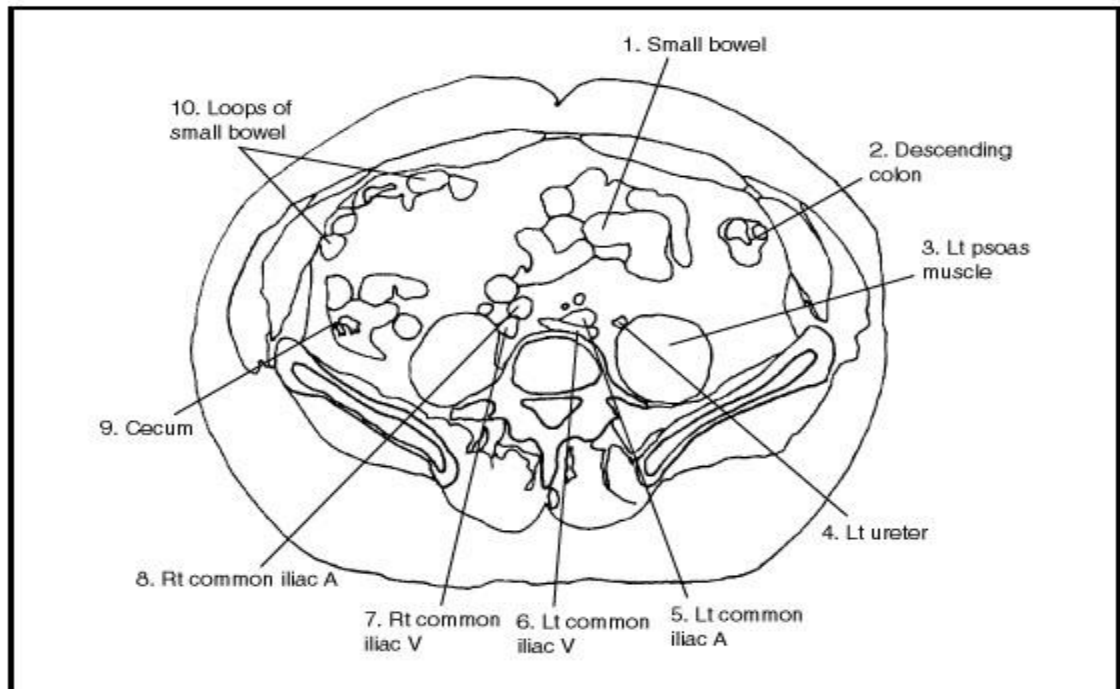
Note Bifurcation of the Inf. V.C.

- Appears flattened

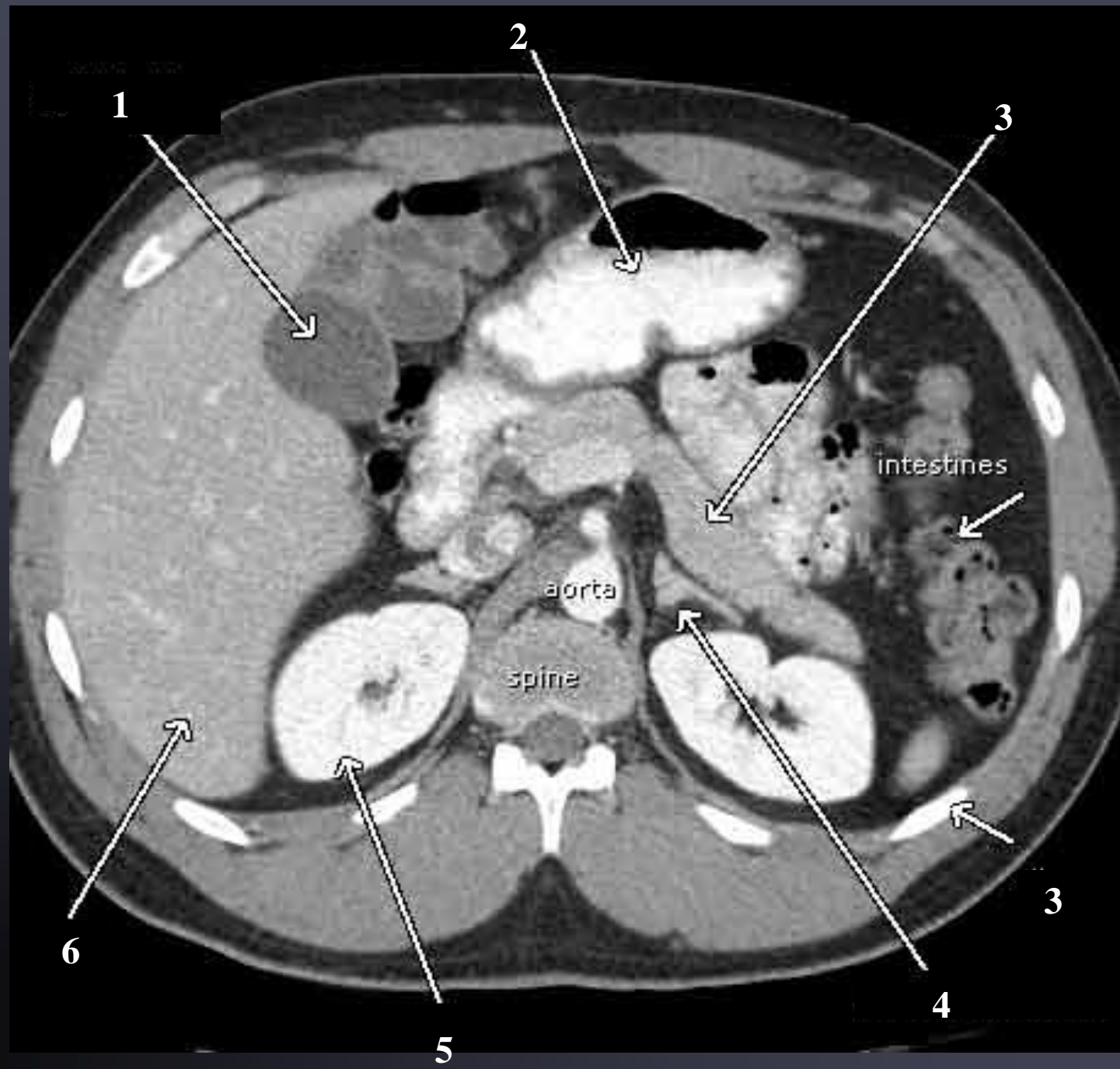
Iliac arteries

- Completely divided
- Right is anterior to IVC

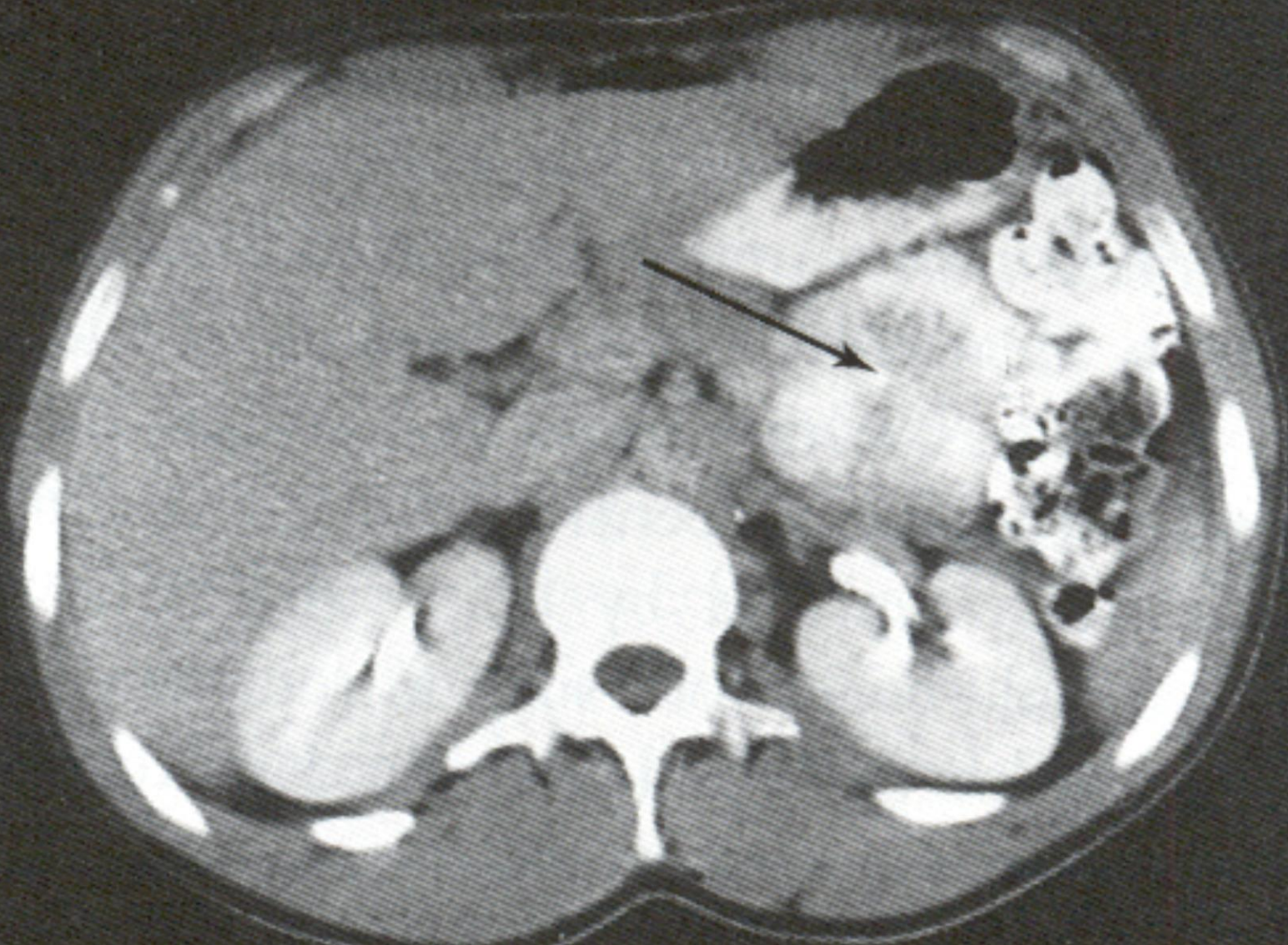
Figure 3-41



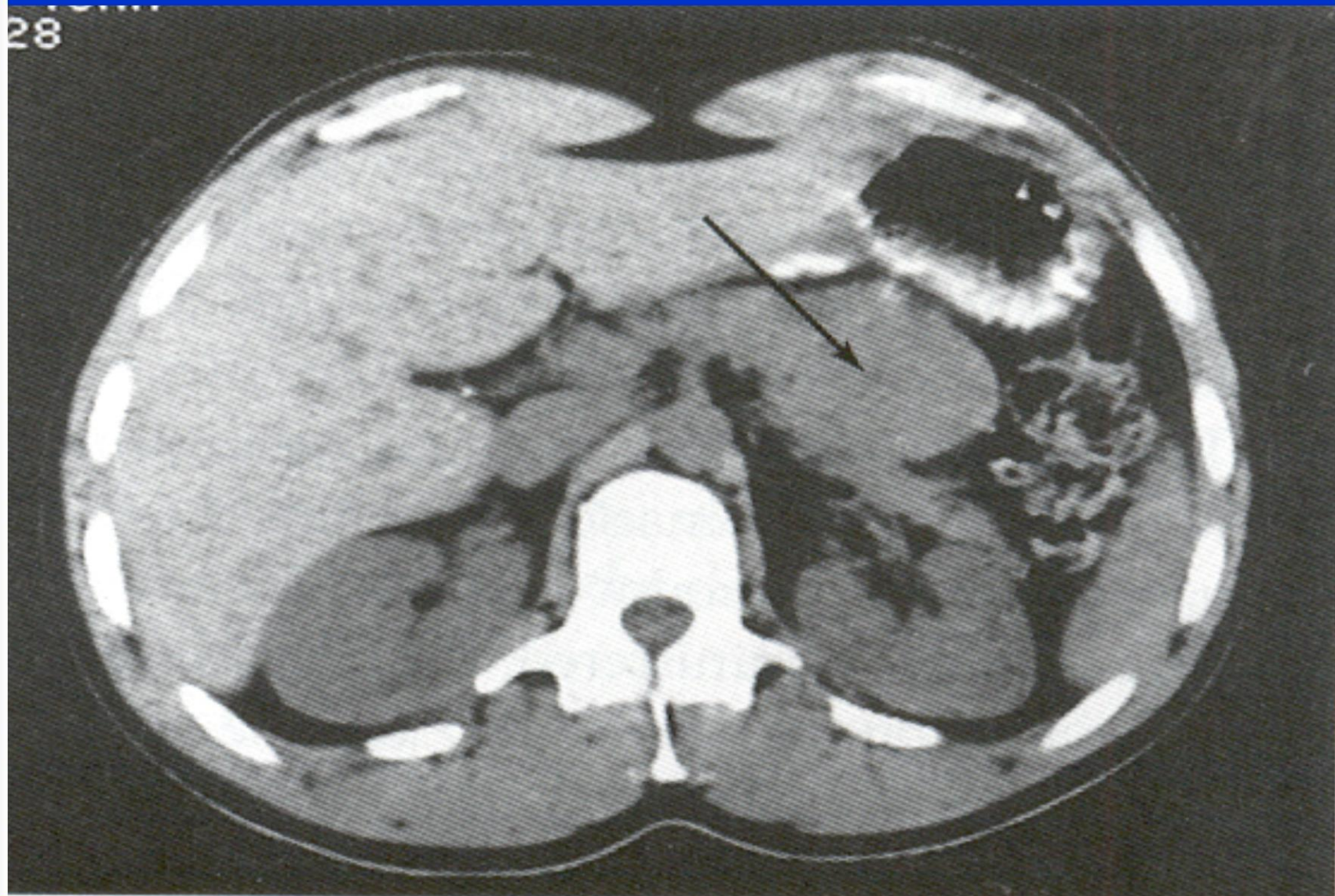
- Iliac crests and L5
- Iliac Arteries Anterior to Veins
- Left Iliac Vein Flattened and Elongated



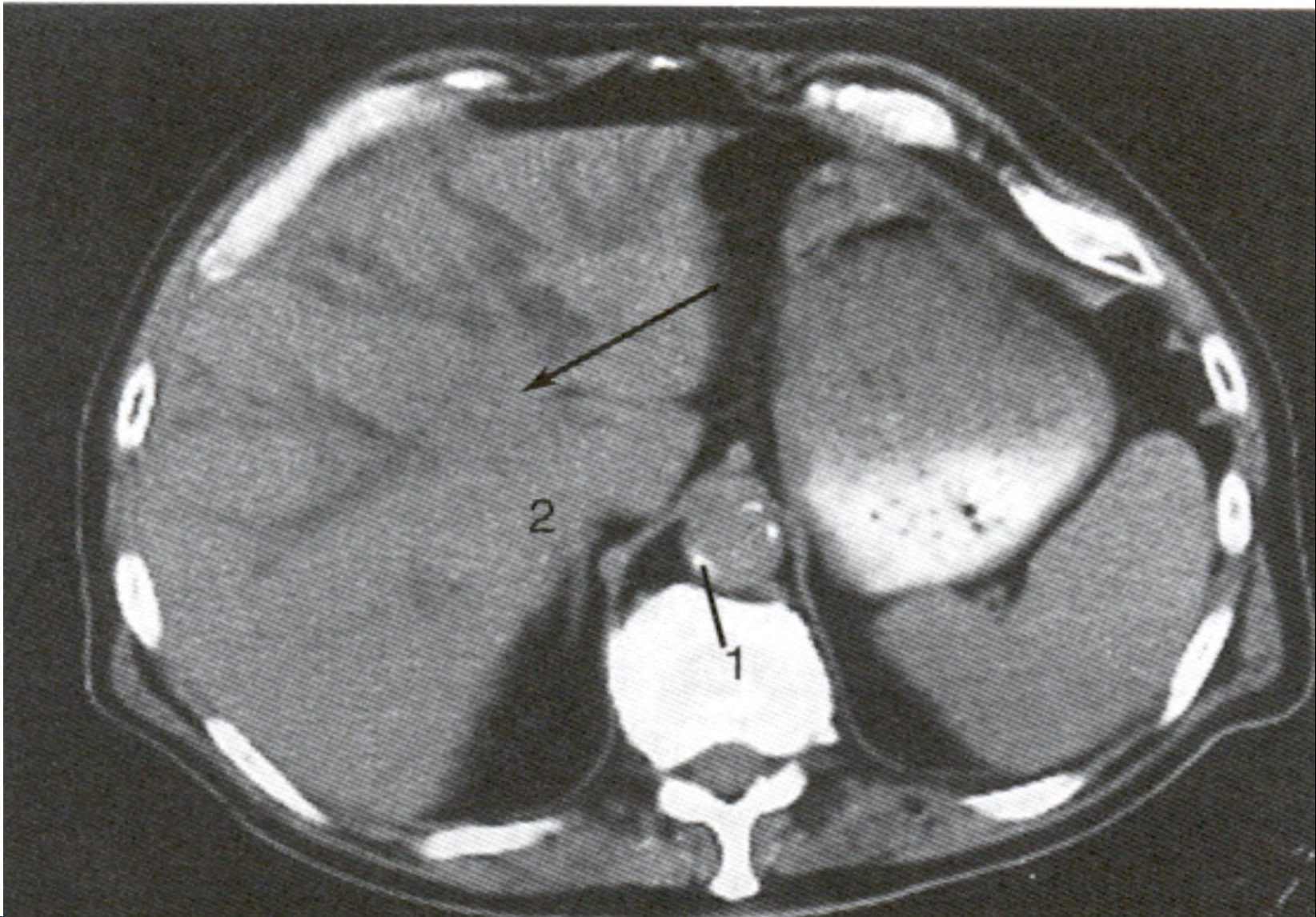
Oral Contrast



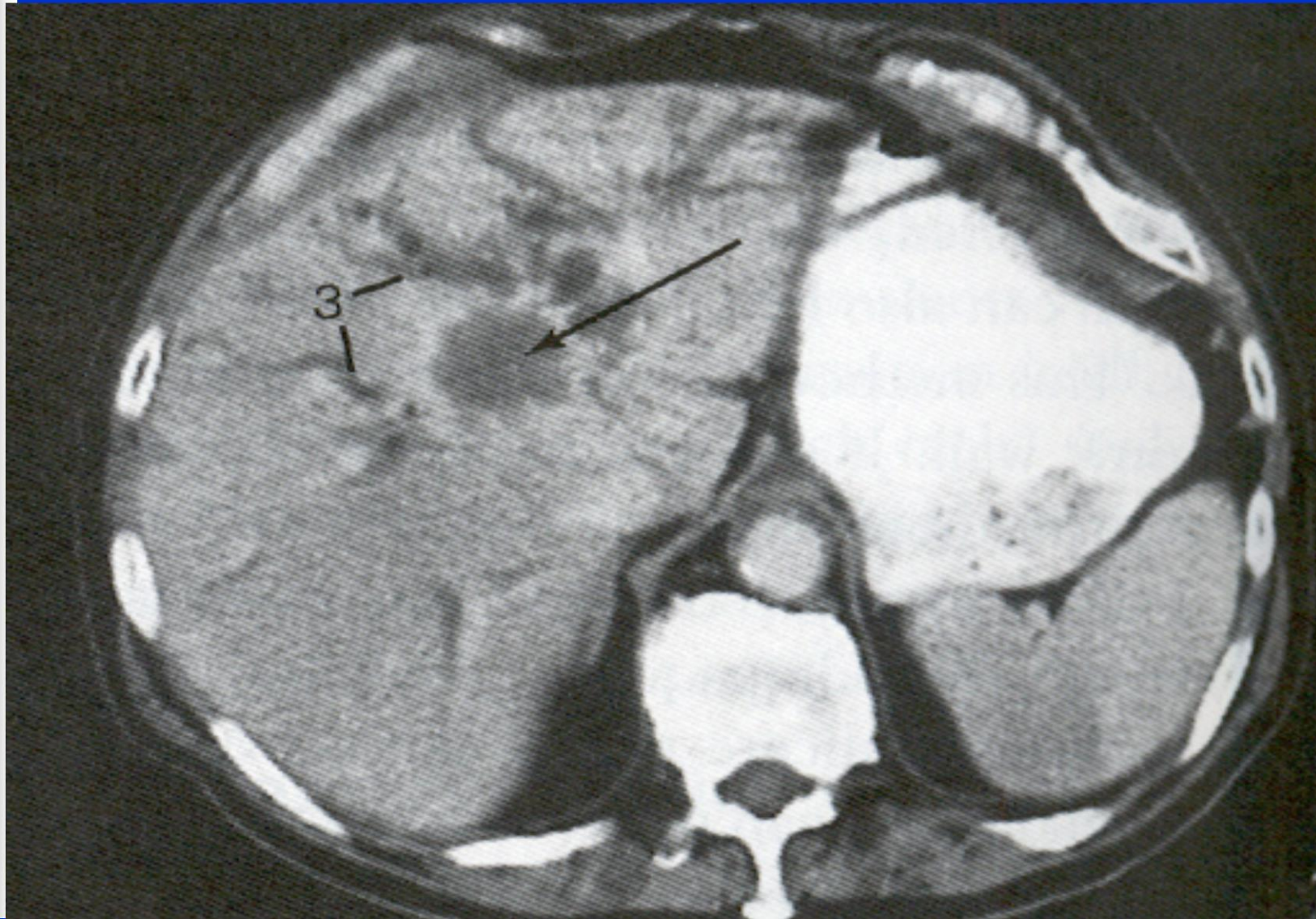
No Oral Contrast

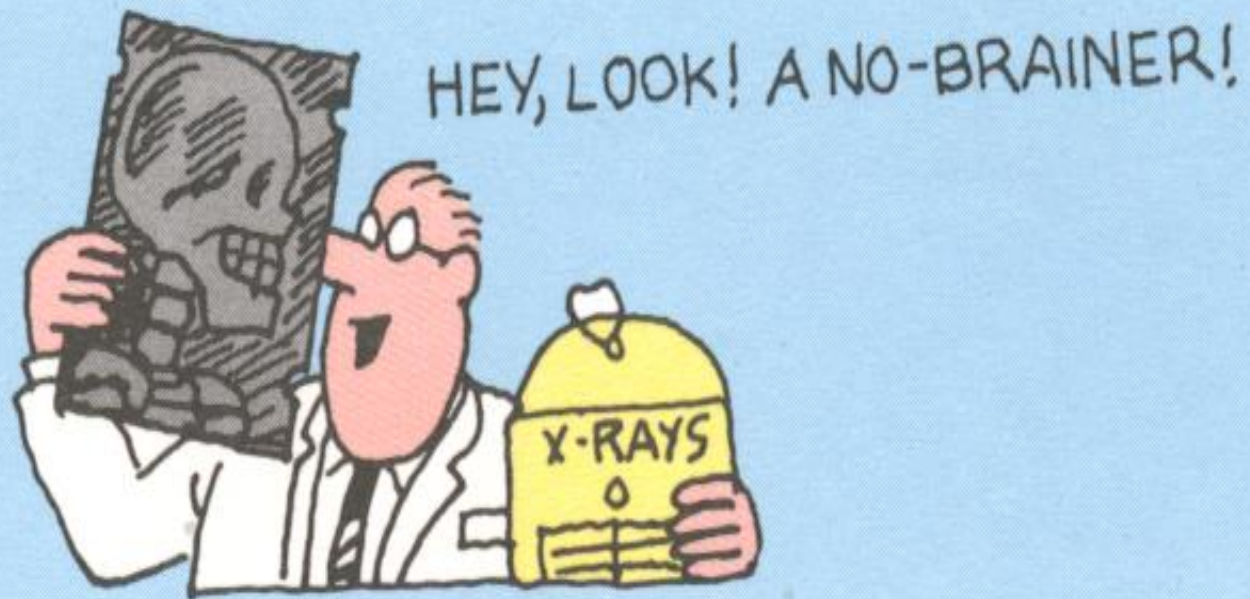


No IV Contrast



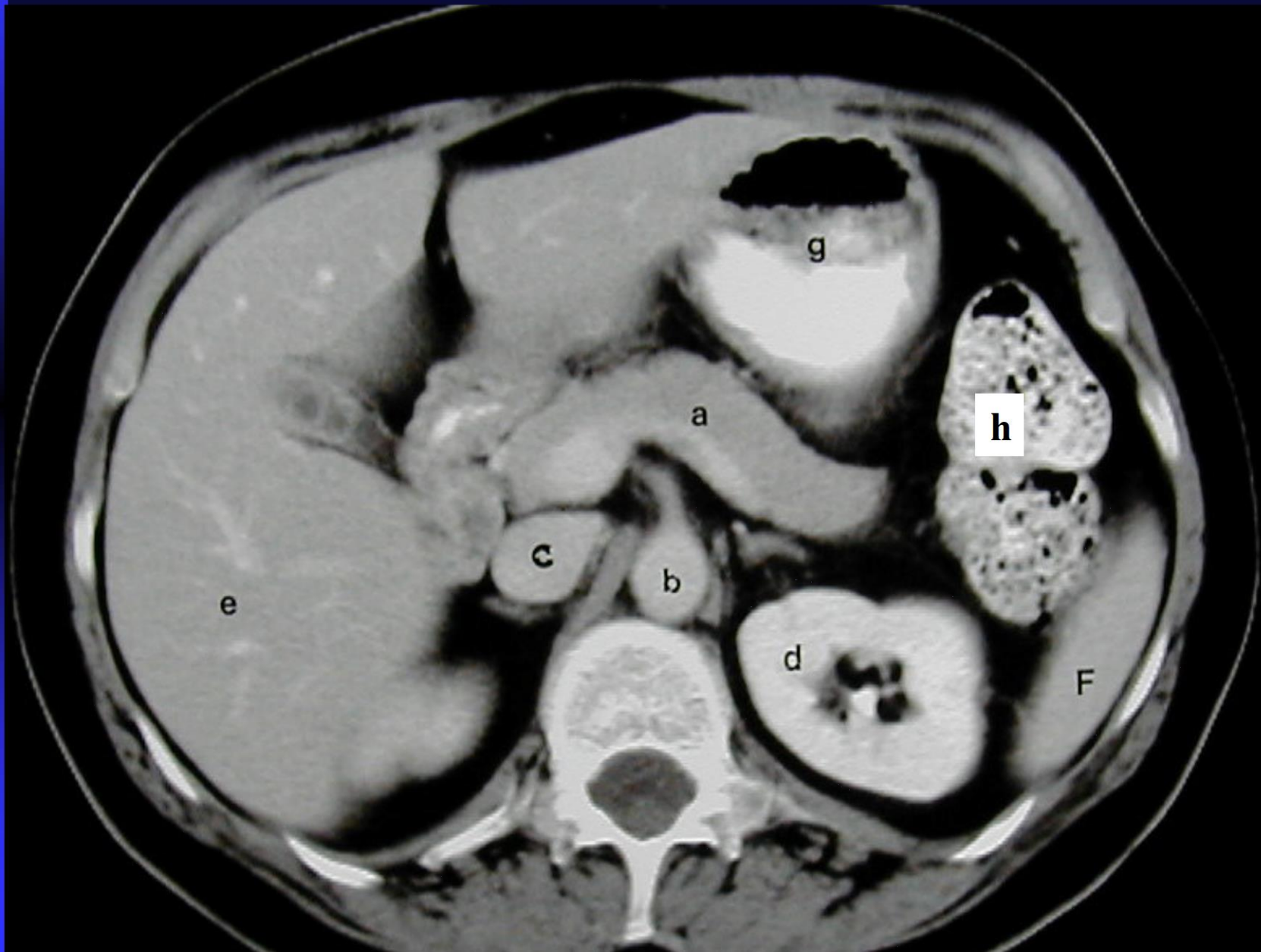
With IV Contrast

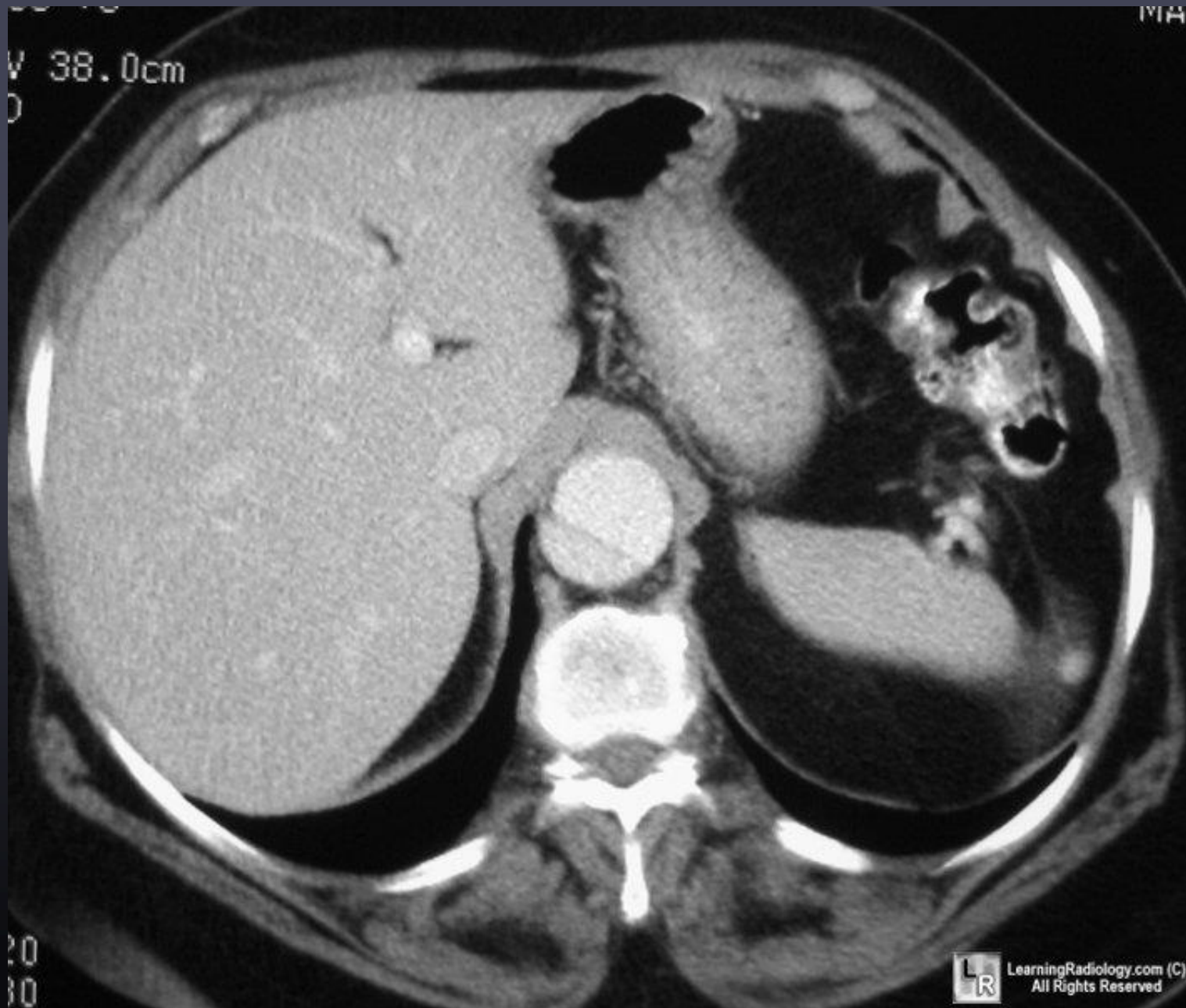




Review Time— A No Brainer

Identify a-h





174

V 38.0cm
0

20
30



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