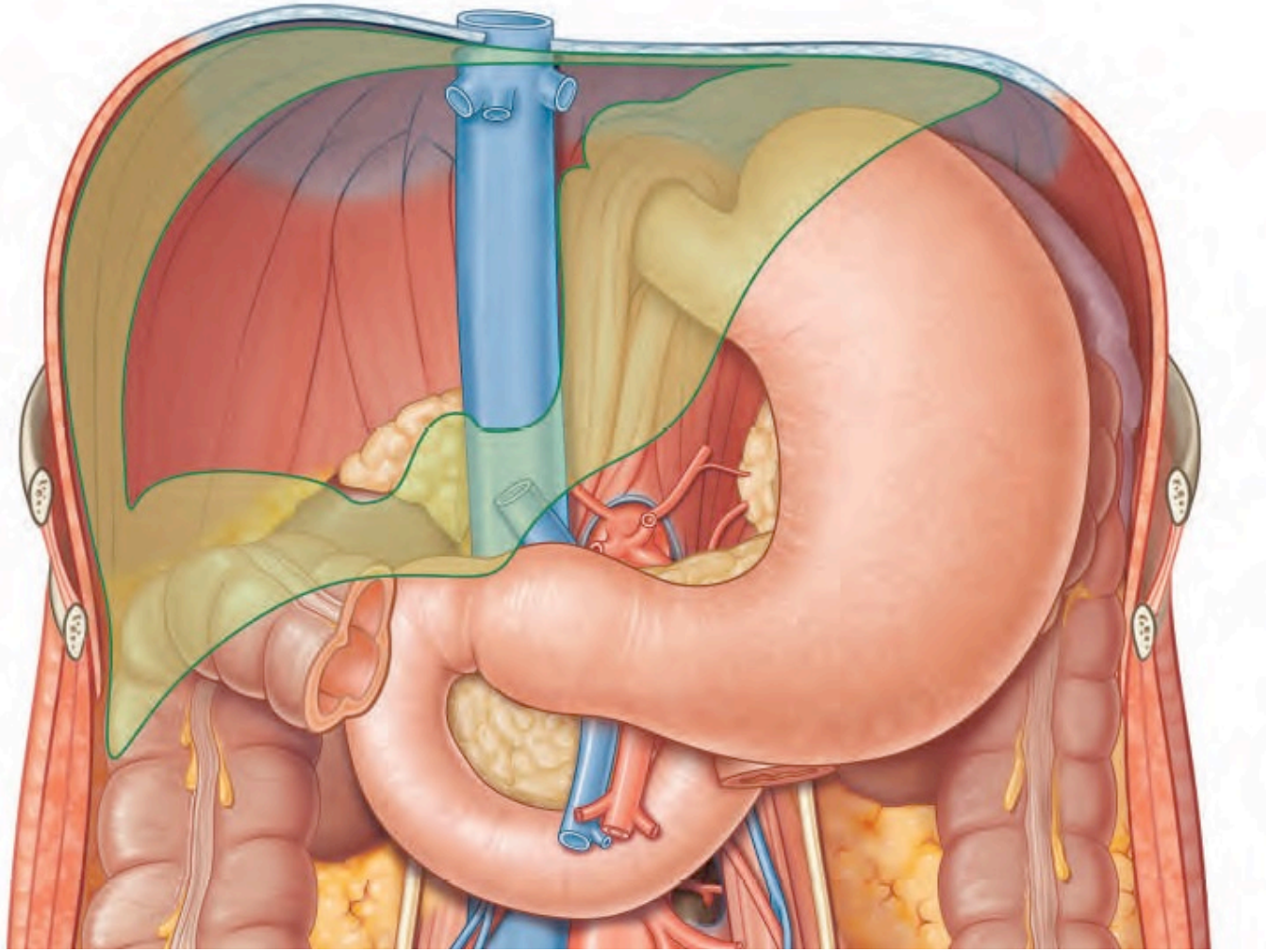
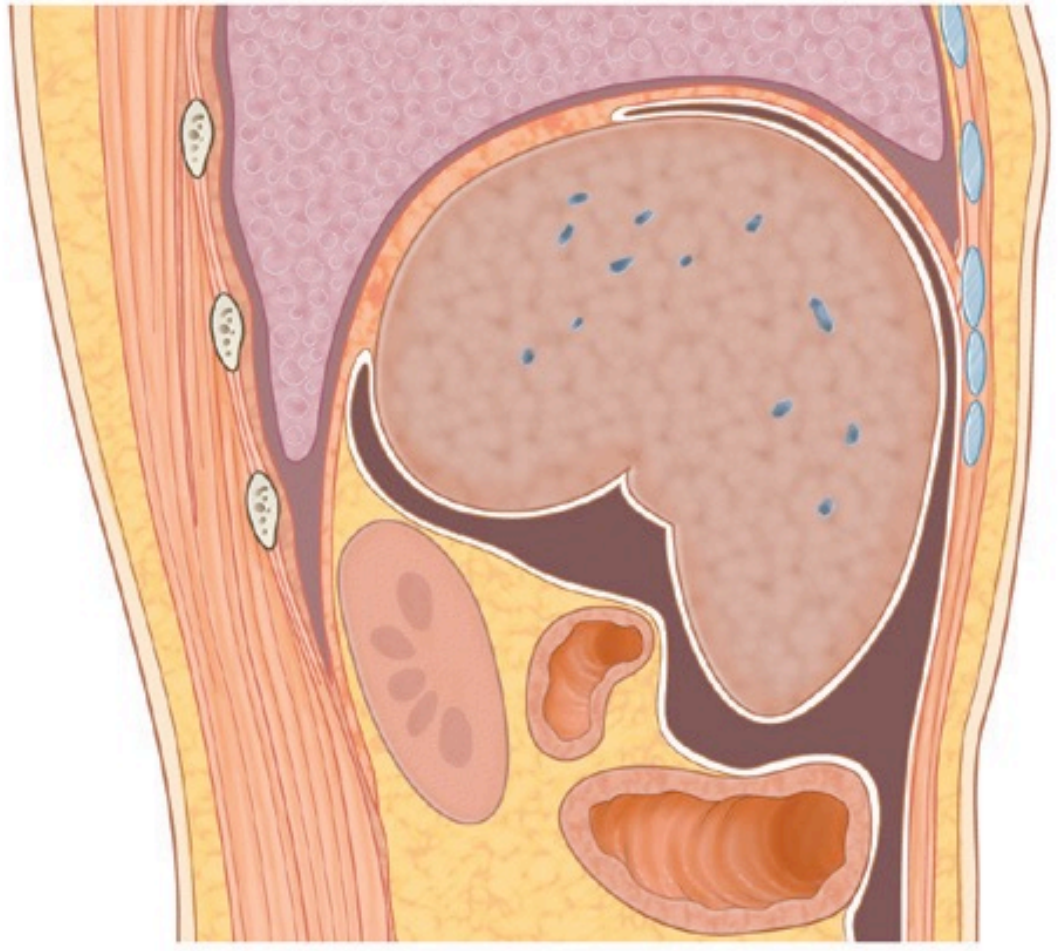
ABDOMEN 4

Prof. MUDr. Jiří Ferda, Ph.D.



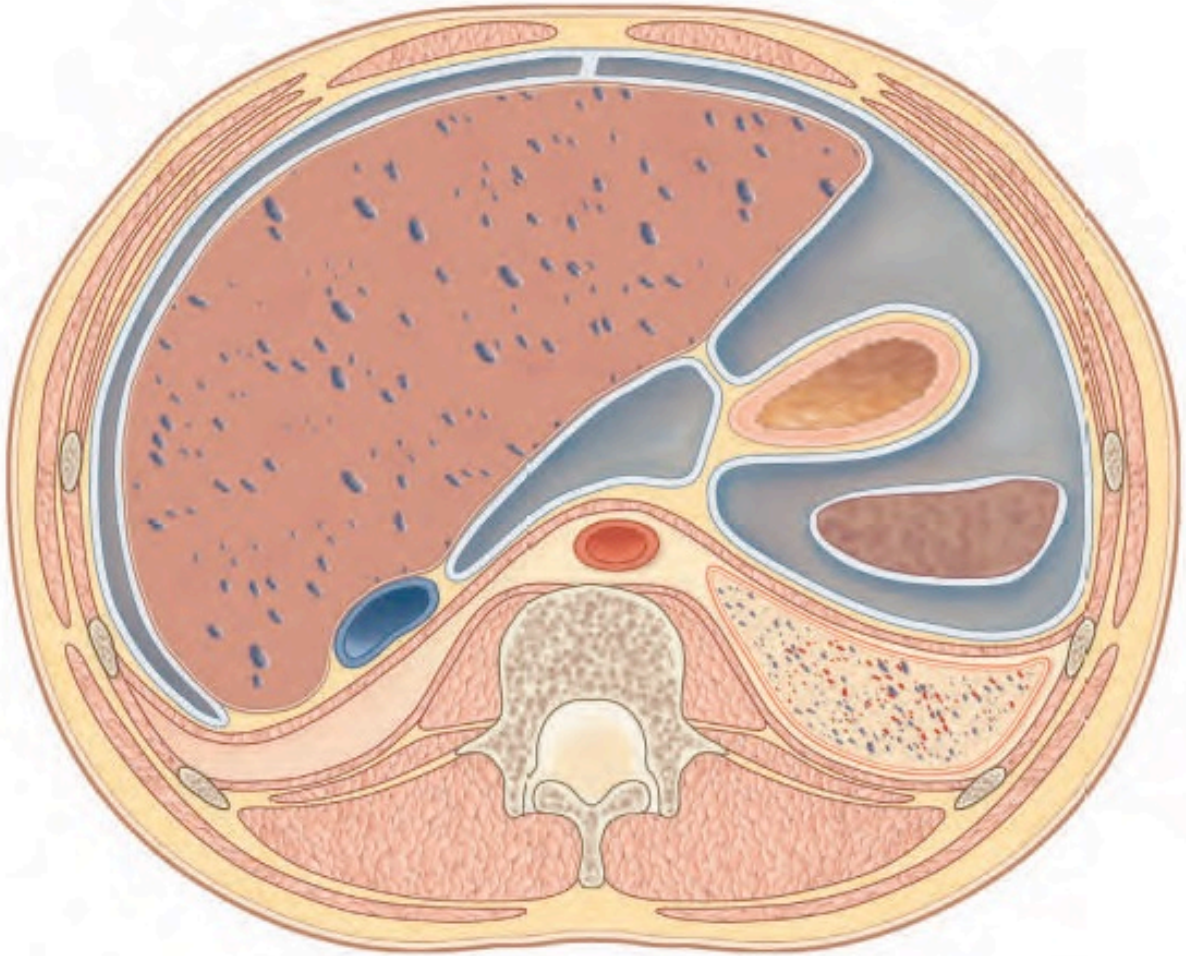
- Liver
- Biliary system
  - intrahepatic
  - Gall bladder
  - extrahepatic
- Pancreas
  - Pancreatic duct
- Duodenum
  - Papilla duodenalis major (et minor)

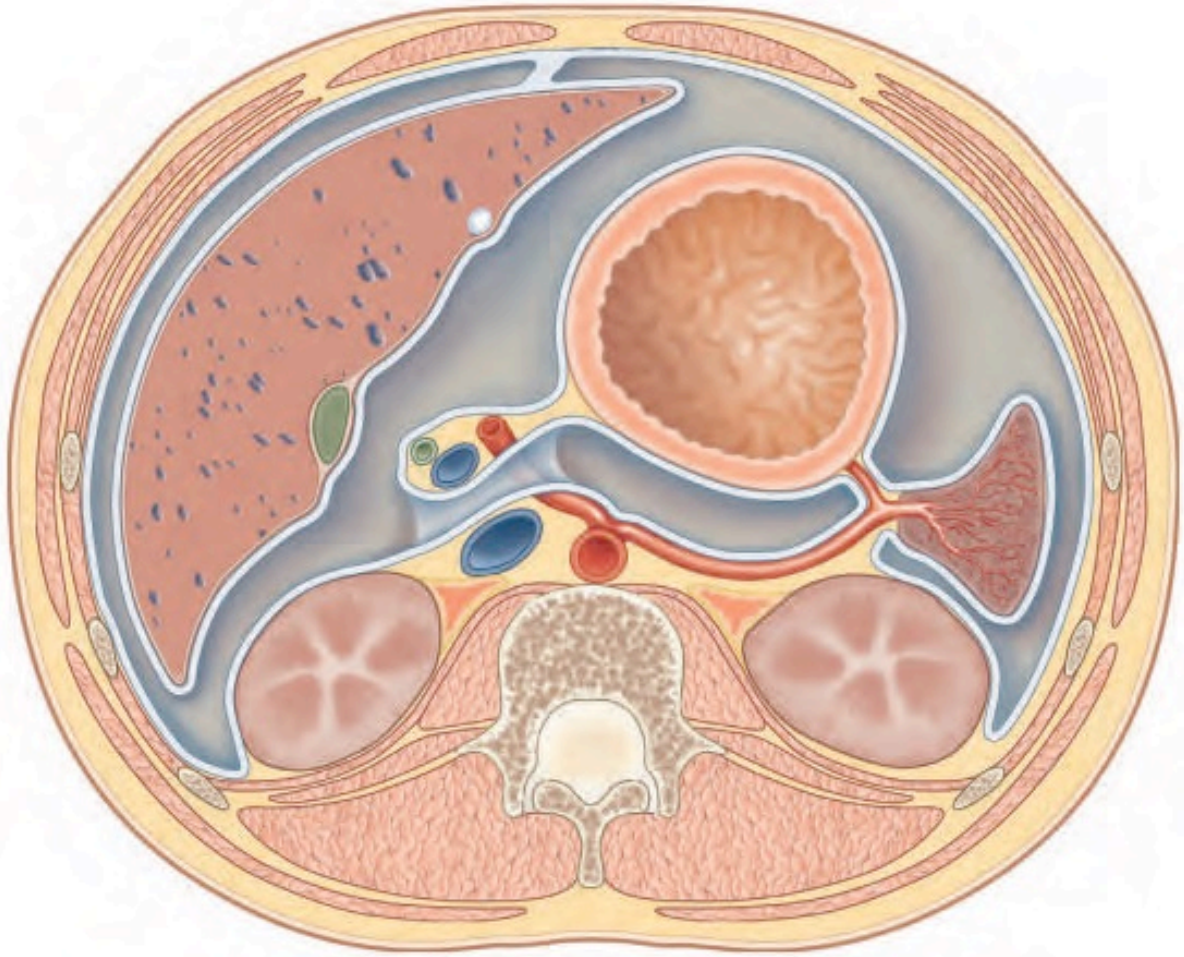
HEPATOBILIARY SYSTEM



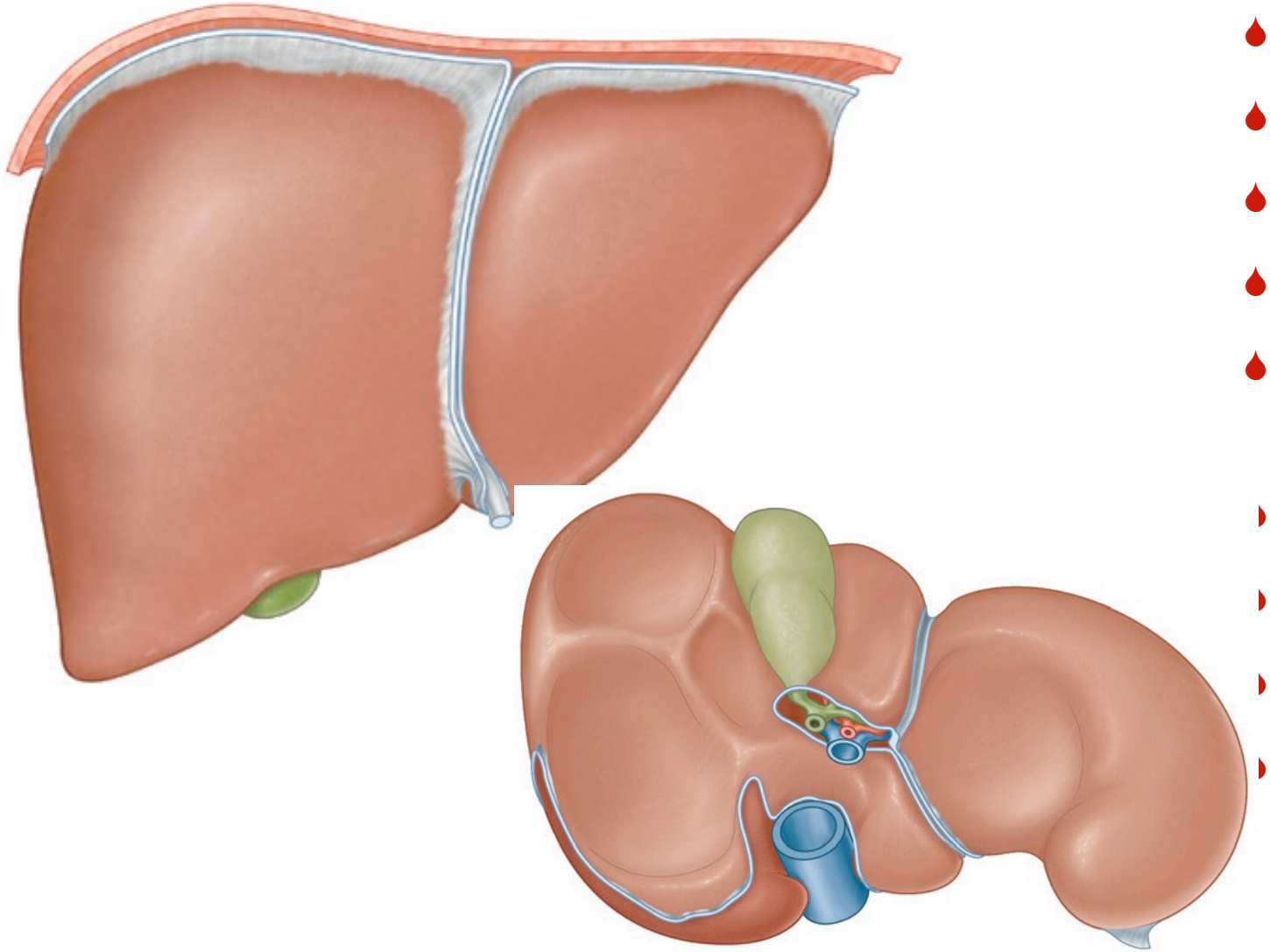
- Recessus subdiaphragmaticus
- Recessus hepatorenalis (morrisoni)

LIVER POSITION



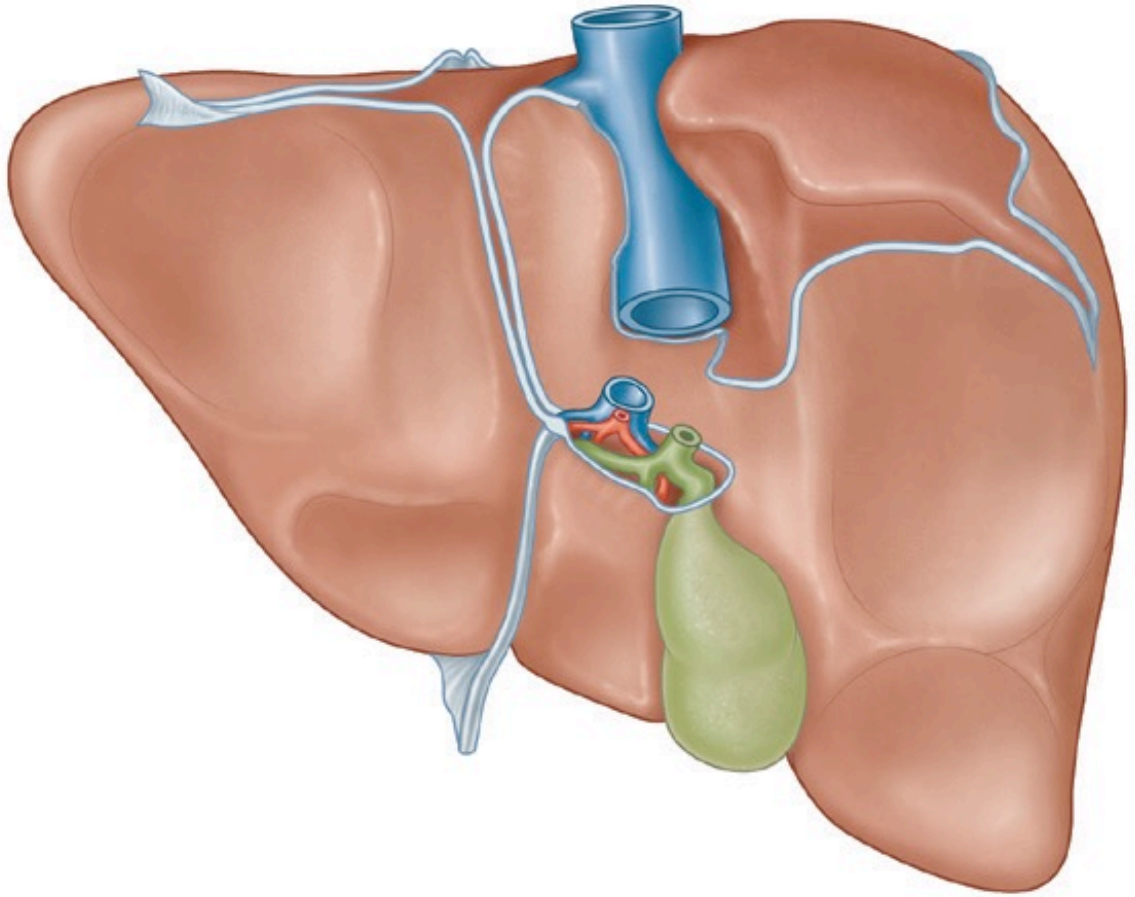


LIVER POSITION



- 1,5 kg, right below diaphragm
- Ligamentum teres hepatis
- Ligamentum venosum
- Ligamentum falciforme
- Ligamentum triangulare sinustrum
  - Appendix fibrosum
- Ligamentum triangulare dextrum
- Ligamentum coronarium anterior
- Ligamentum coronarium posterior
- Pars affixa (area nuda)

HEPAR



- 1,5 kg
- Ligamentum teres hepatis
- Ligamentum venosum
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- Ligamentum triangulare sinustrum
  - Appendix fibrosum
- Ligamentum triangulare dextrum
- Ligamentum coronarium anterior
- Ligamentum coronarium posterior
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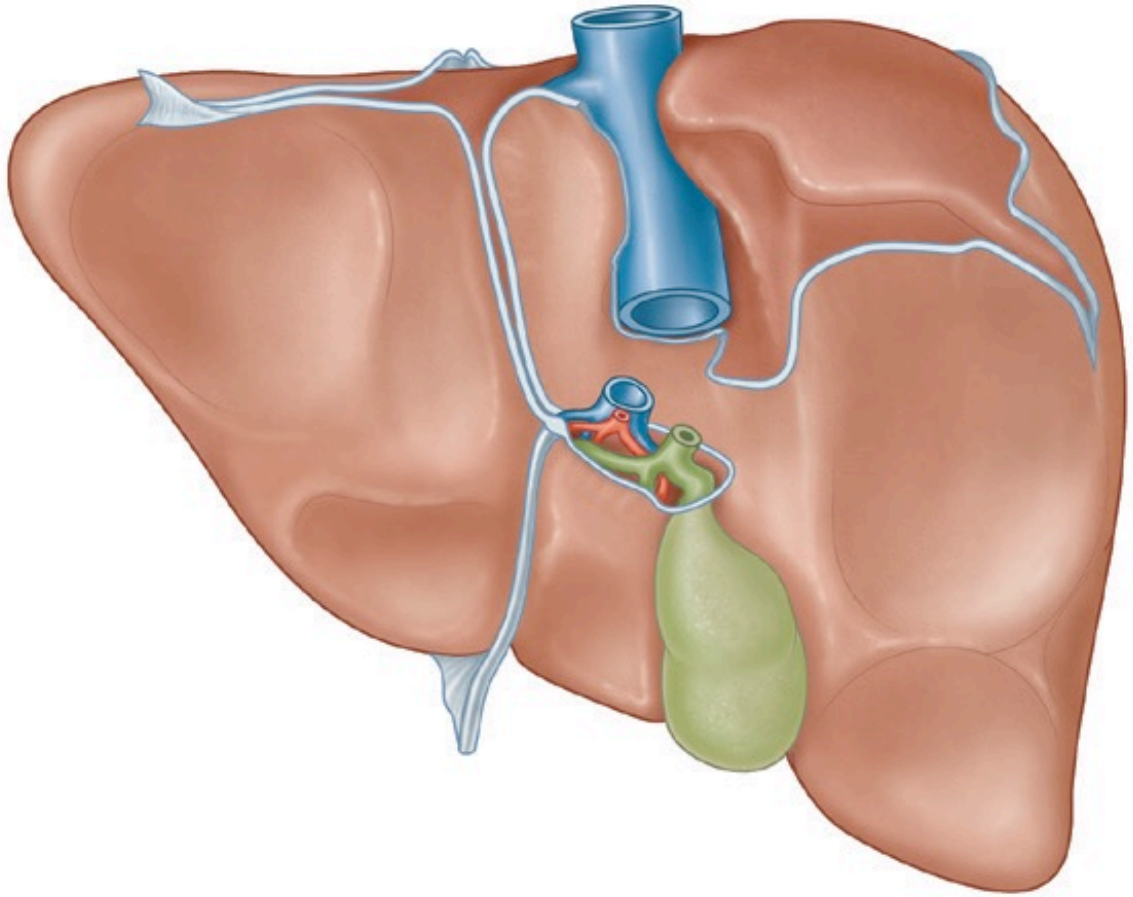
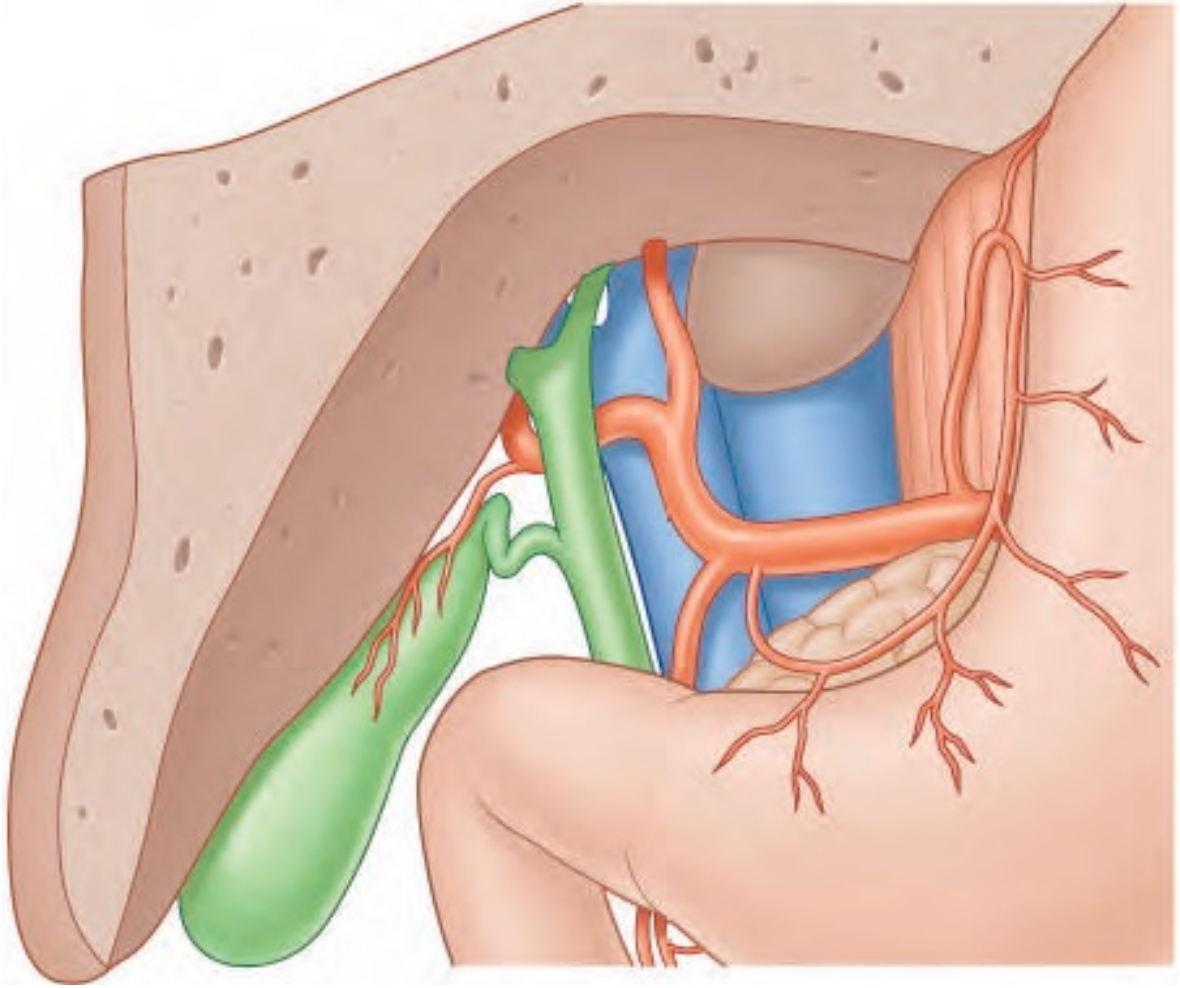
HEPAR



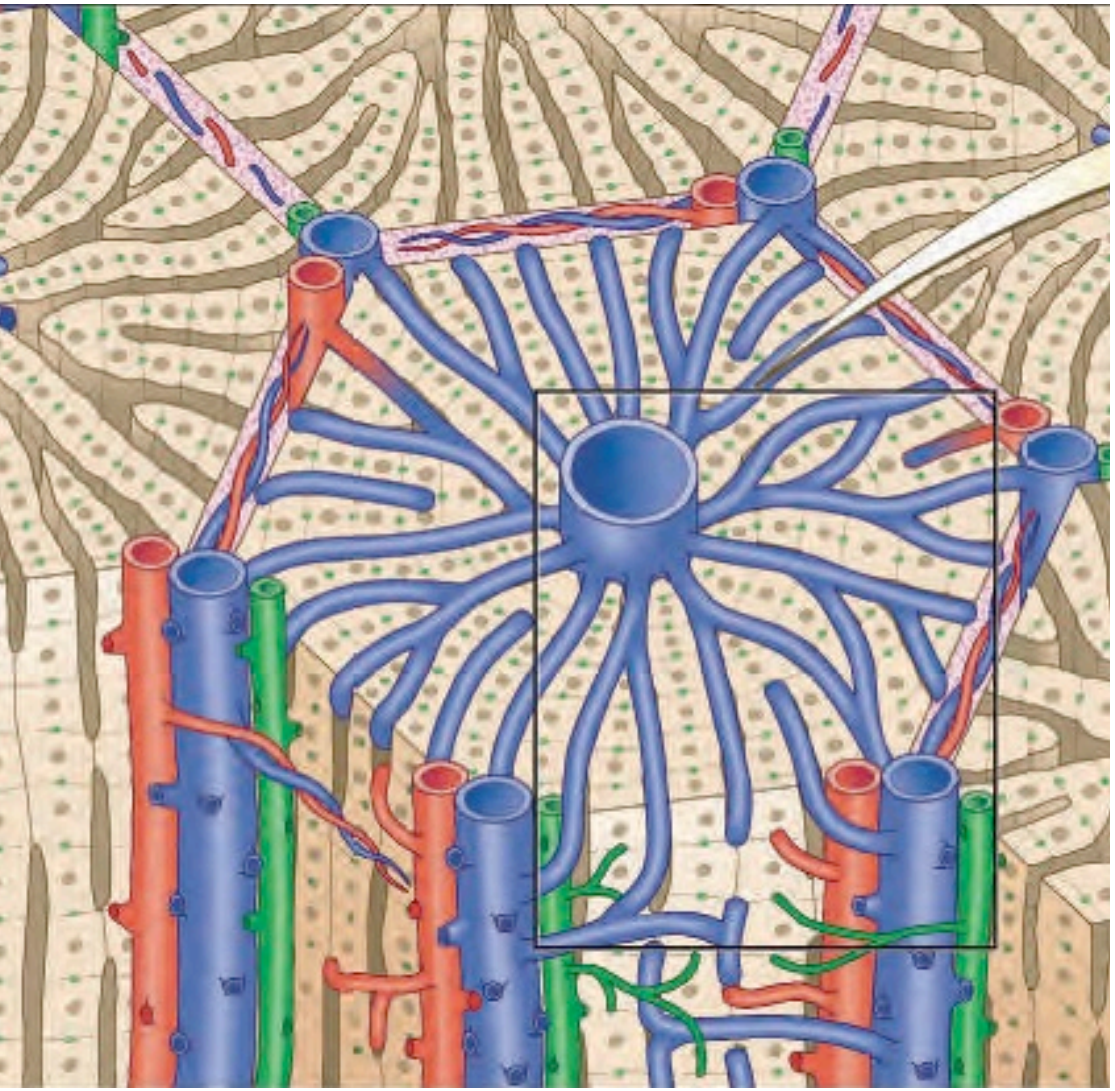
- Fissura sagittalis dextra
  - Sulcus venae cavae inferioris
  - Fossa vesicae felleae
- Fissura sagittalis sinistra
  - Ligamentum venosum Arantii (ductus venosus)
  - Ligamentum teres hepatis - v. umbilicalis
- Porta hepatis (zprava doleva)
  - dc. hepaticus, v. portae h., a. hepatica propria
- Lobus dexter
- Lobus sinister
- Lobus caudatus
- Lobus quadratus

HEPAR



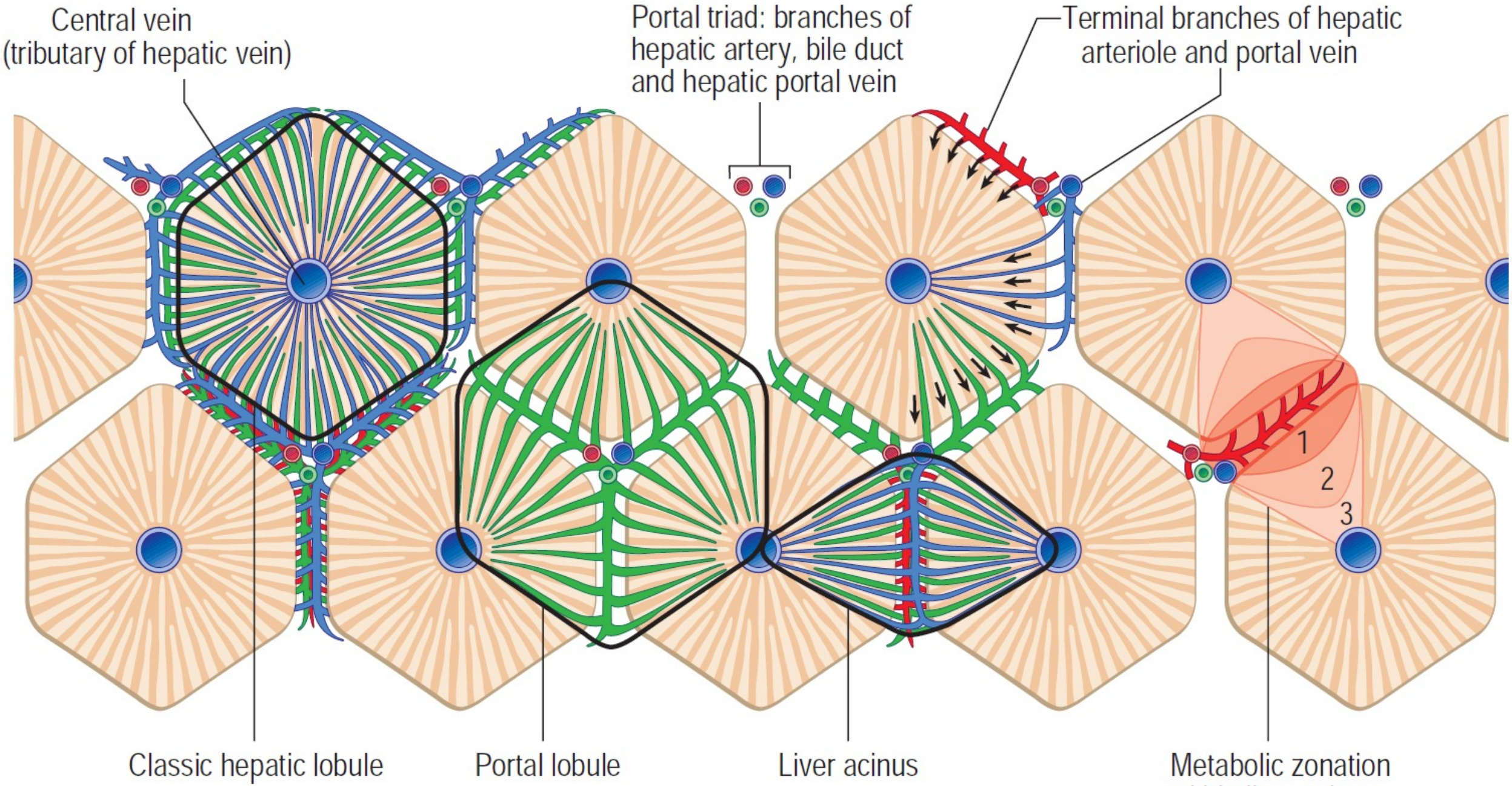
- nutritive
- A. hepatica propria
  - Glucose a O2
- functional
  - V. portae hepatis
    - Radices v. portae - v. lienalis, v. mesenterica sup, inf
  - Proteins, sacharides, degradation product of ahemoglobine
- Vv. hepaticae

LIVER VASCULATURE



- lobulus hepatis
- Hexagonal prism
- Hepatobilliary spaces
  - Interlobular branches
  - A. interlobularis hepatica
  - V. interlobularis hepatica (v. portae)
  - Ductus interlobularius
- Lobular centre
  - V. centralis
- units
  - Morfological - lobulus
  - Functional - portal lobulus triangular vv . Hep.
  - Smallest functional - primary acinus - lobulus v. circumlobularis

MICROSTRUCTURE



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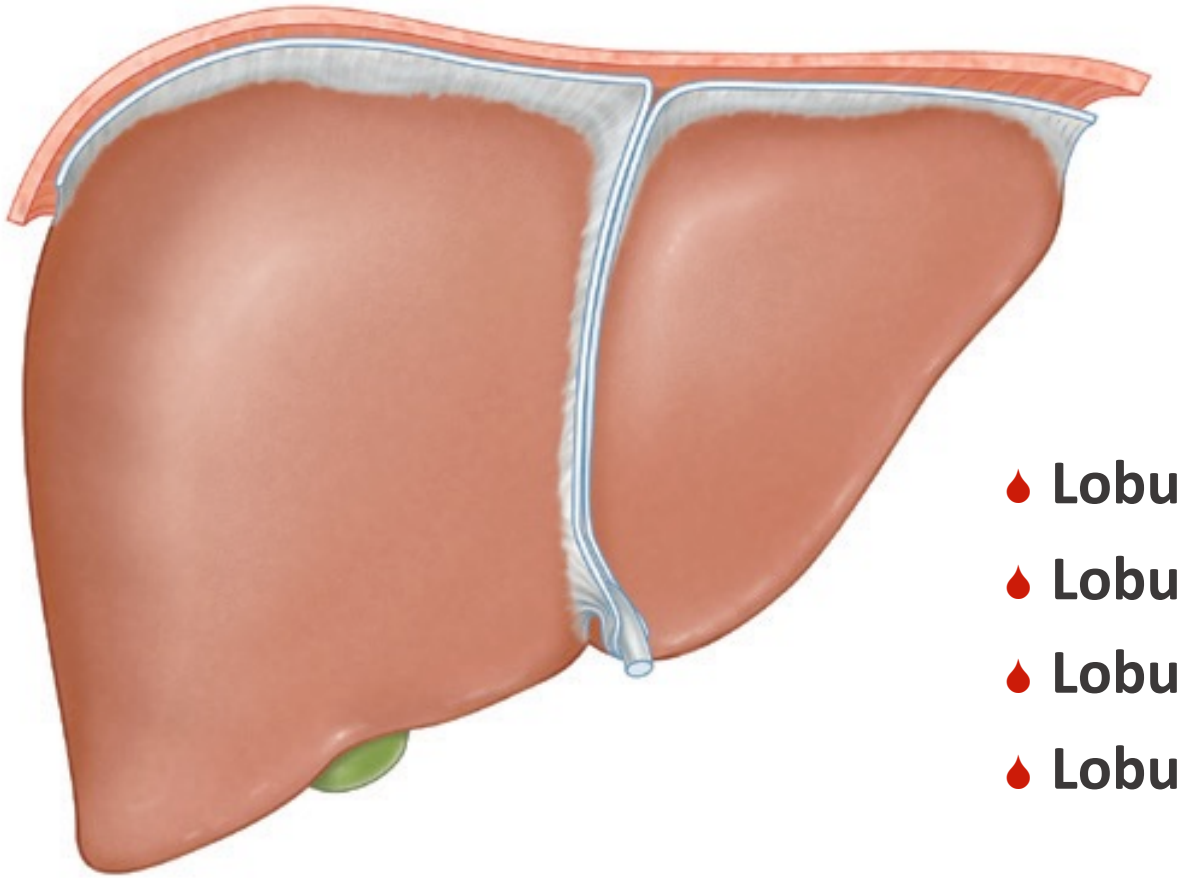
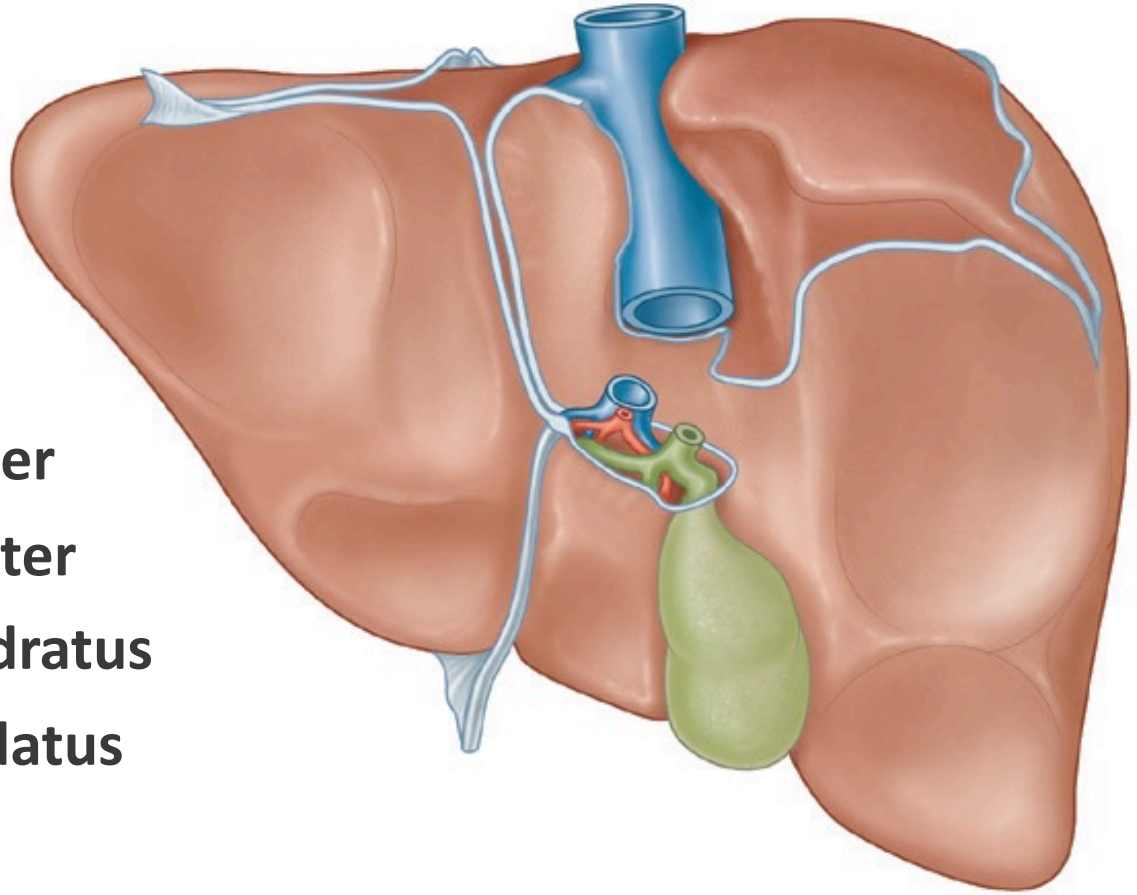
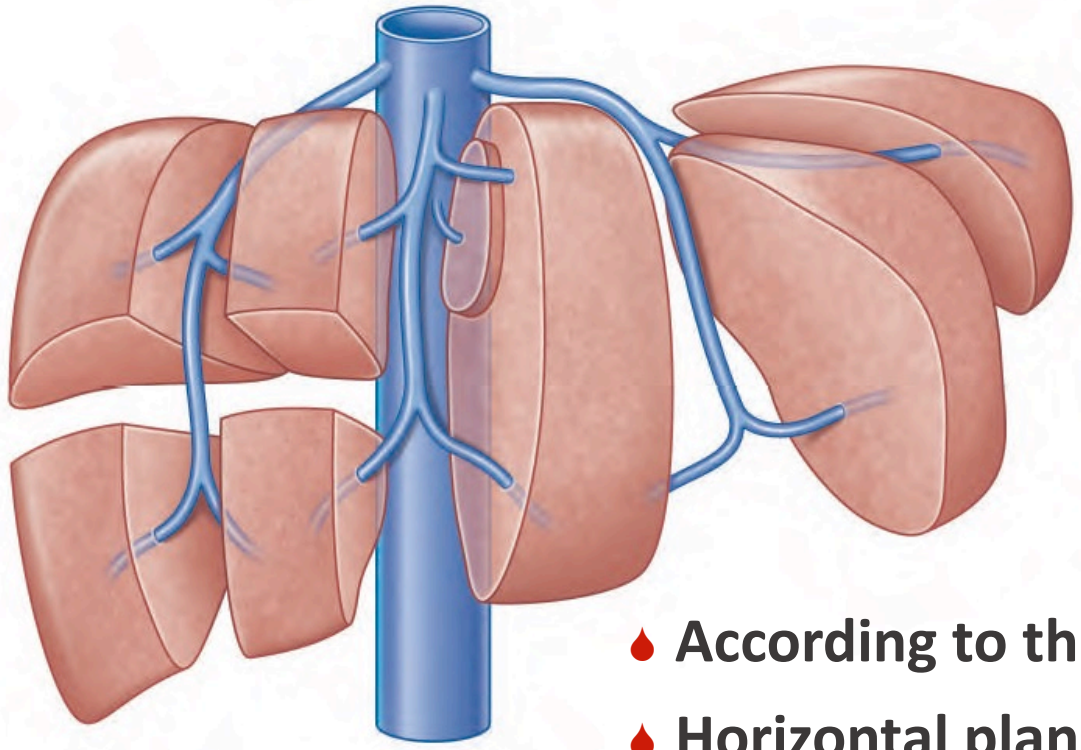
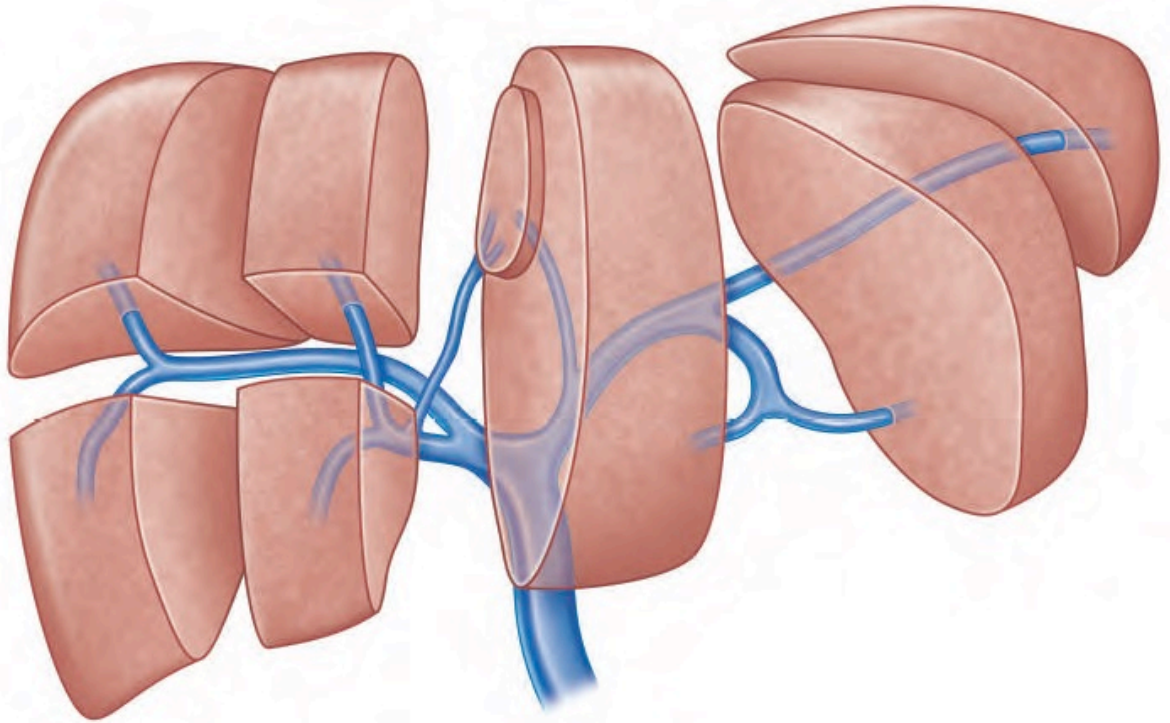


- Lobus dexter
- Lobus sinister
- Lobus quadratus
- Lobus caudatus



LIVER LOBES





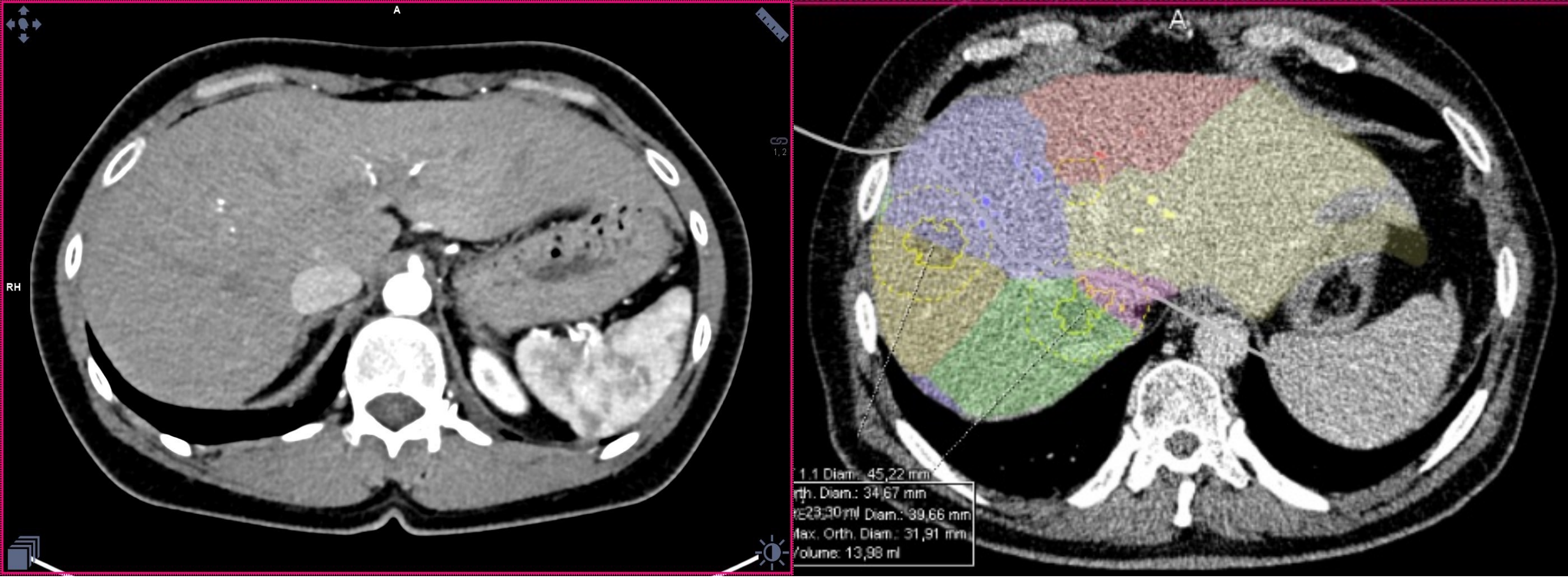
- According to the vessels
- Horizontal plane - v. portae
- Vertical planes v. Hepaticae

- surgery

LIVER SEGMENTS

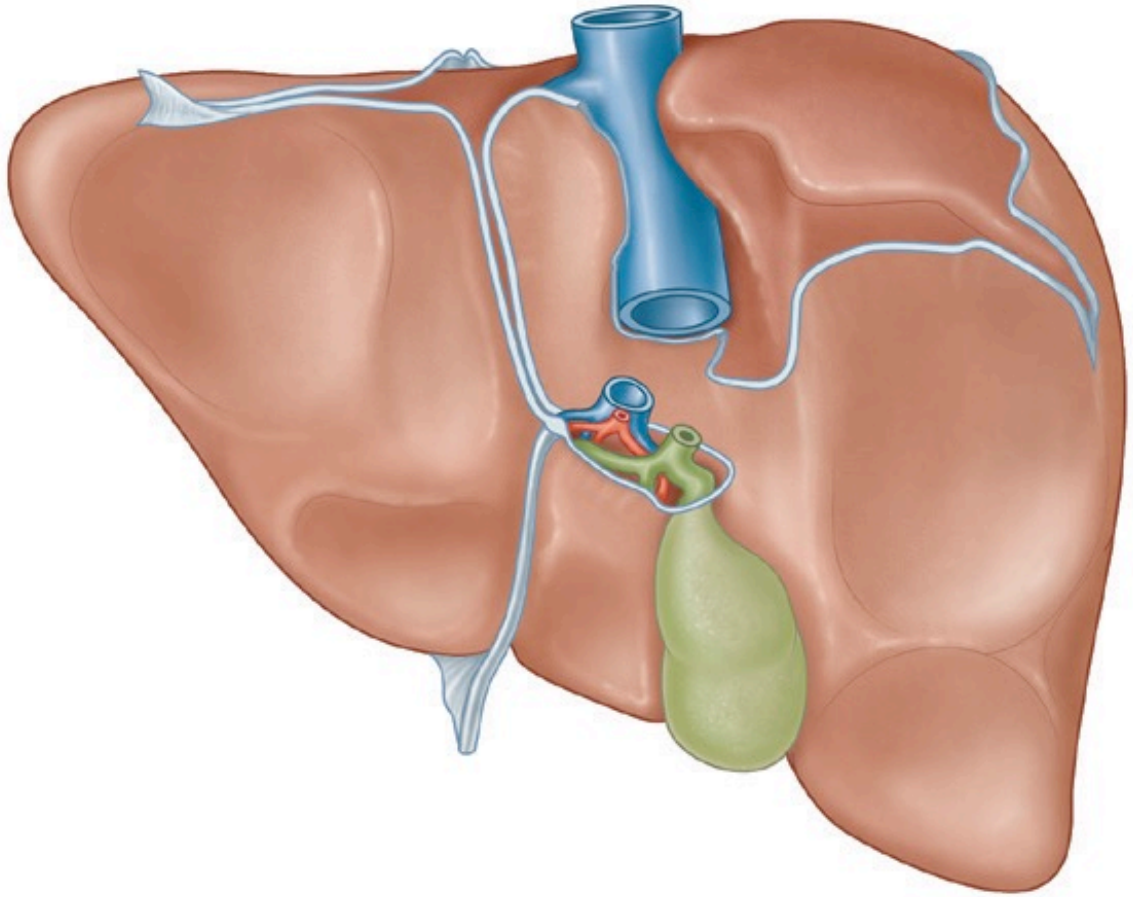
- L. caudatus
  - S1 - caudate
- L. sinister
  - S2 - left lateral superior
  - S3 - left medial inferior
- L. quadratus
  - S4a medial superior
  - S4b medial inferior 4b
- L. dexter
  - S5 anterior medial
  - S6 posterior inferior
  - S7 posterior lateral
  - S8 posterior medial

LIVER SEGMENTS

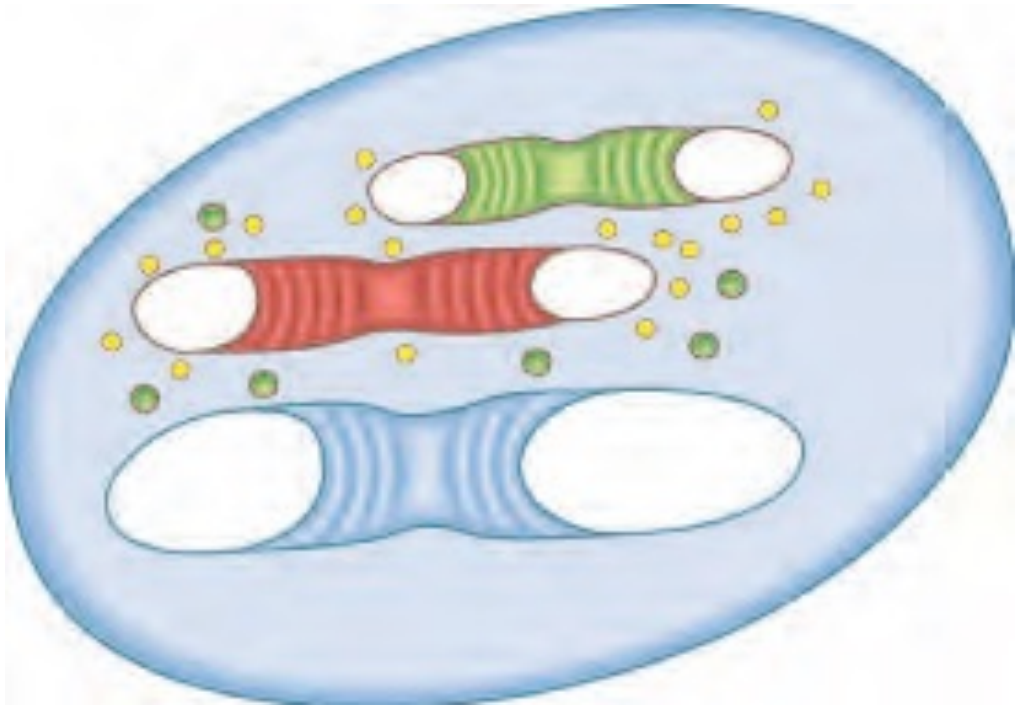


LIVER SEGMENTS

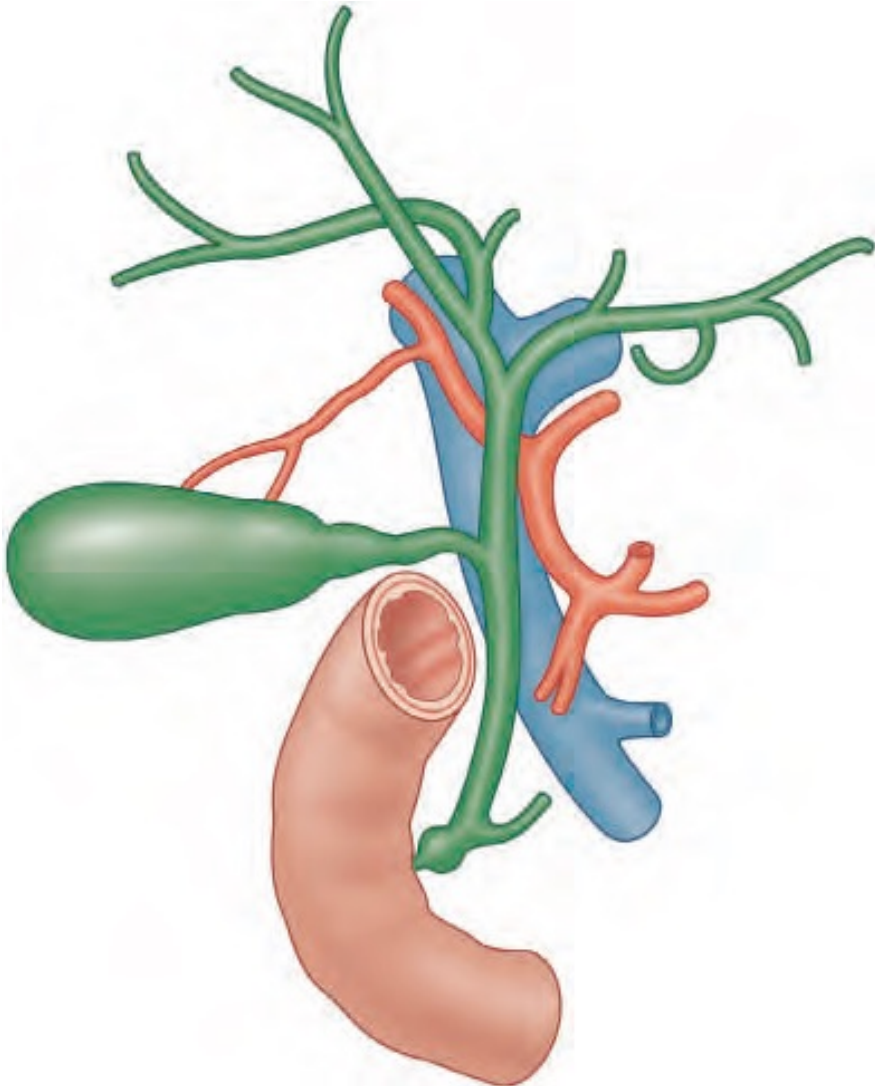
Gray's Anatomy 41th ed.



- Portal trias
- Ventral bile duct
- In the middle a. hepatica propria
- Dorsal v. portae hepatis



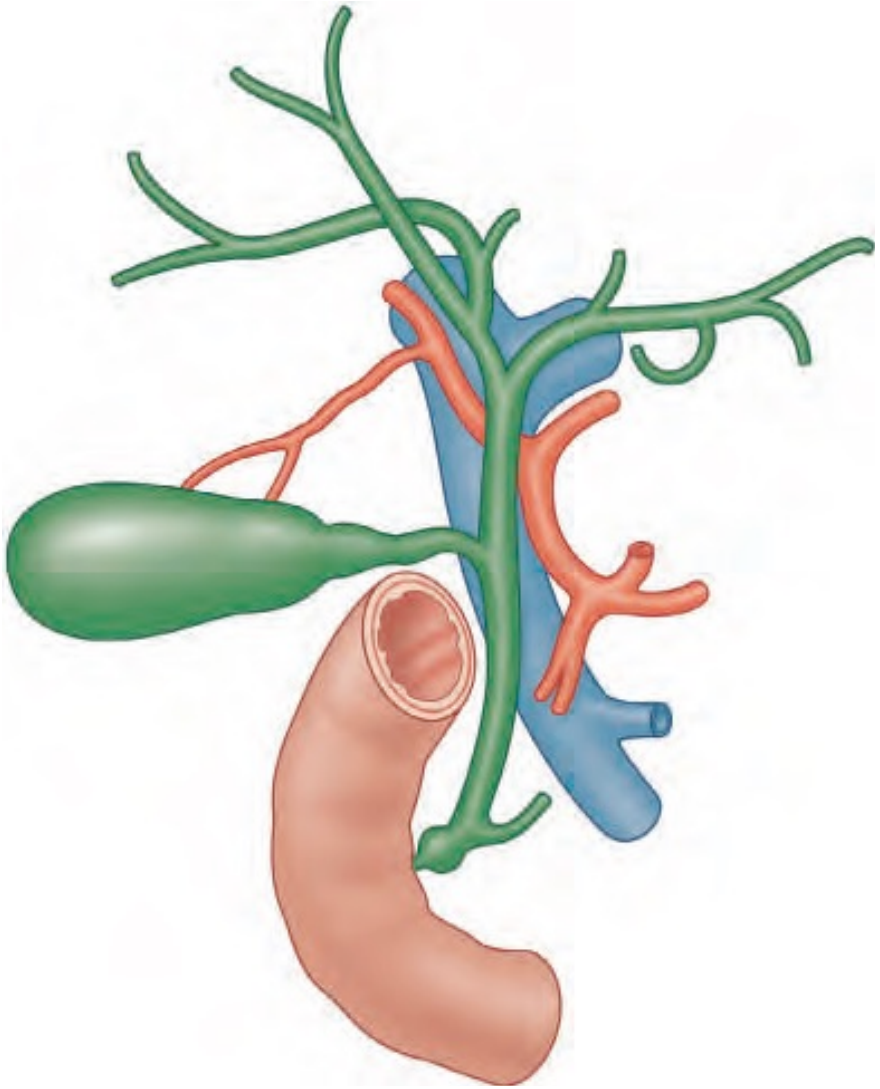
PORTA HEPATIS



- bile - billis, fel
- Excrete and secrete
- Bile acids
- Cholesterol
- Bilirubin

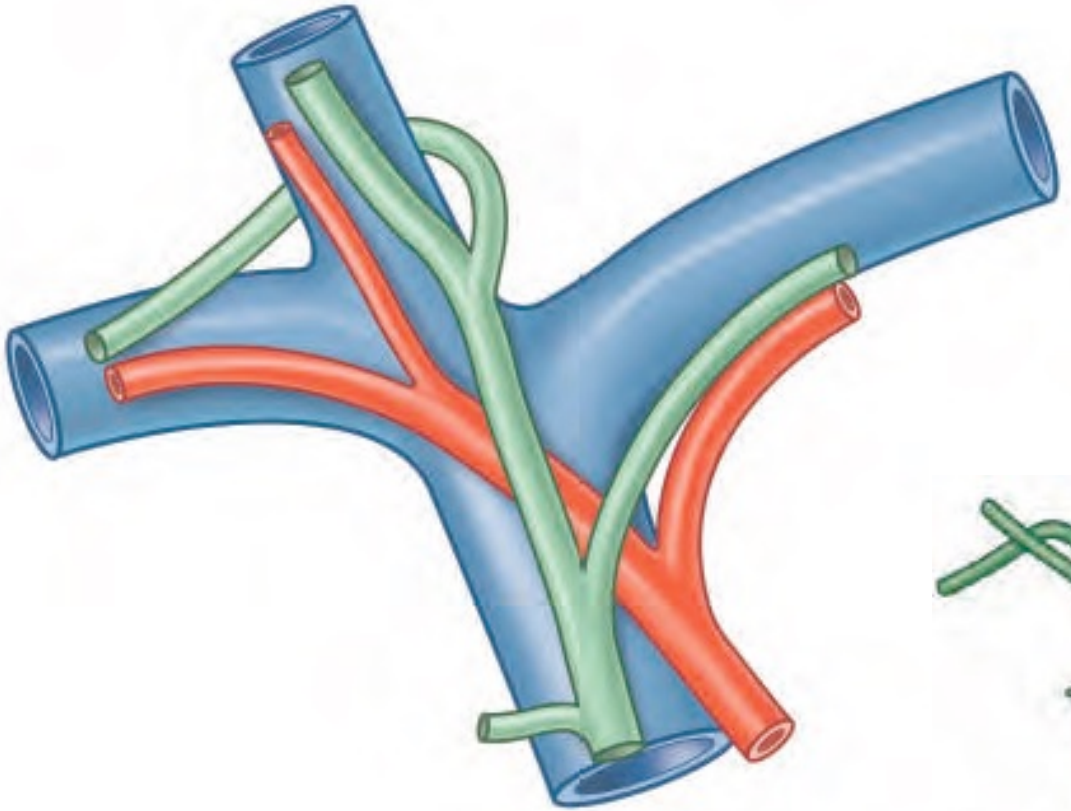
- 1 litre / day

BILIARY SYSTEM

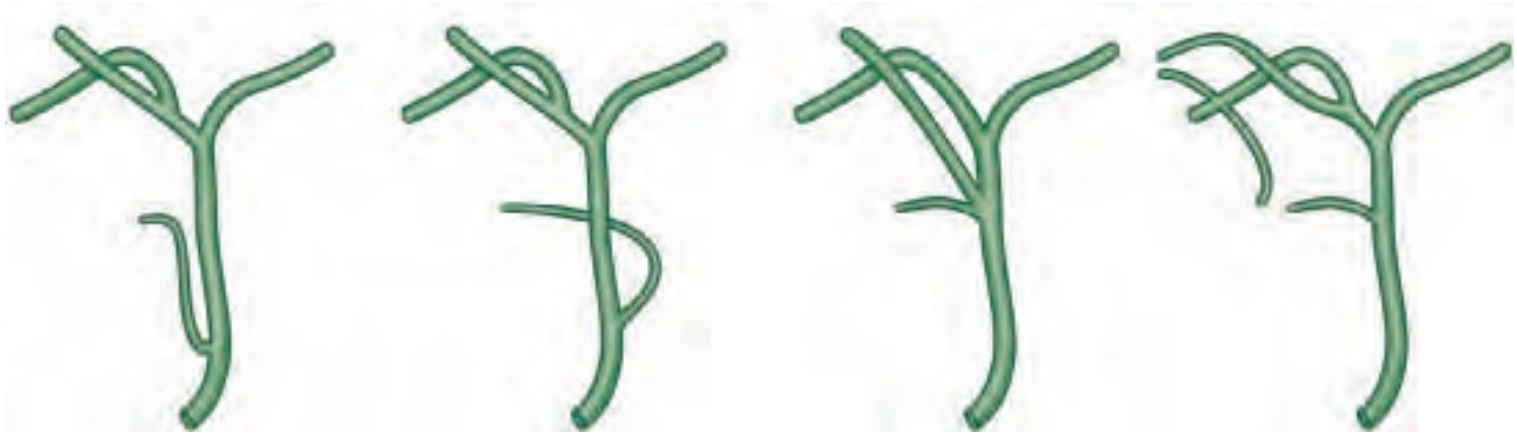


- Dcc. segmentales
- Dc. hepaticus dx
- Dc. hepaticus sinister
- Dc. hepaticus communis
- Dc. cysticus
- Vesica fellea
- Dc. choledochus

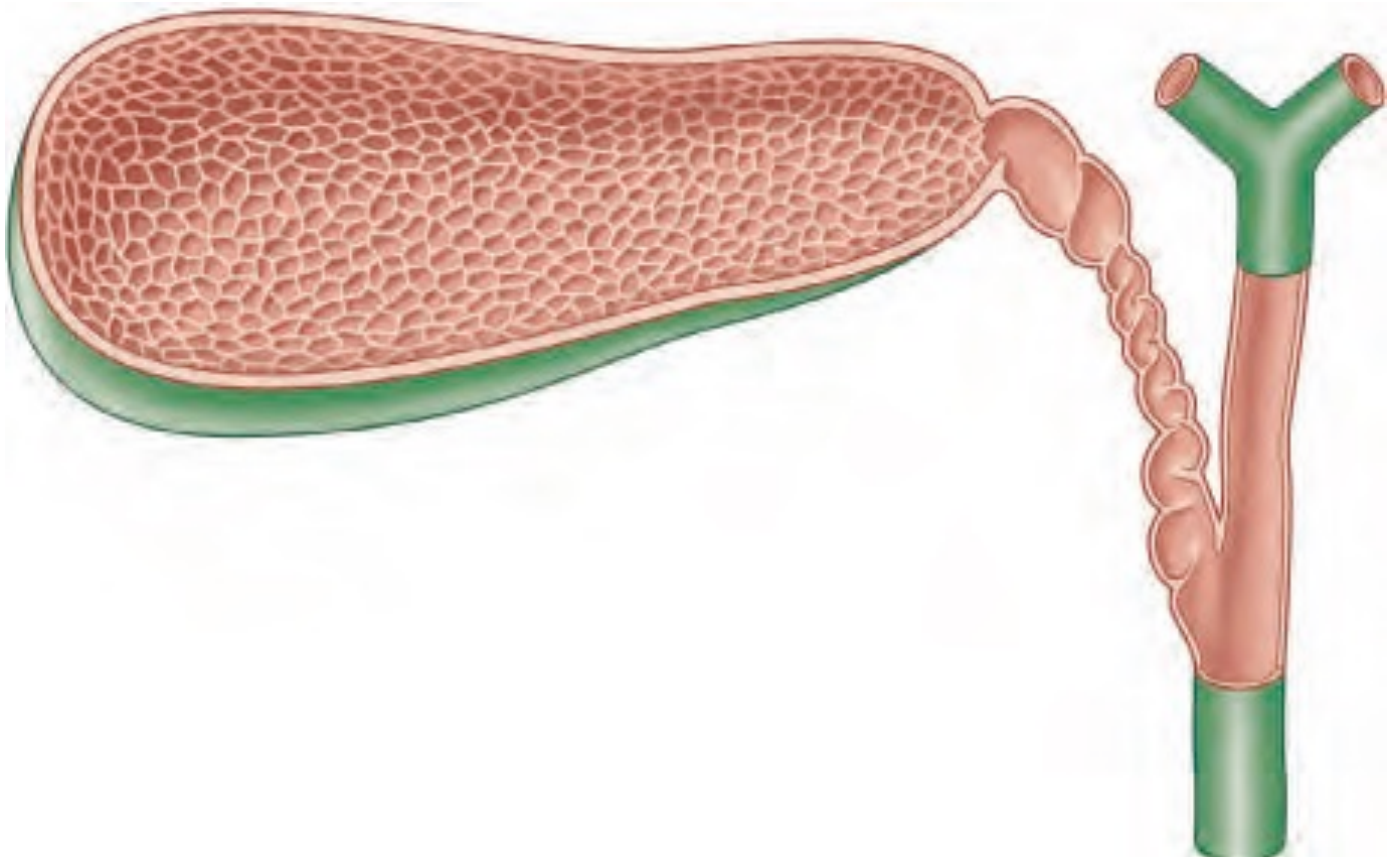
BILIARY TREE



- Hjortsö's crook
-
- Behind middle segment of v. portae hepatis
- Variability of dc. cysticus



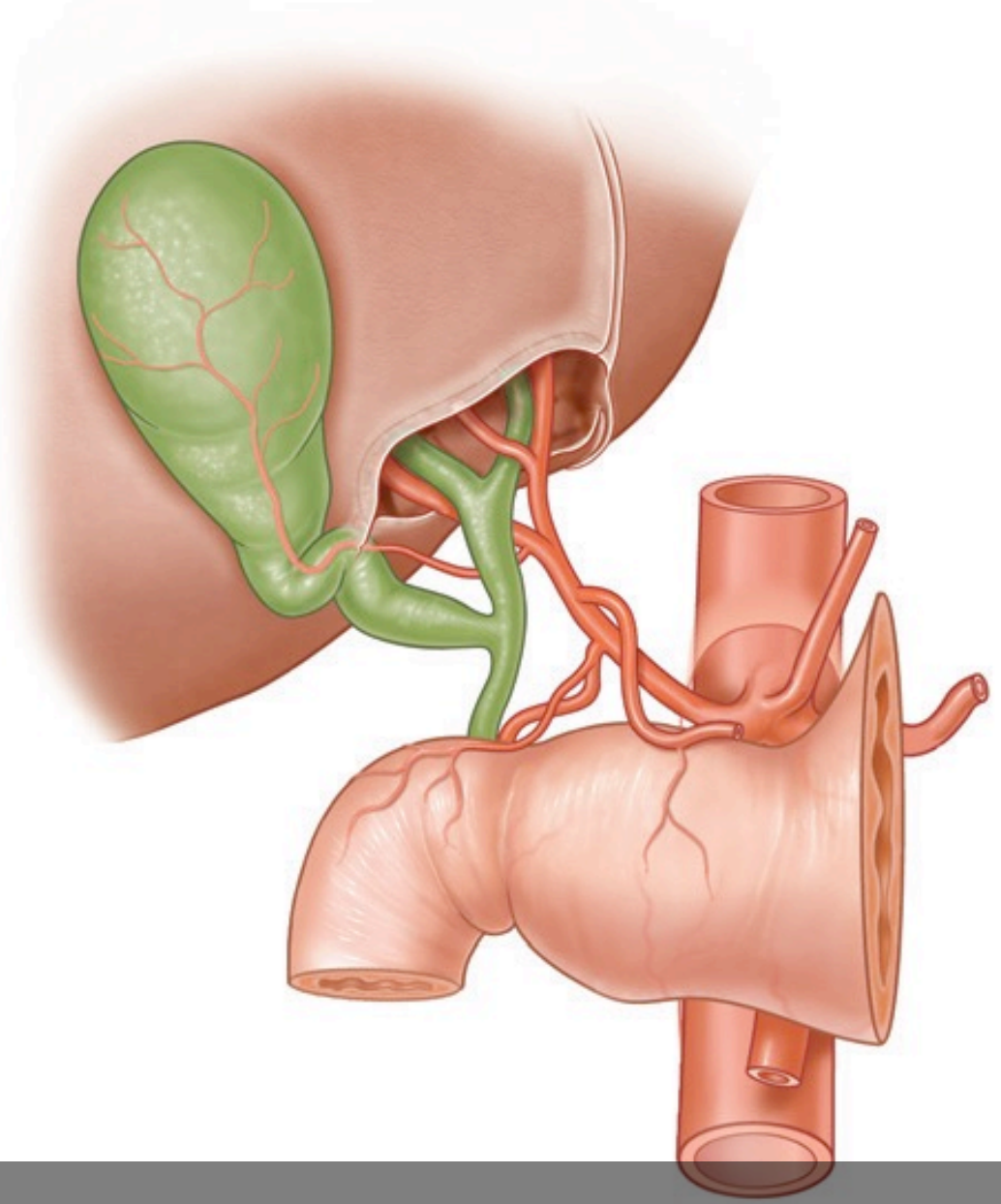
EXTRAHEPATIC BILE DUCTS



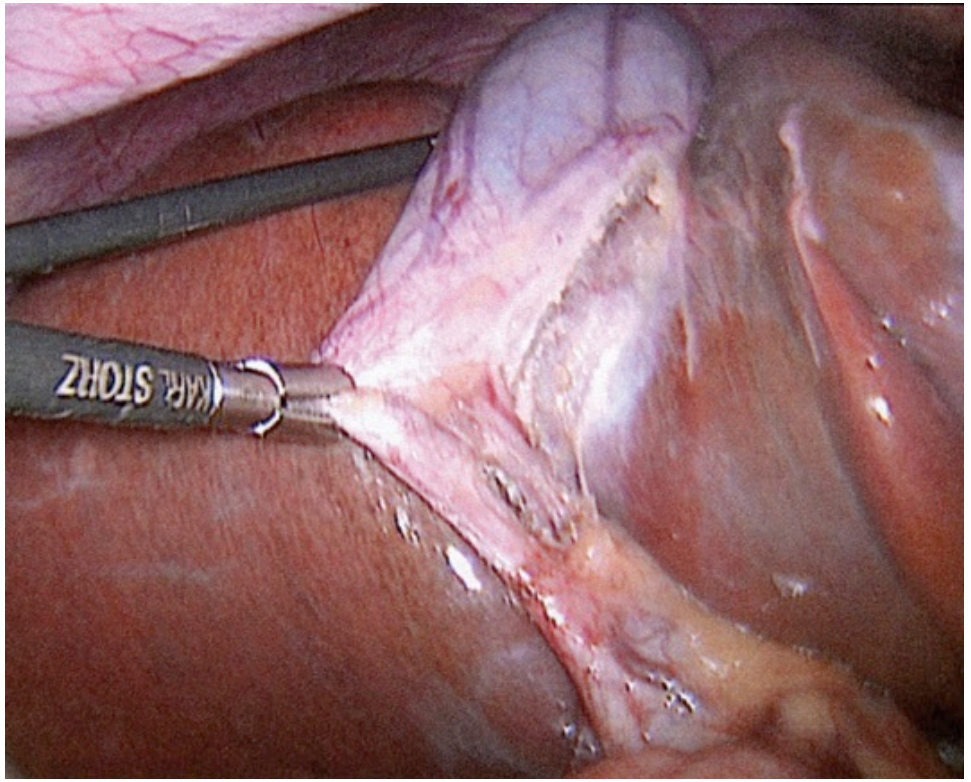
- Fundus
- Corpus
- Collum
- Dc. cysticus

- Biliary stones

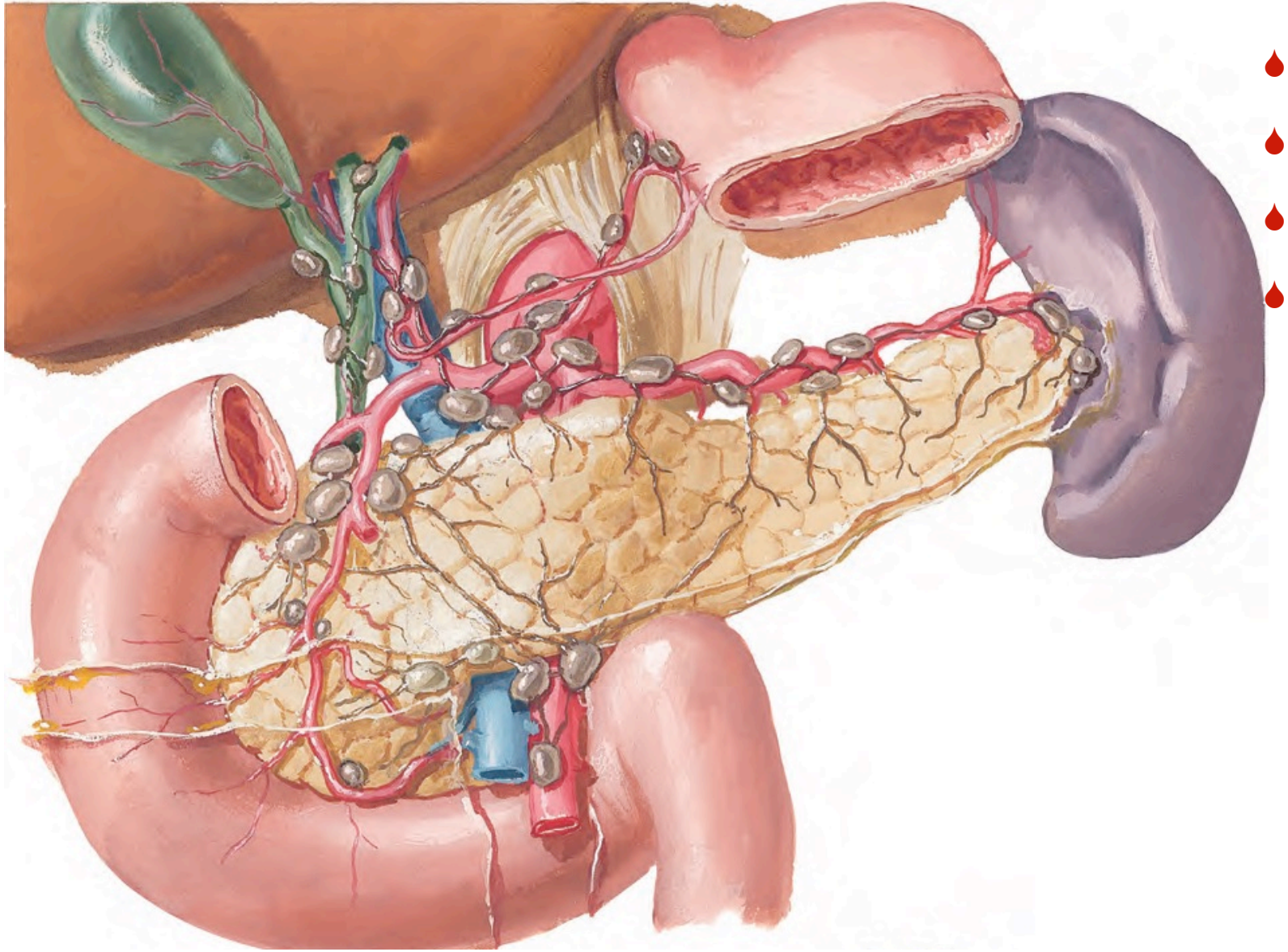
VESICA FELLEA



- Arises from a. hepatica propria

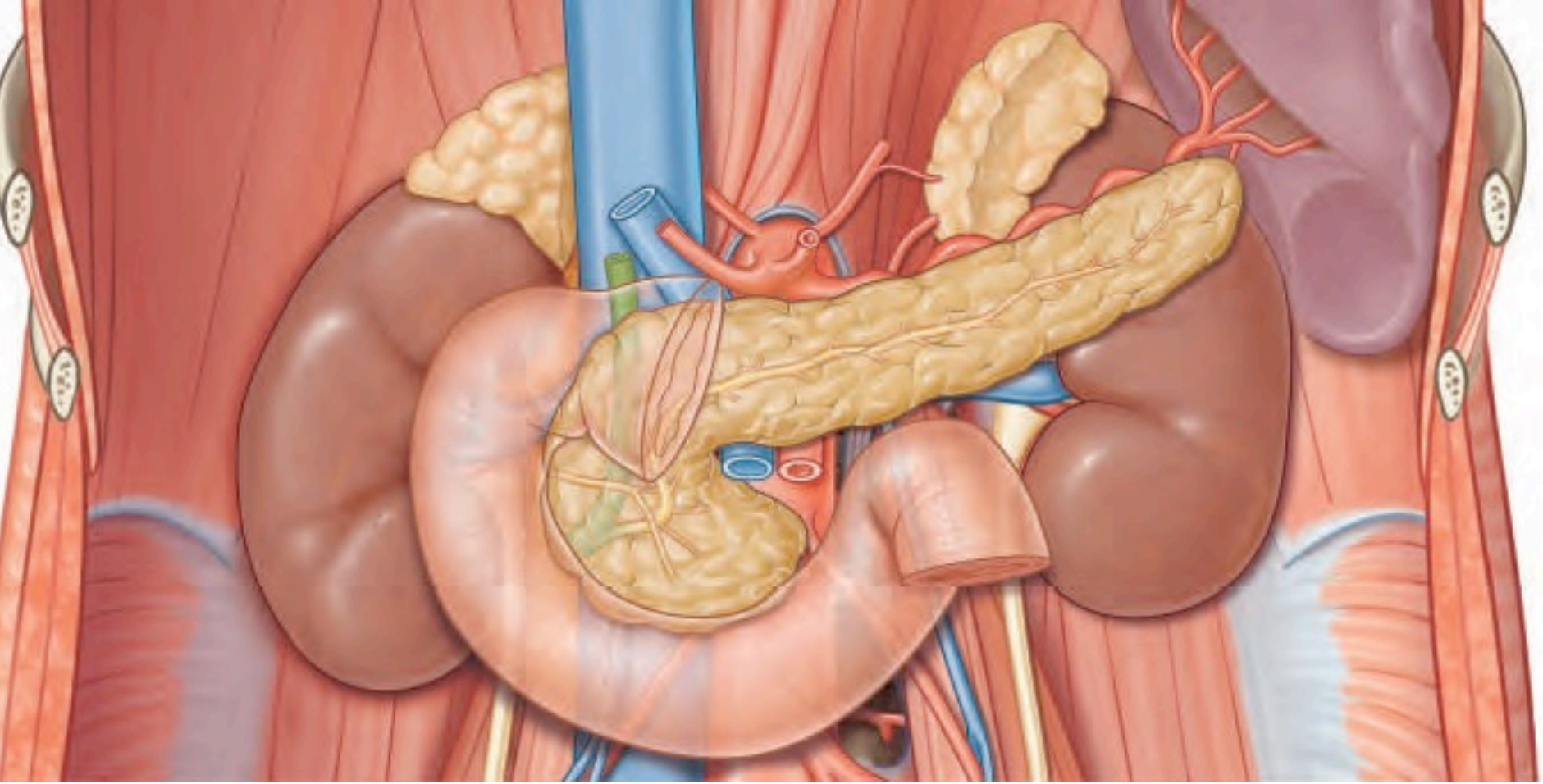


A. CYSTICA



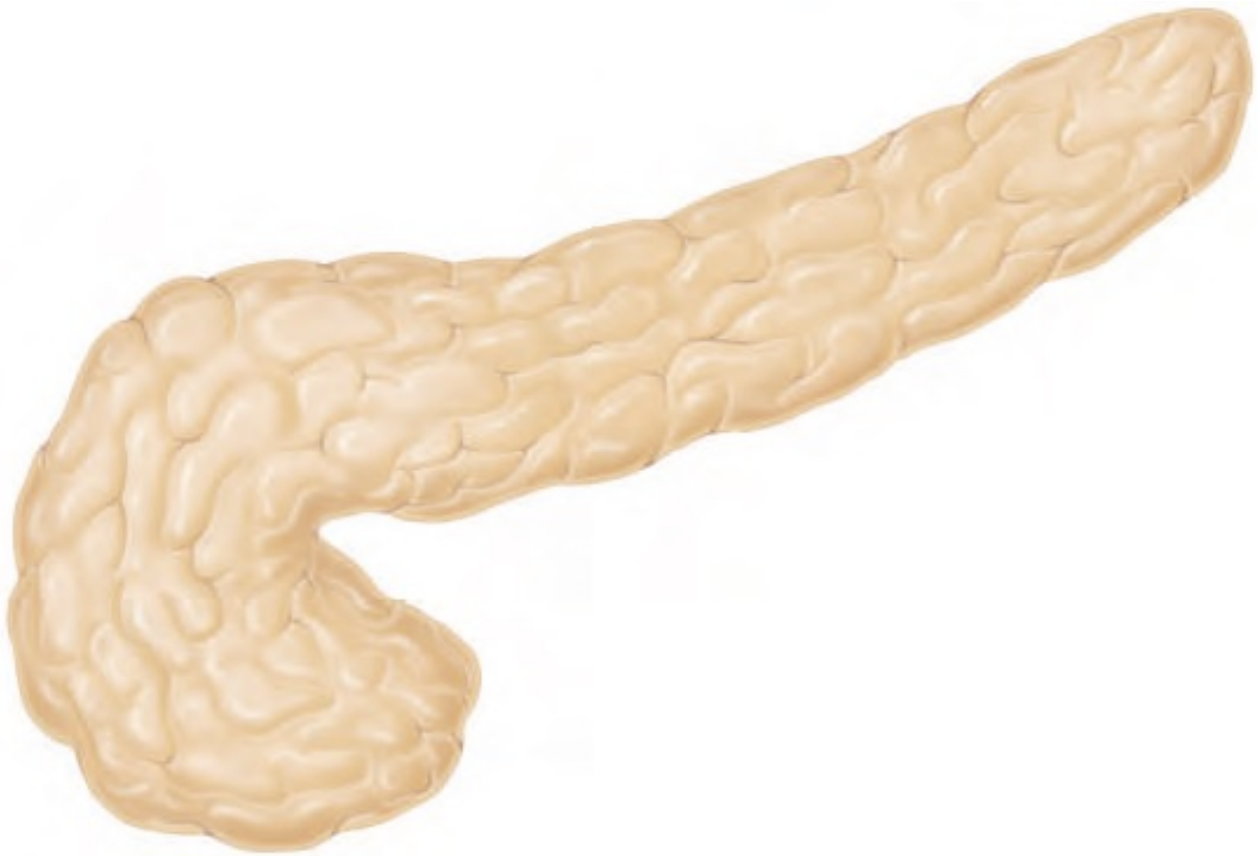
- Nodi hepatici
- Nodi coeliaci
- Nodi pylorici superiores
- Nodi cardiaci dextri

LYMPHATIC DRAINAGE



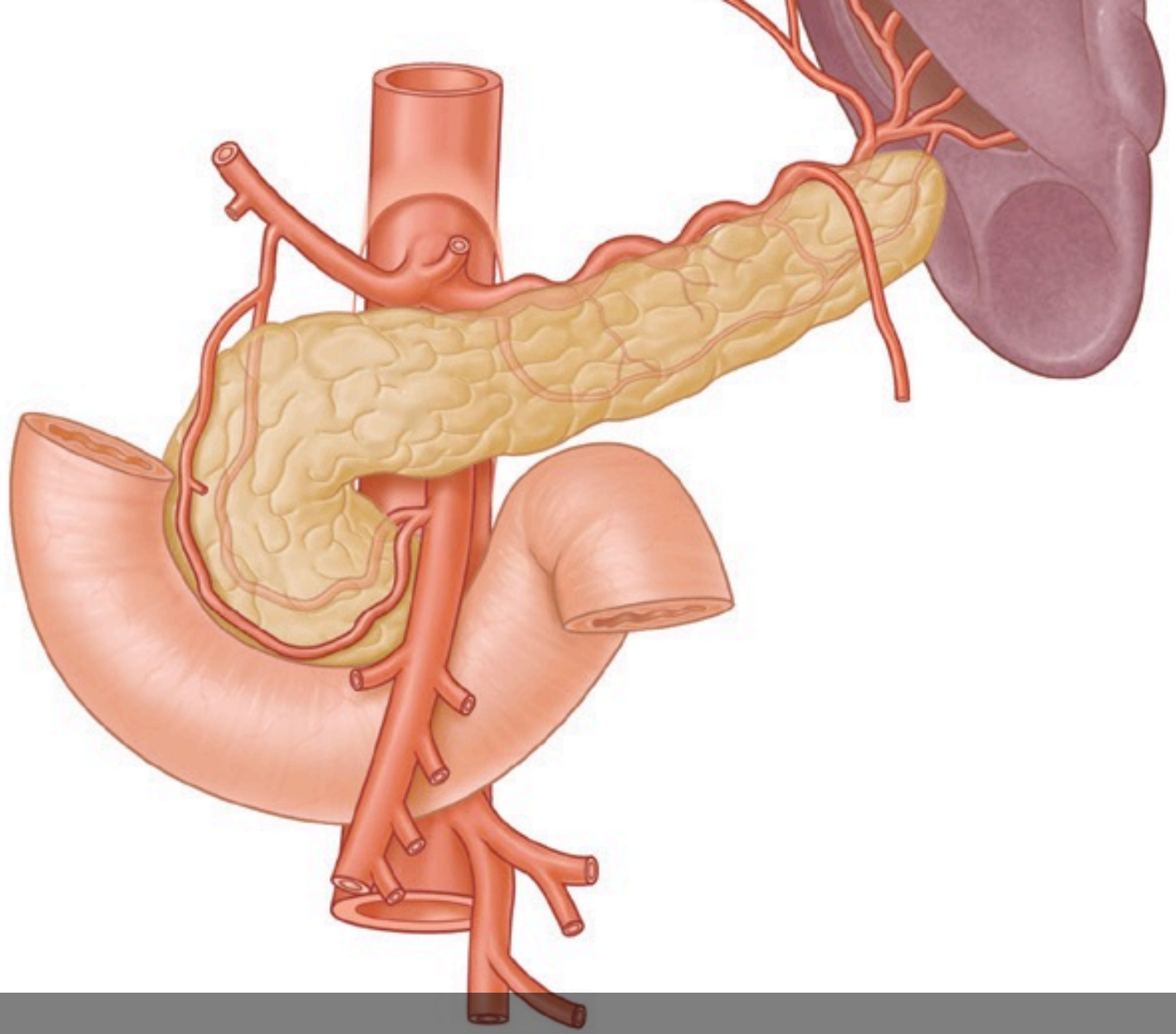
- Retroperitoneum
- DUODENAL WINDOW
- Vasa lienalis

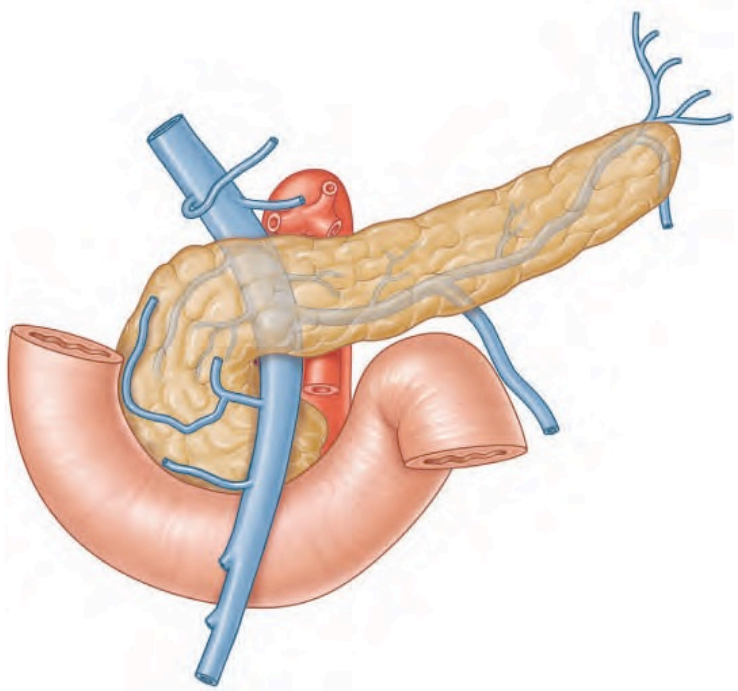
PANCREAS



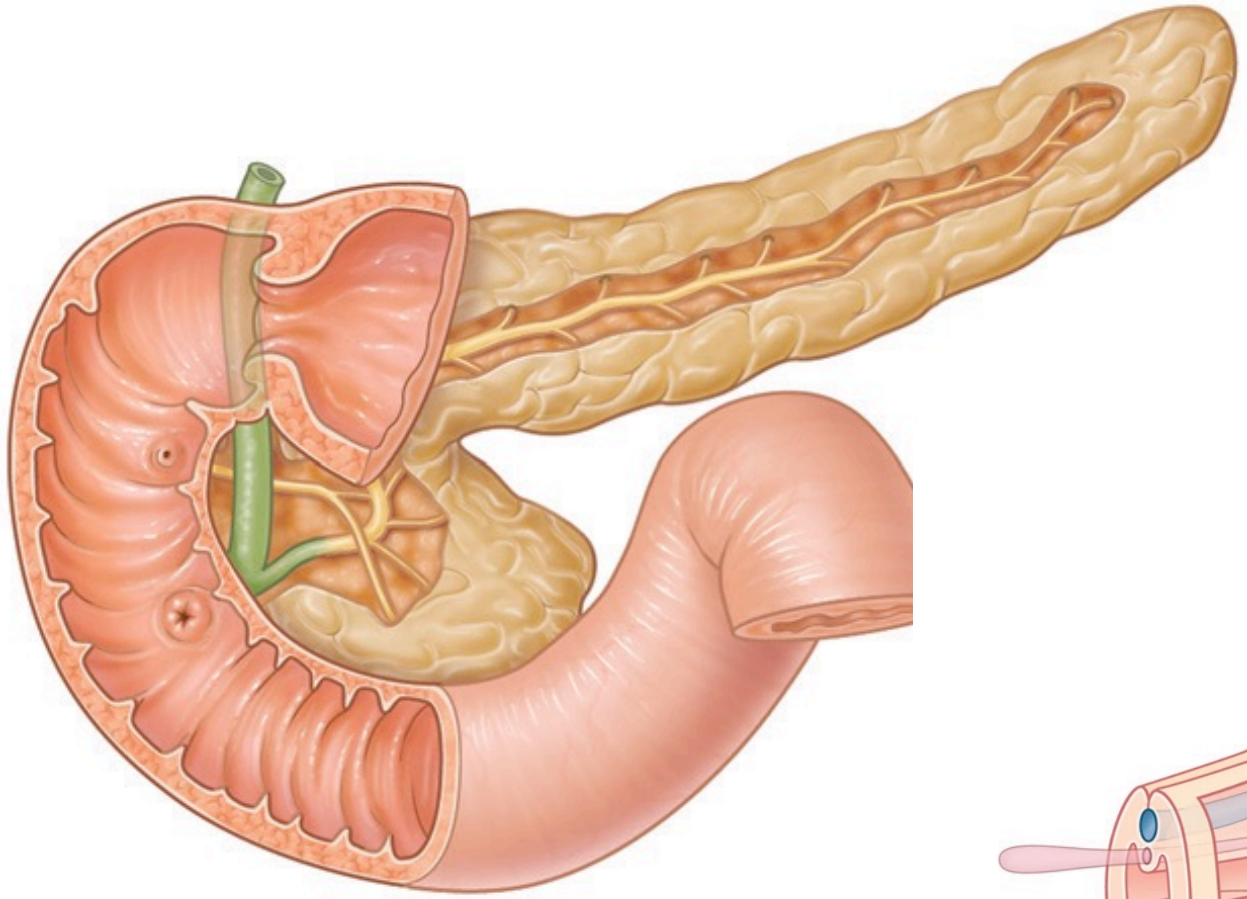
- Caput
- Processus uncinatus
- Incissura pancreatis
- Collum
- Corpus
- Cauda
  - Apex caudae

PANCREAS

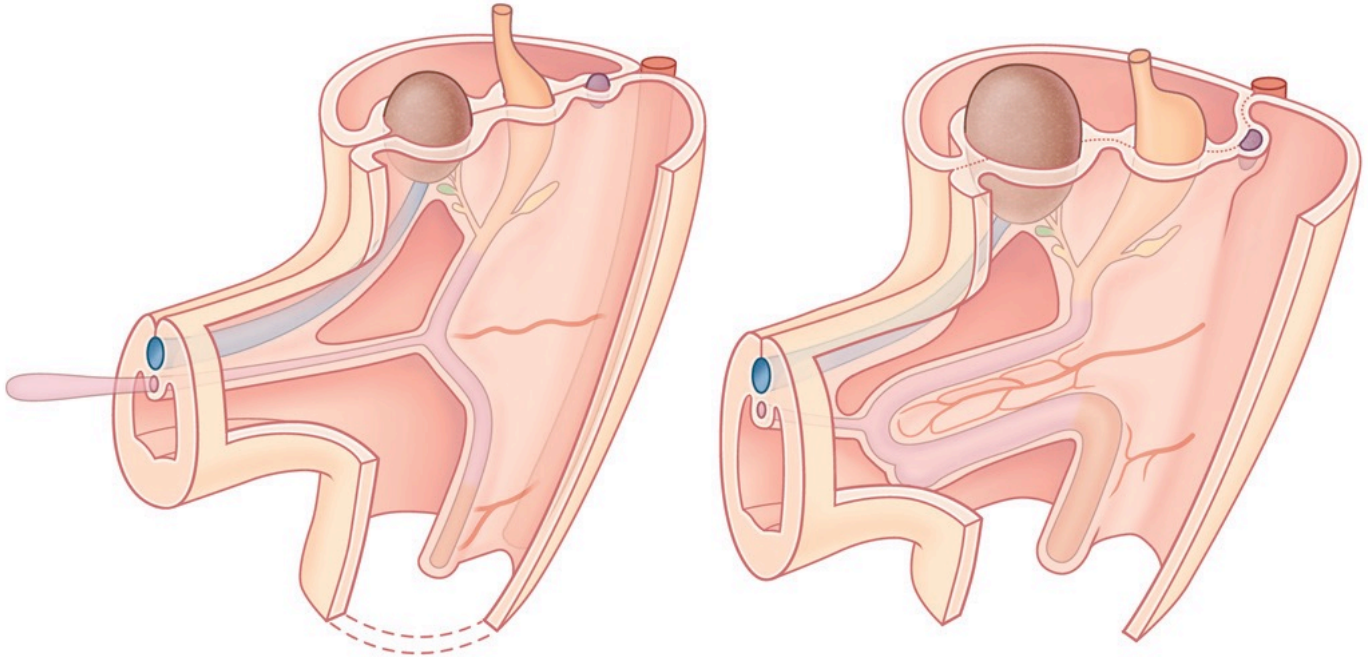




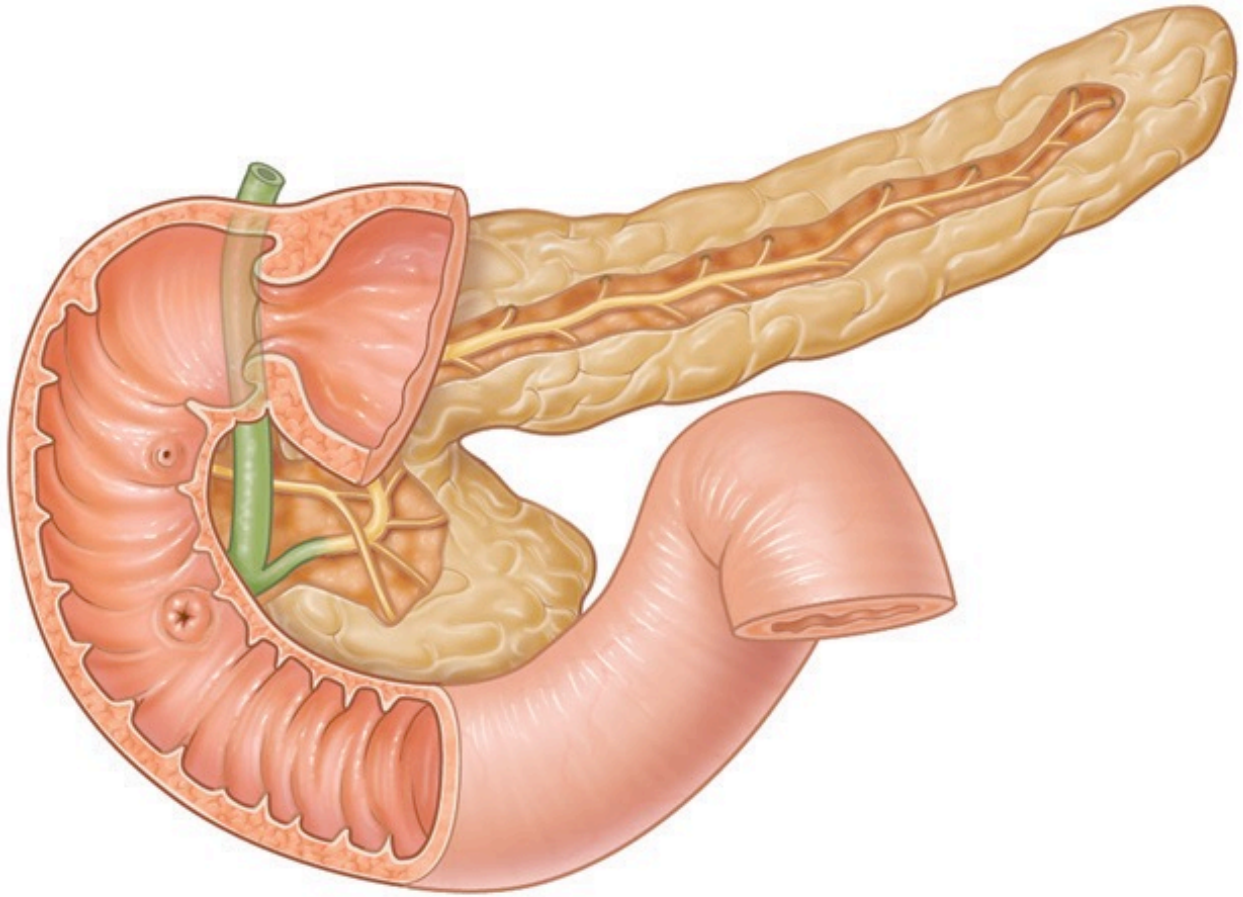
PANCREAS AND VESSELS



- Pankreatic buds
- Pancreas ventralis
  - Proc. uncinatus
- Pancreas dorsalis

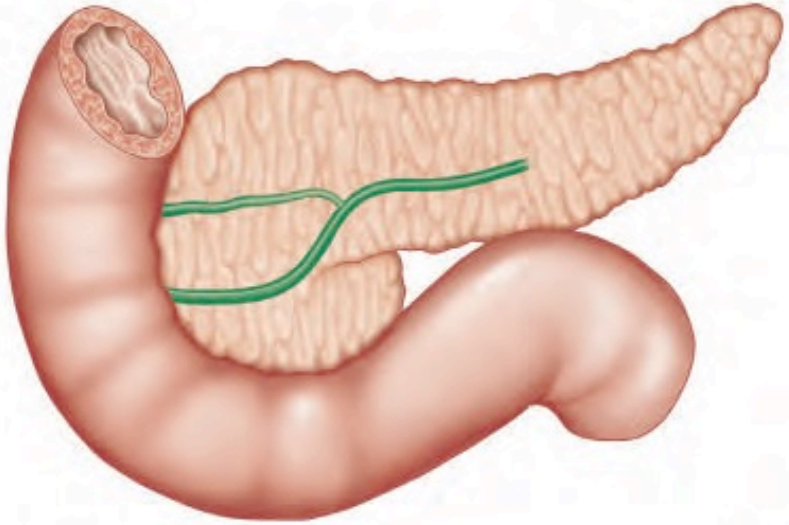


PANCREATIC DEVELOPMENT

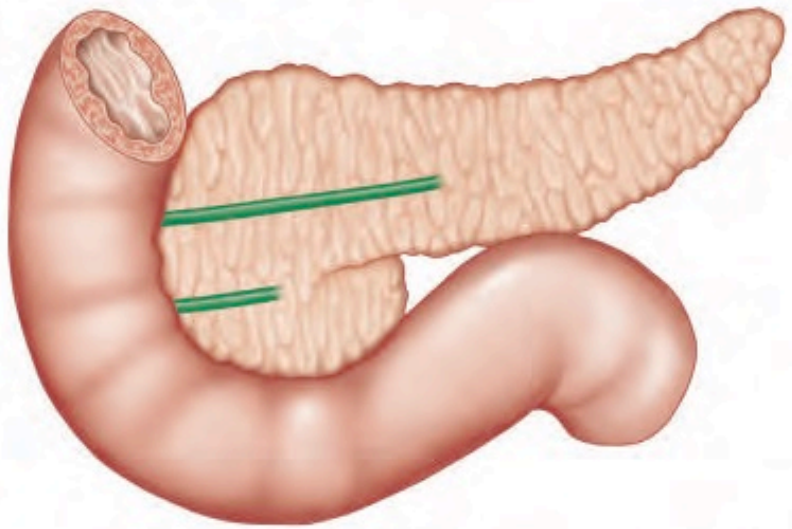


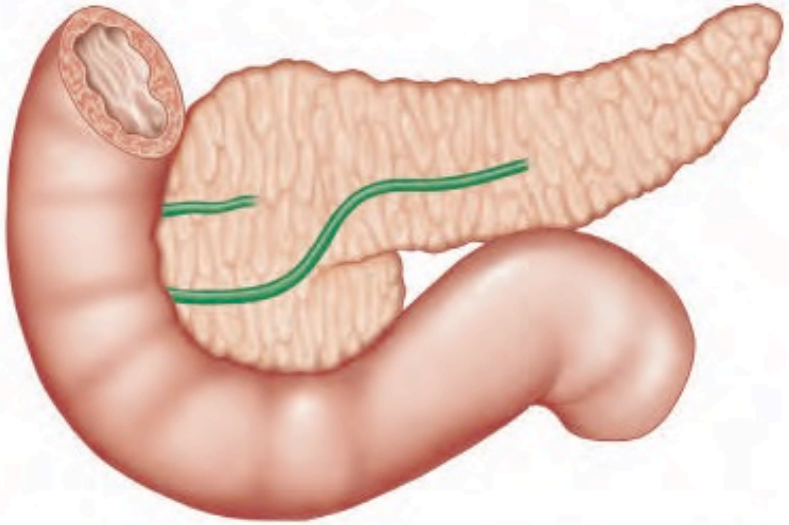
- Dc. pancreatricus maior Wirsungi
- Papilla duodenalis major
- Dc. pancreaticus minor Santorini
- Papilla duodenalis minor

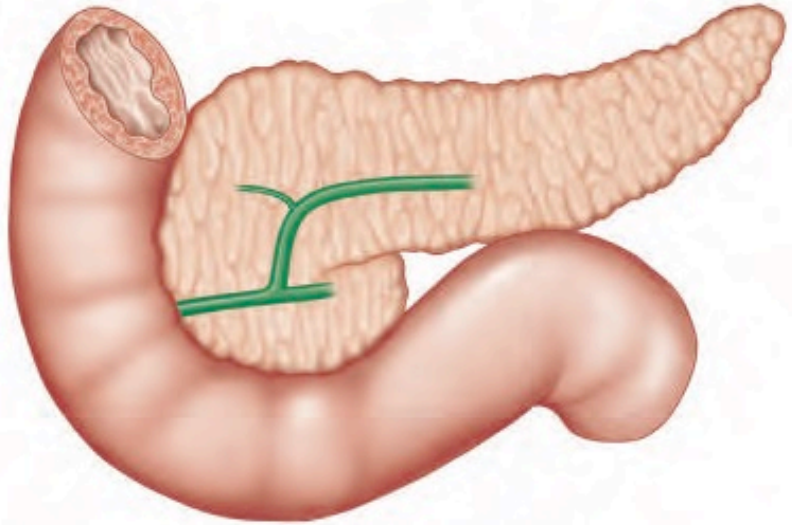
DUCTUS PANCREATICUS



- Pancreas ventralis
- Pancreas dorsalis



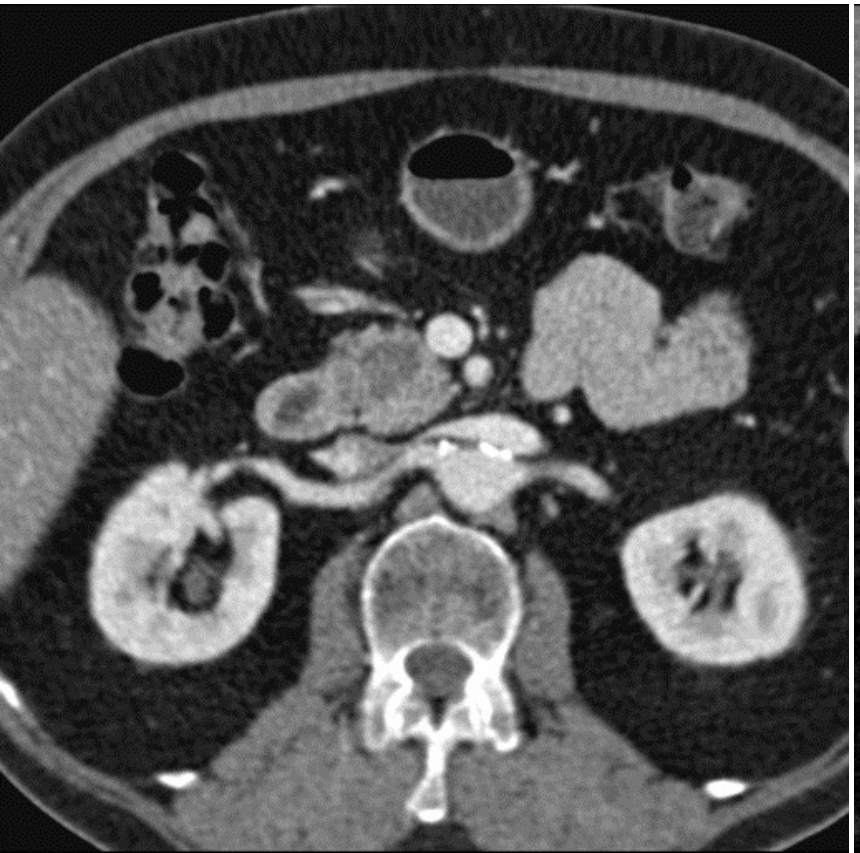


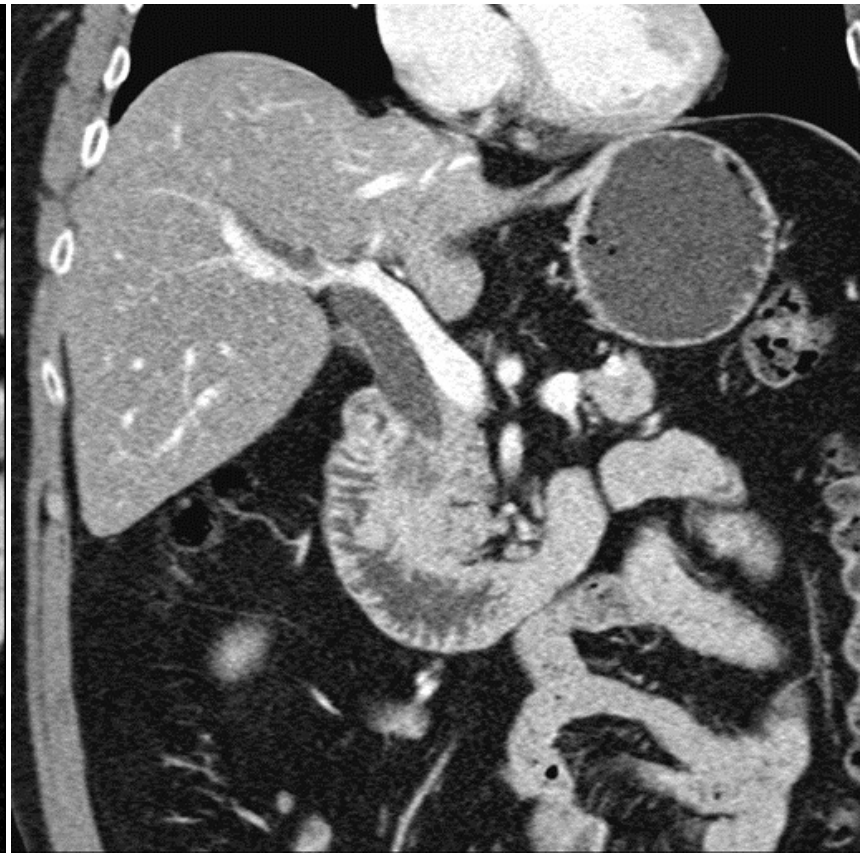


DUCTUS PANCREATICI

Pancreatic carcinoma

- *Double duct sign*
- *Jaundice*
- *Common distal course of dc. pancreaticus and choledochus*





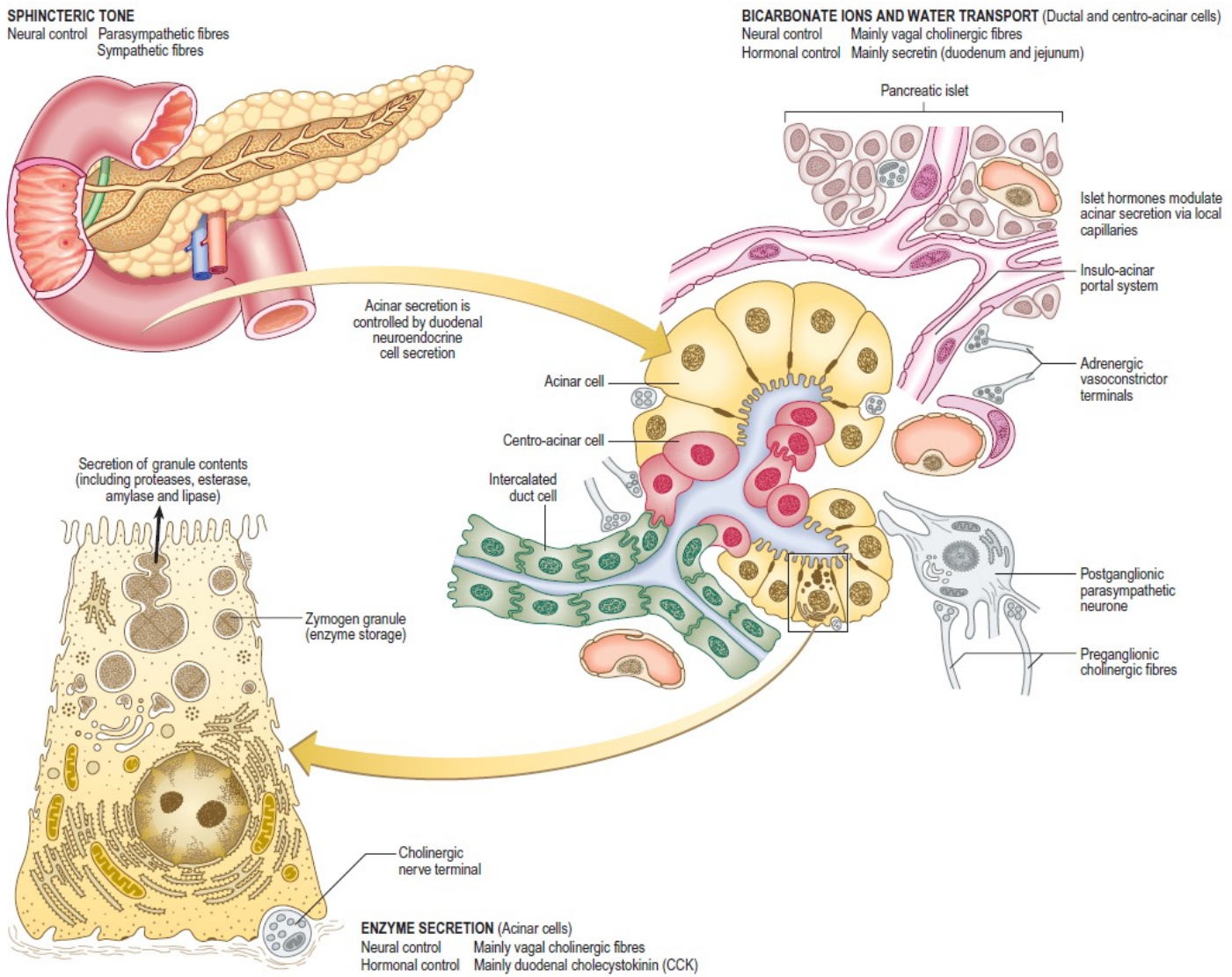


Fig. 69.8 The microstructure of the exocrine pancreas and the mechanisms by which its secretion is controlled. Pancreatic stellate cells (see text) are not shown.

- Aciary cels
- enzymes
  - amylase
  - Trypsine
  - Lipase
- Excretion of HCO_3^-
- Hormonal interaction
  - Cholecystokinine
  - Pankreozymine
  - Sekretine

EXOCRINE PANCREAS

Gray´s Anatomy 41th ed.

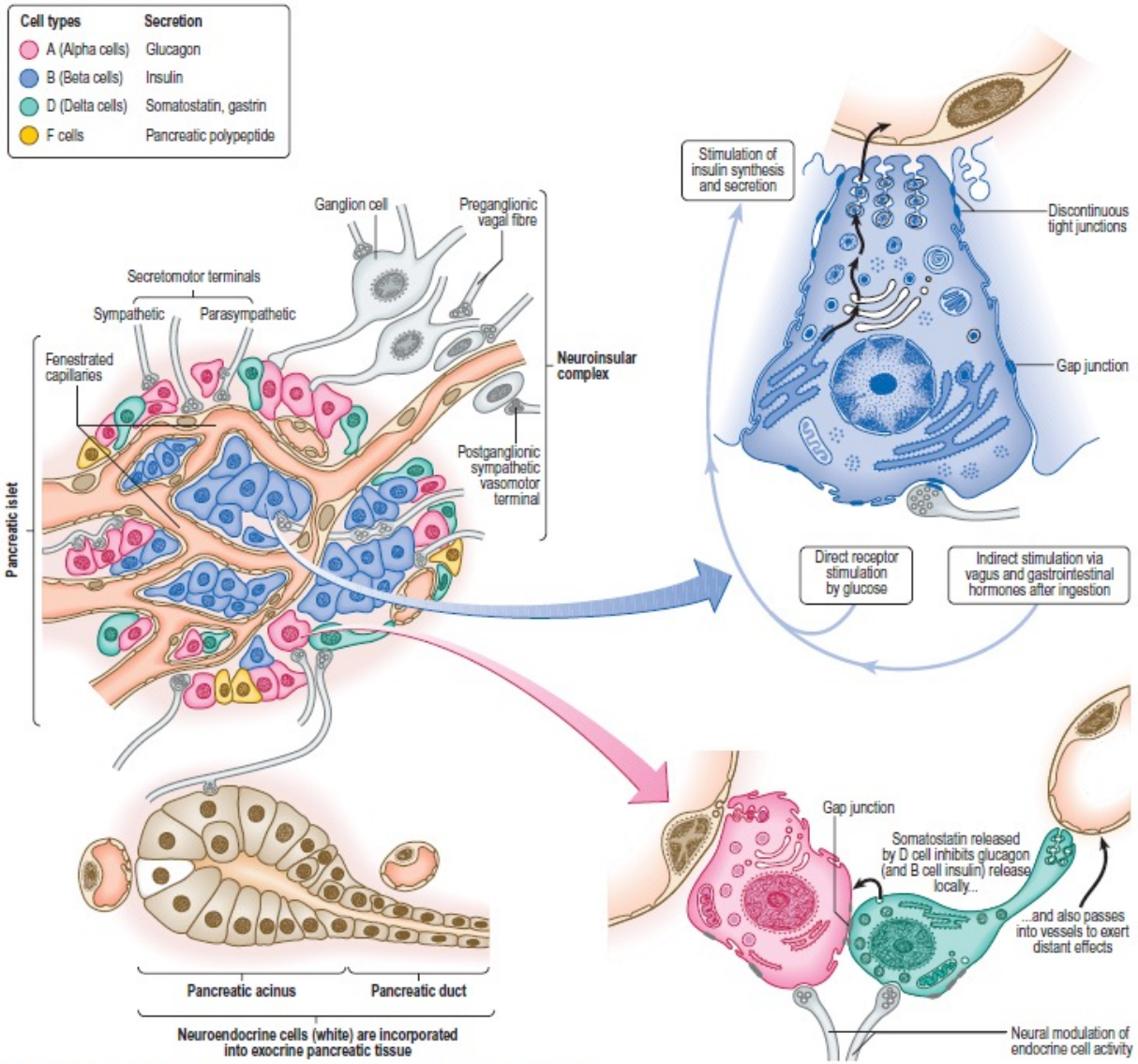
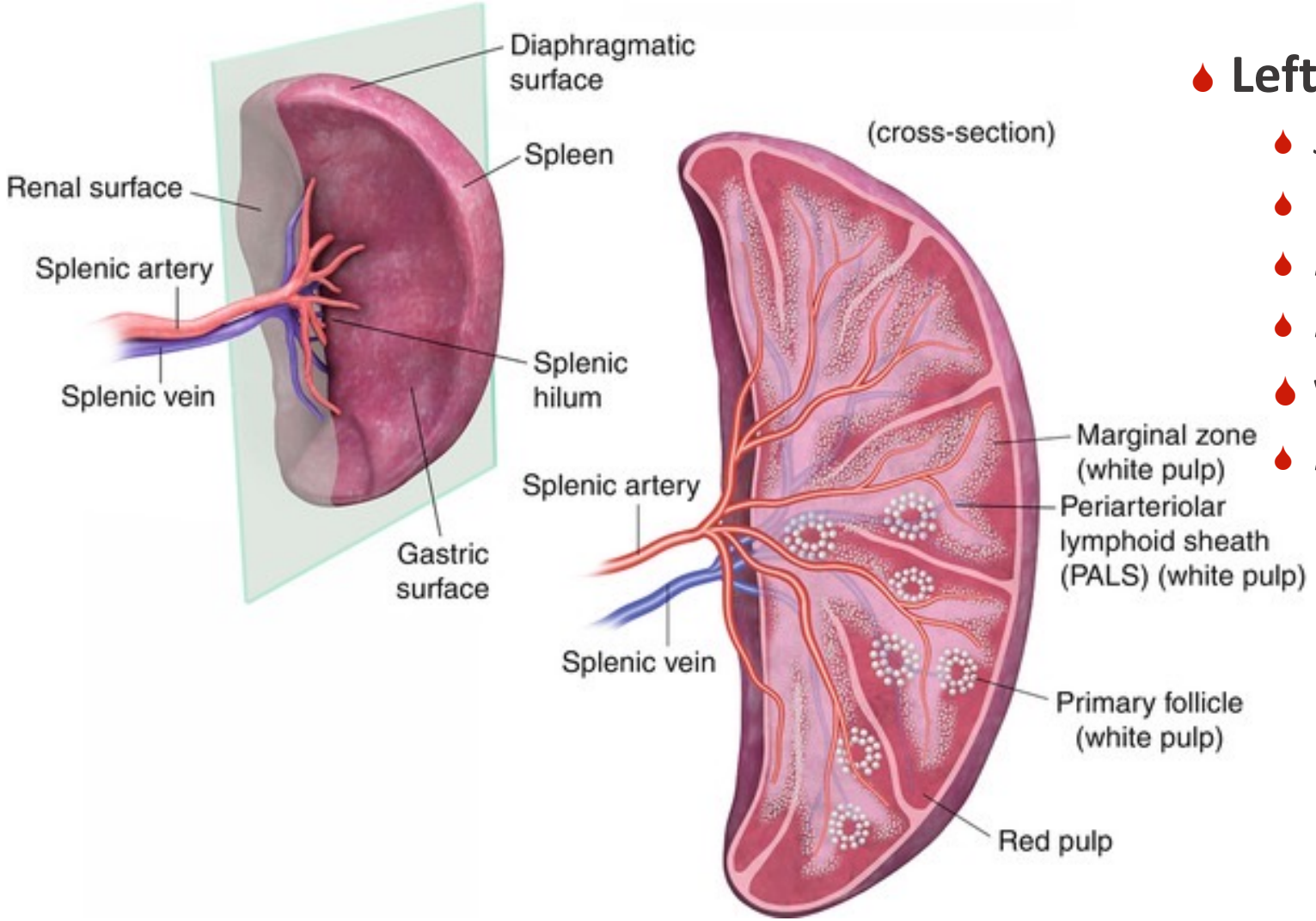


Fig. 69.10 The microstructure and control of function of the endocrine pancreas.

- Langerhans islands
- Neuroectoderma origin
- Insulin - B - beta - cells
  - central
- Glukagon - A - alfa - cells
  - peripheral
- Somatostatin - D - delta- cells
  - peripheral
- Gastrin - D - delta -
  - perif.
- Pancreatic polypeptid F - cells
  - Minority

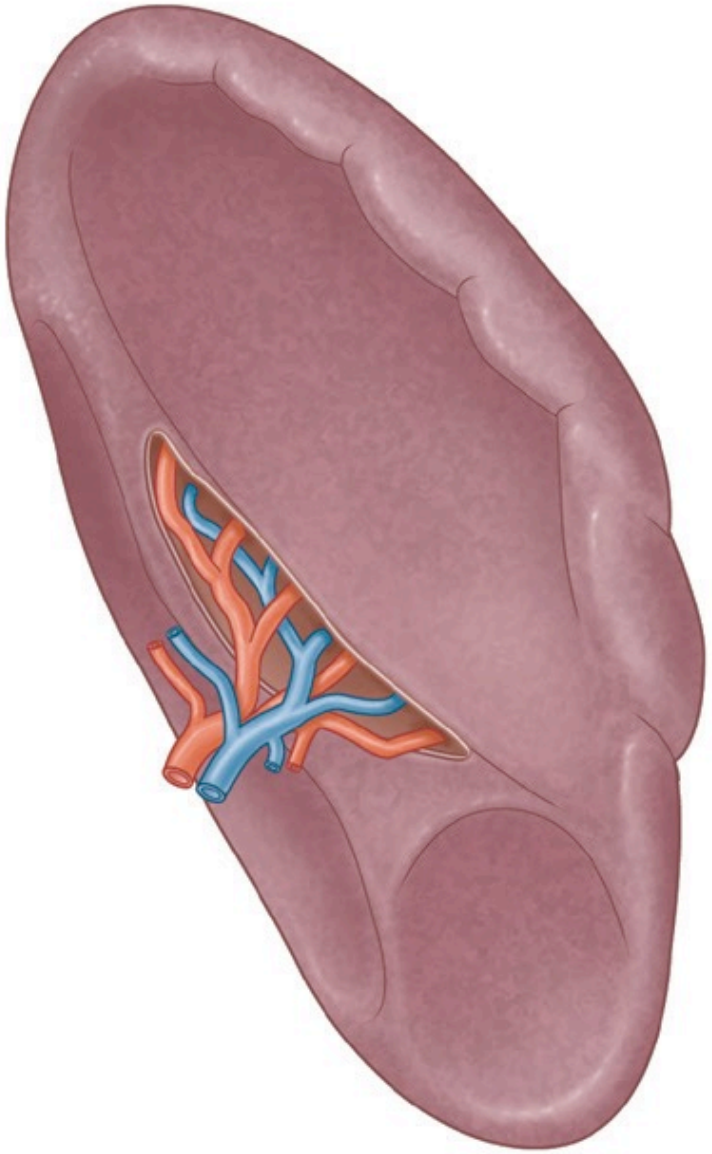
ENDOCRINE PANCREAS



- **Left subdiaphragmatic**
  - *serosa(peritoneum)*
  - *Tunica fibrosa – capsula*
  - *Pulpa alba*
  - *Pulpa rubra*
  - **weight**
  - *M – 140-160 g, F – 120-140 g*

LIEN (SPLEEN)

https://radiologykey.com/cross-sectional-imaging-of-the-spleen/

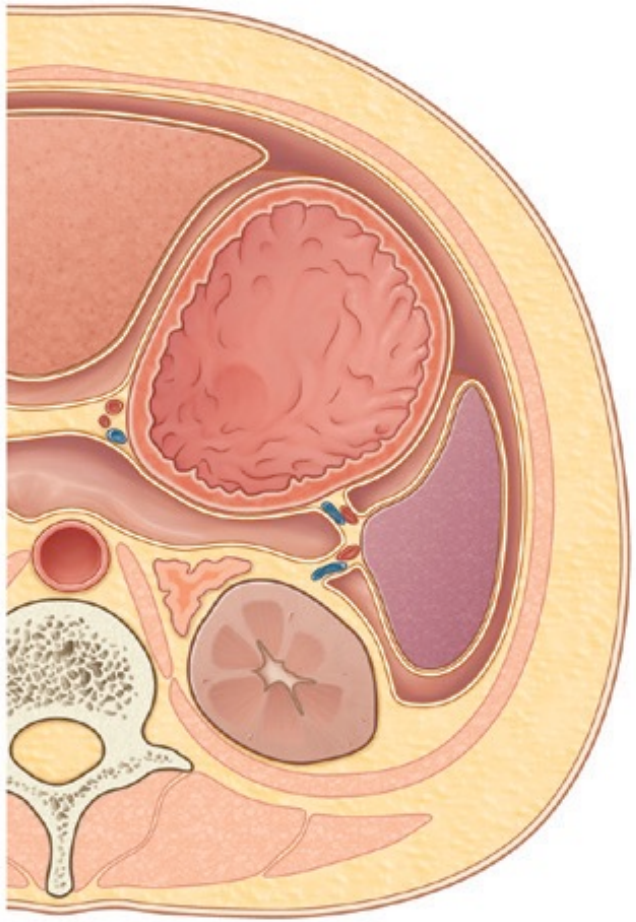


- **Facies diaphragmatica**
  - **Costa IX - XI**
- **Facies visceralis**
- **Margo crennatus**
- **Hilus lienis**
  - **A. et. v. lienalis - několik větví**
- **size**
  - *10 -13 cm*
  - *6 -8 cm*
  - *4 cm*

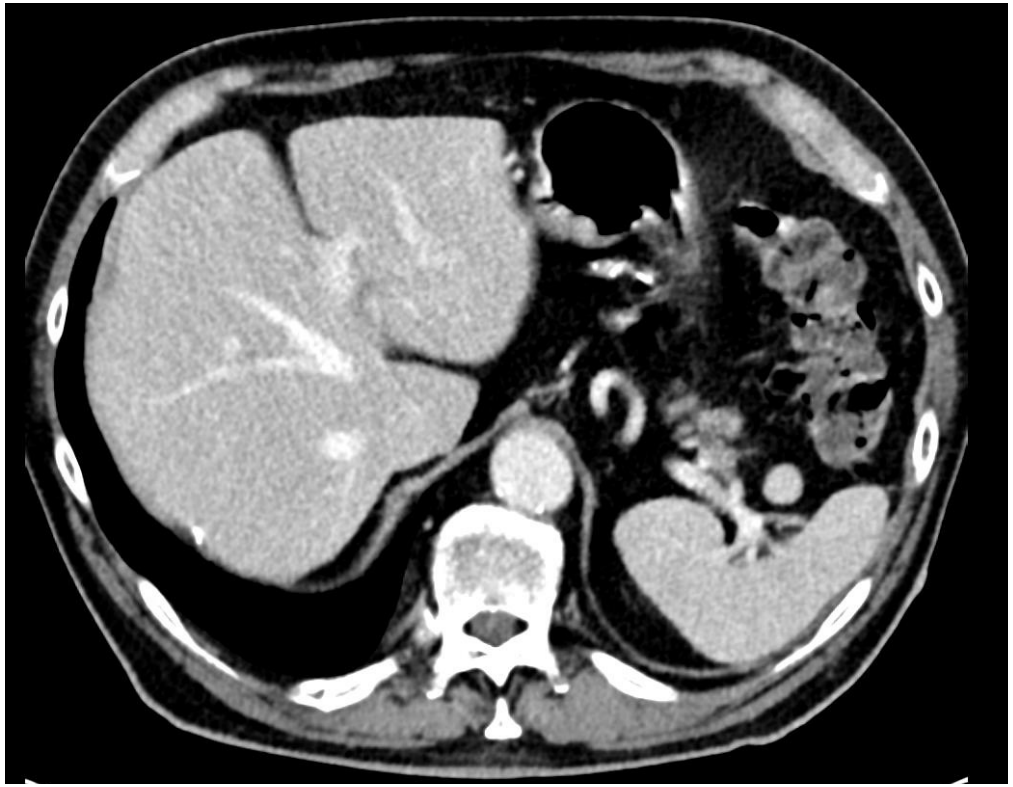
SPLEEN

- Axis
- *Parallel with costa X.*
- *Costa IX-XI*

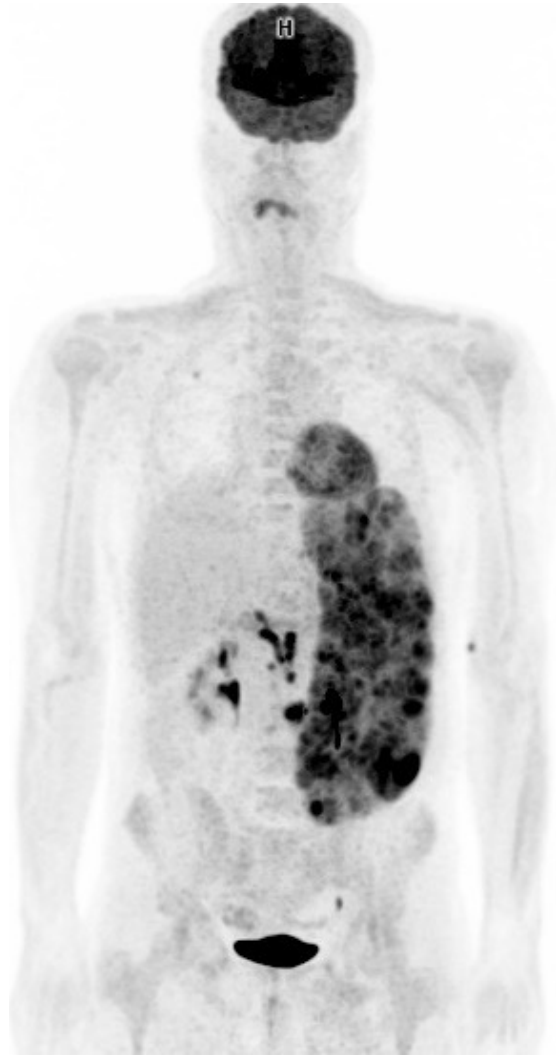
- Lig. gastrosplenicum
- Lig. splenorenalis



SPLEEN



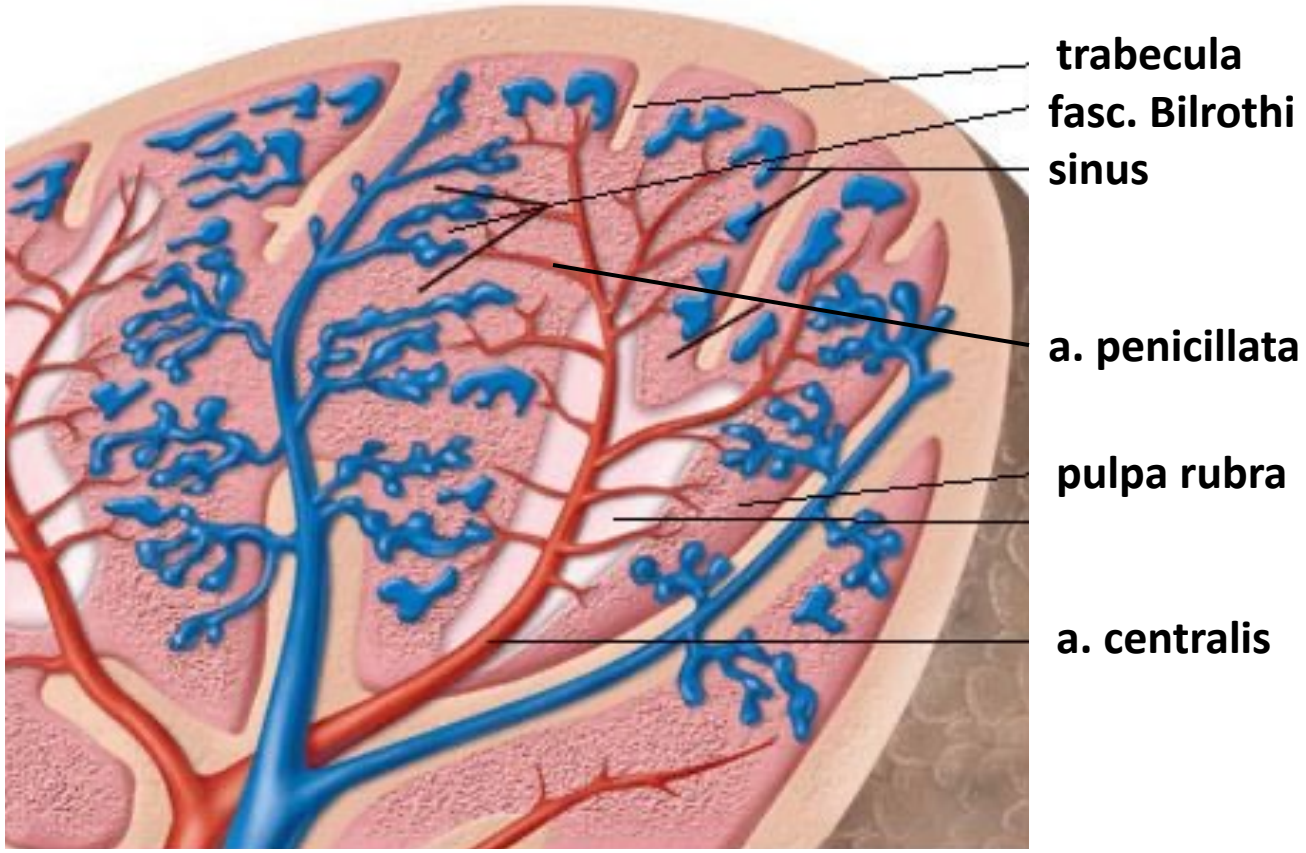
- **Shape**
- **variants**
  - *Lien lobatus*
  - *Lien accesorius (spleniculus)*
  - *Polysplenia*
  - *Splenosis peritonei*
- **Splenomegaly**



SPLEEN

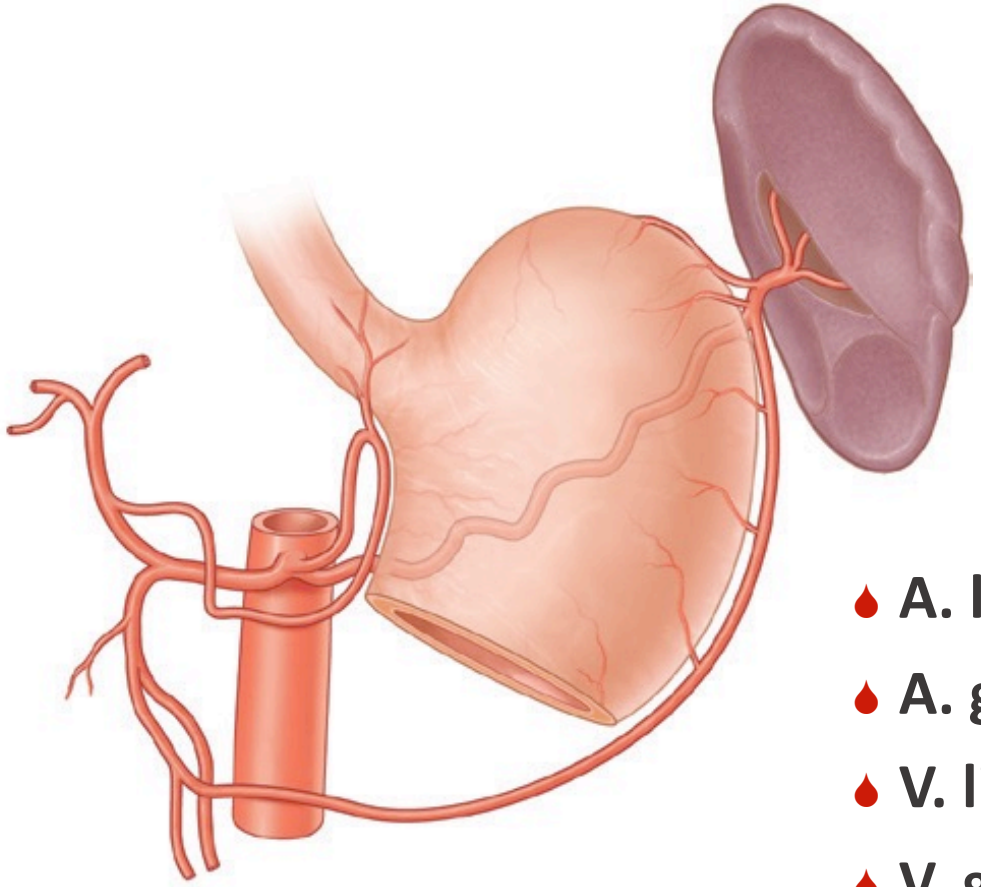
VESSELS

- **A. lienalis**
  - ***tr. coeliacus***
  - *Aa. trabeculares*
  - *Aa. centrales*
  - *Aa penicillatae 25 um (ending arteries)*
- ***Sinuses***
  - ***80 -150 um***
  - ***Bilroth fascicles***
  - *Vv. postcapillares*
  - *Vv. medullares*
  - *Vv. trabecullares*
- **V. lienalis**
  - **v. portae hepatis**

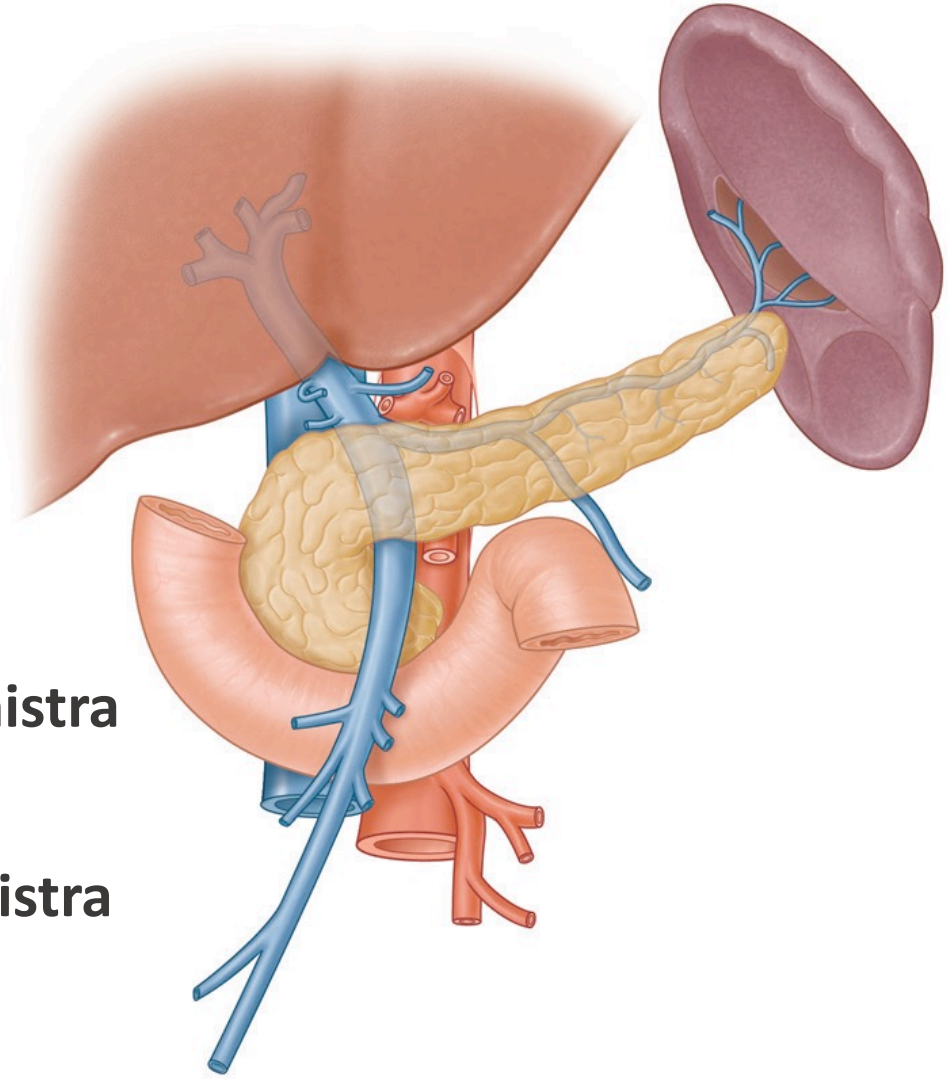


- **Red pulp - 80%**
  - *Sinus lienis – sinusoids 80 -150 um*
    - *Incomplete basement membrane*
  - *Reticulum settled by blood cells*
    - *ery, B-ly, plasmatic cells, trombo, macrophages*
  - *Macrophagest ingest spherocytes*
- **White pulp - 20%**
  - *Periarteriolar lymphatic sheath*
  - *Folliculi lymphatici (corpuscula Malpighi)*
    - *Primay - non-activated*
    - *secondary - activated*

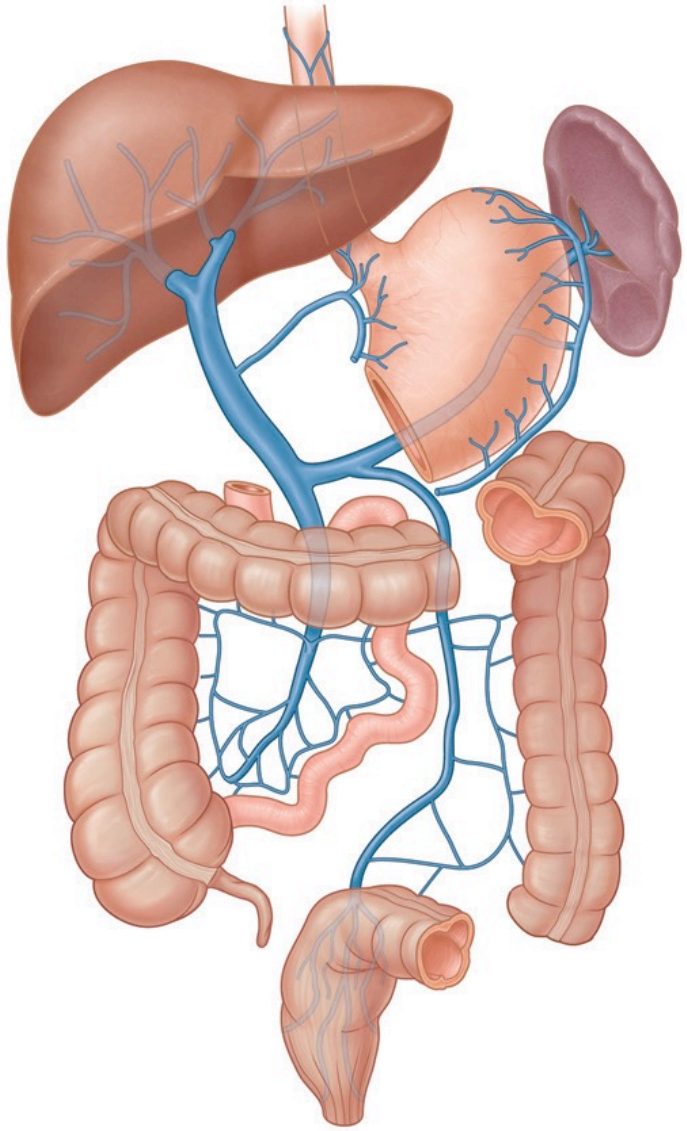
RED AND WHITE PULP



- A. lienalis
- A. gastroomentalis sinistra
- V. lienalis
- V. gastroomentalis sinistra



VASA LIENALES

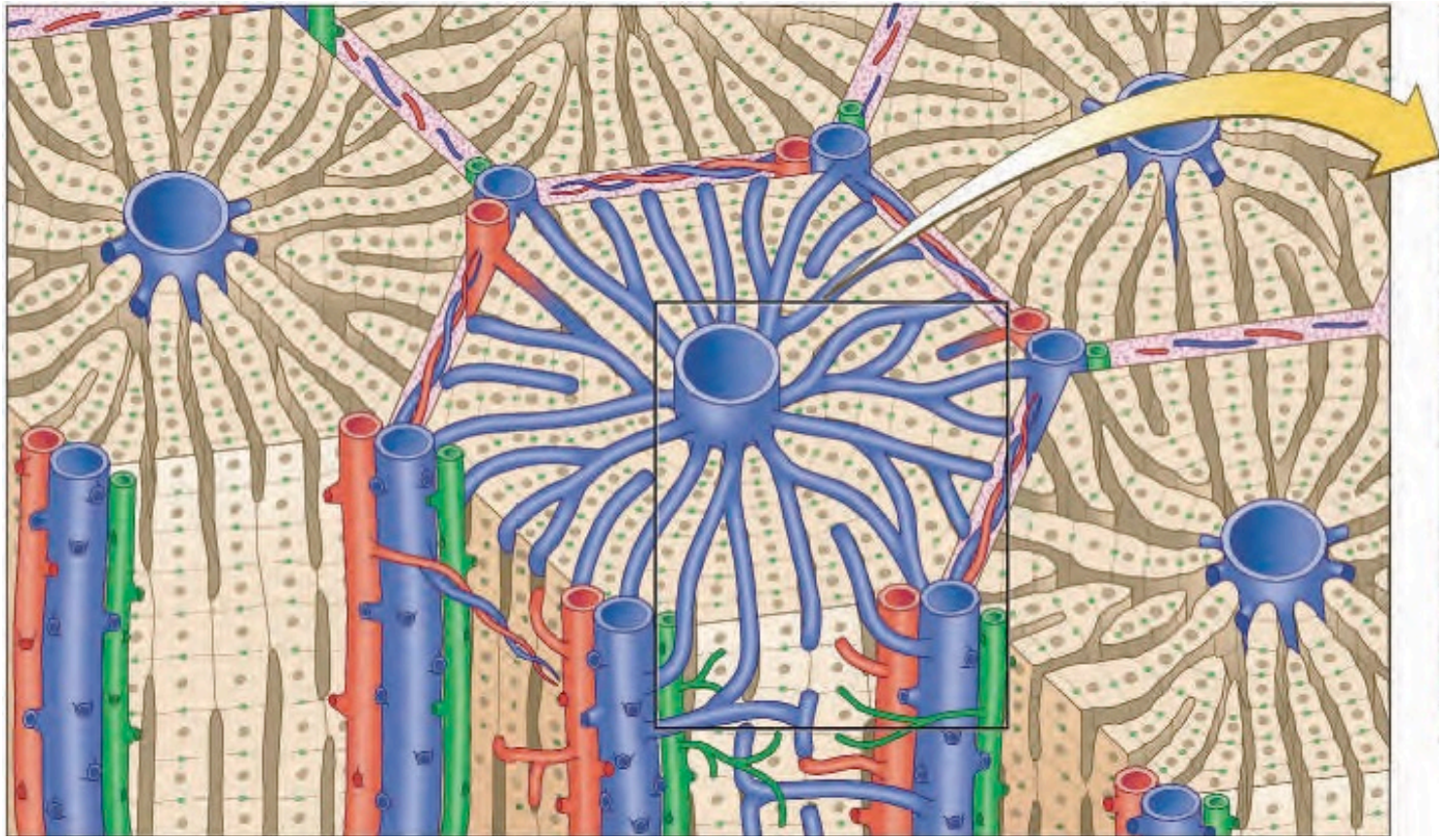


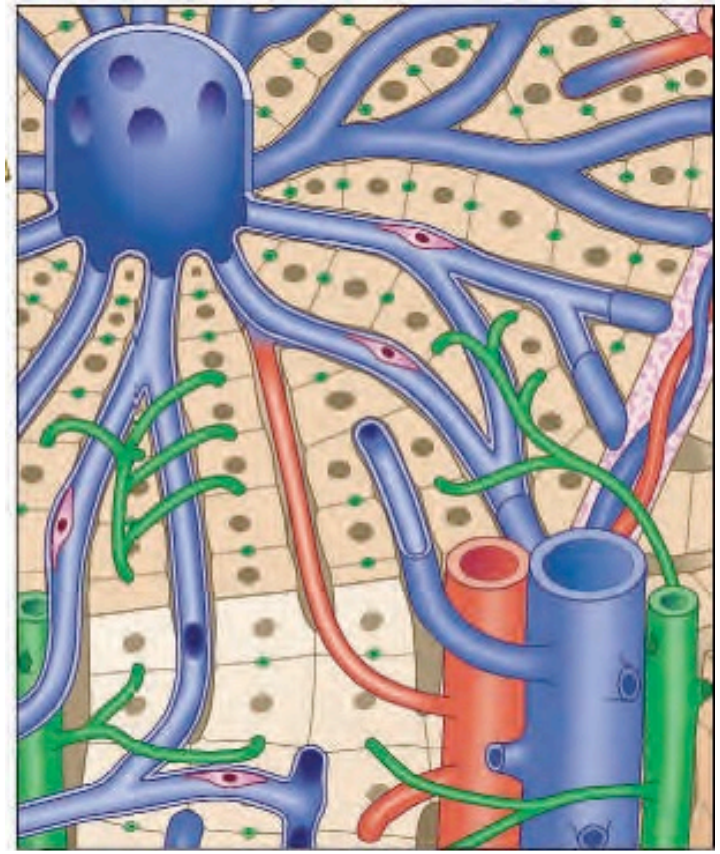
- Visceral blood outflow
- Ventriculus
- Lien
- Pancreas
- Intestinum tenue
- Intestinum crassum
- V. portae hepatis
  - Radices
  - V. lienalis
  - V. mesenterica superior
  - V. mesenterica inferior

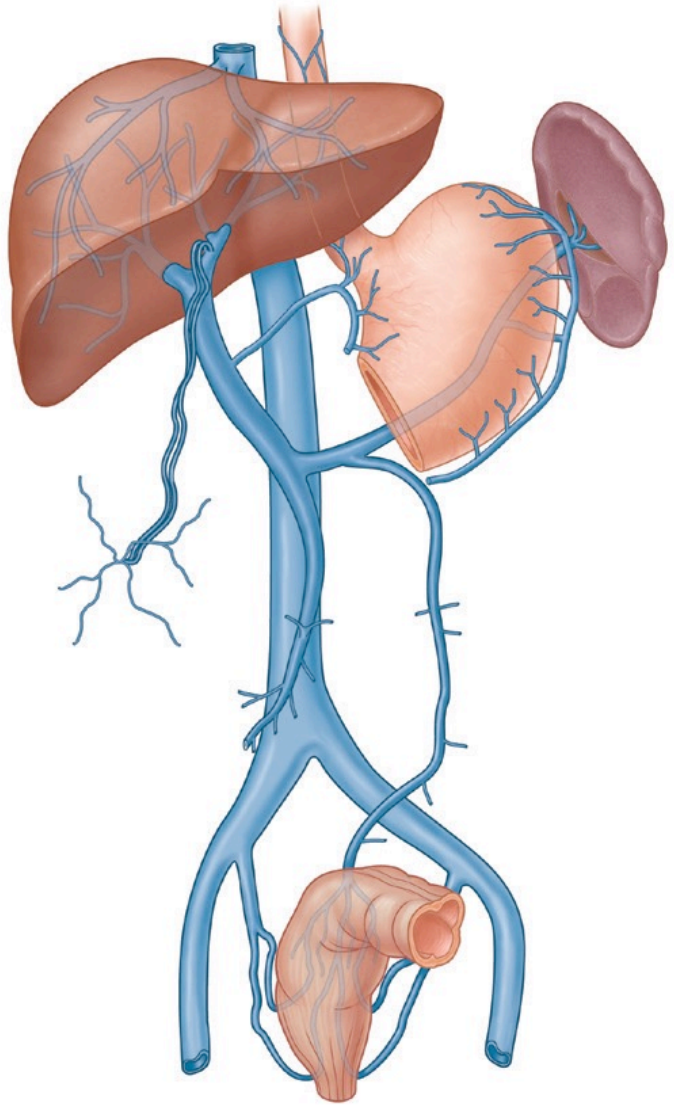
PORTAL SYSTEM

VENA PORTAE HEPATIS

BLOOD FLOW THROUGH LIVER



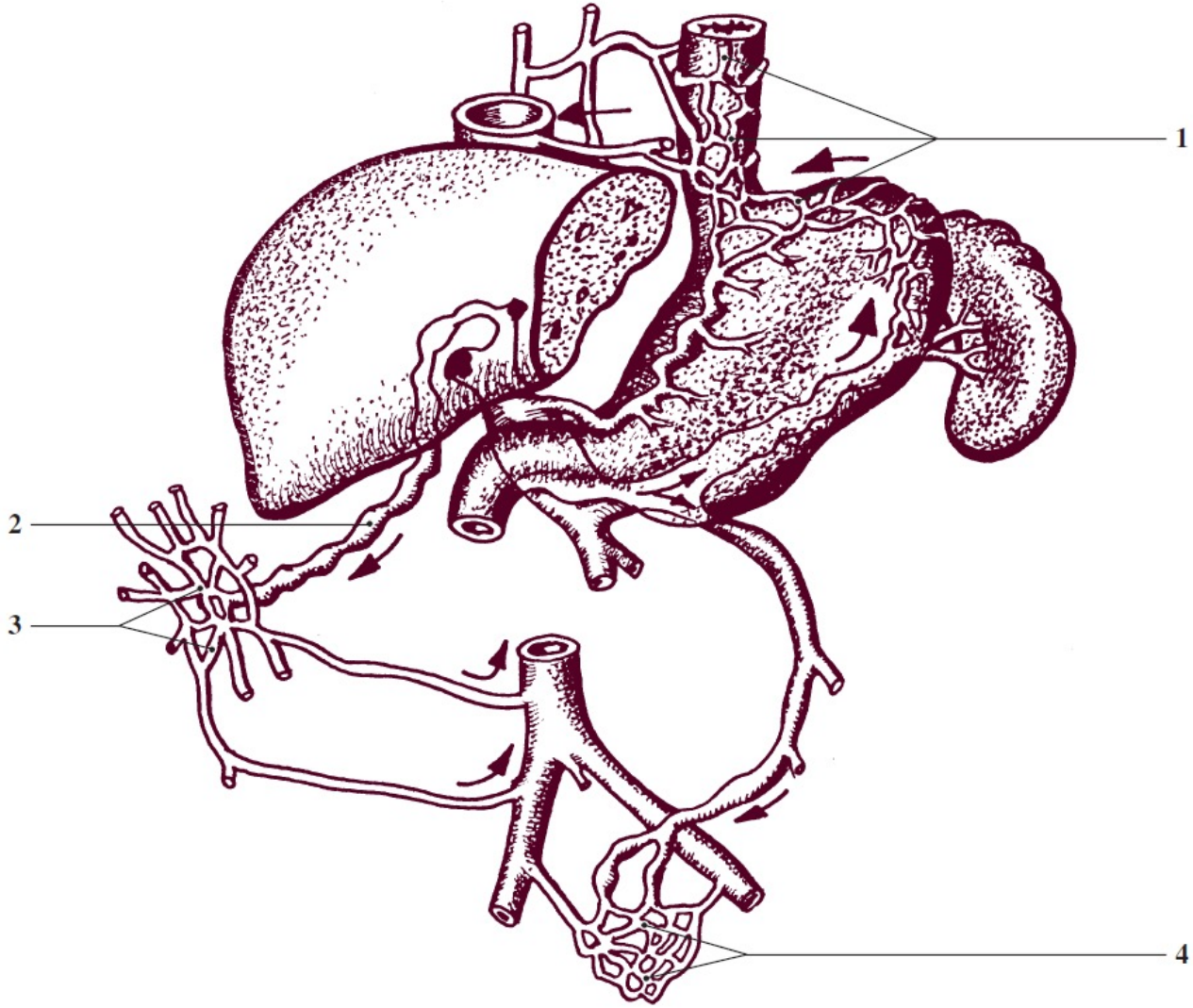




- Increased vlood preasure in portal system
- Presinusoidal
- Sinusoidal
- Postsinusoidal

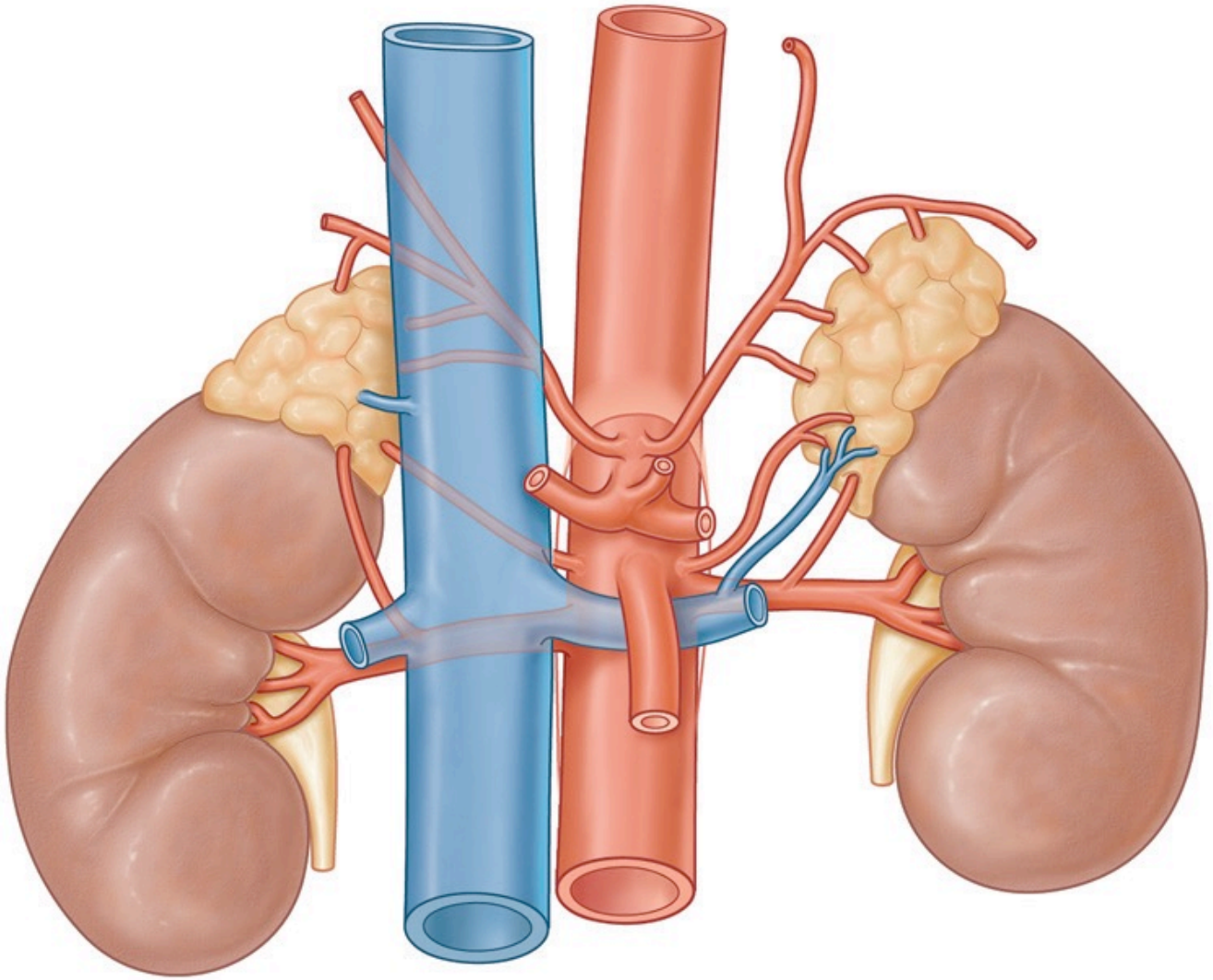
- Thrombosed v. portae or its roots
- Liver diseases
  - Cirrhosis hepatis
  - Hepatocellular carcinoma
- Liver veins occlusion

PORTAL HYPERTENSION



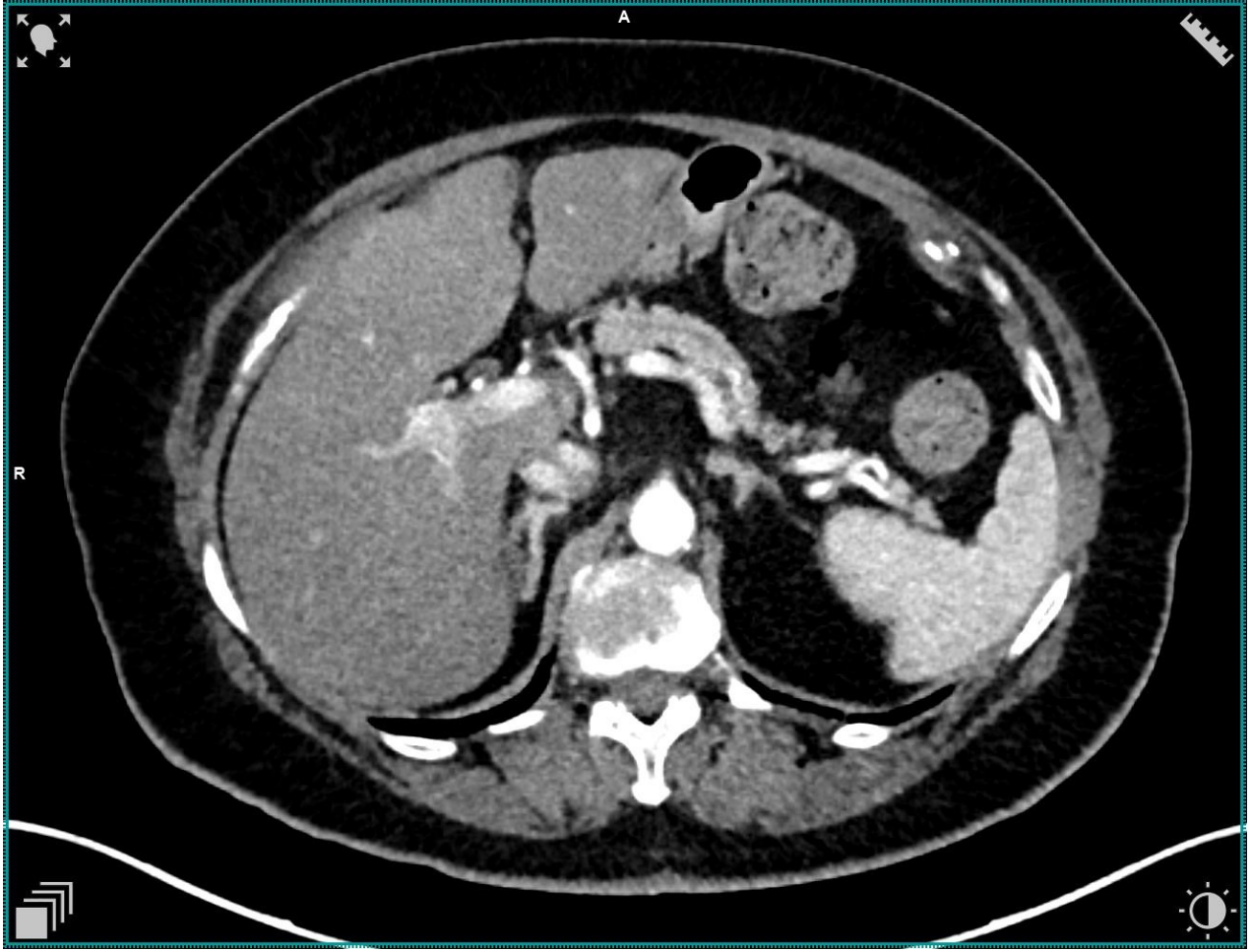
- *Vv. gastricae breves*
  - **Varices oesophageales (1)**
- *V. umbilicalis (2) (rekanalizace)*
  - **Caput Medusae (3)**
- *V. mesenterica inferior*
  - **Plexus hemorrhoidalis (4)**

PORTOCAVAL ANASTOMOSES

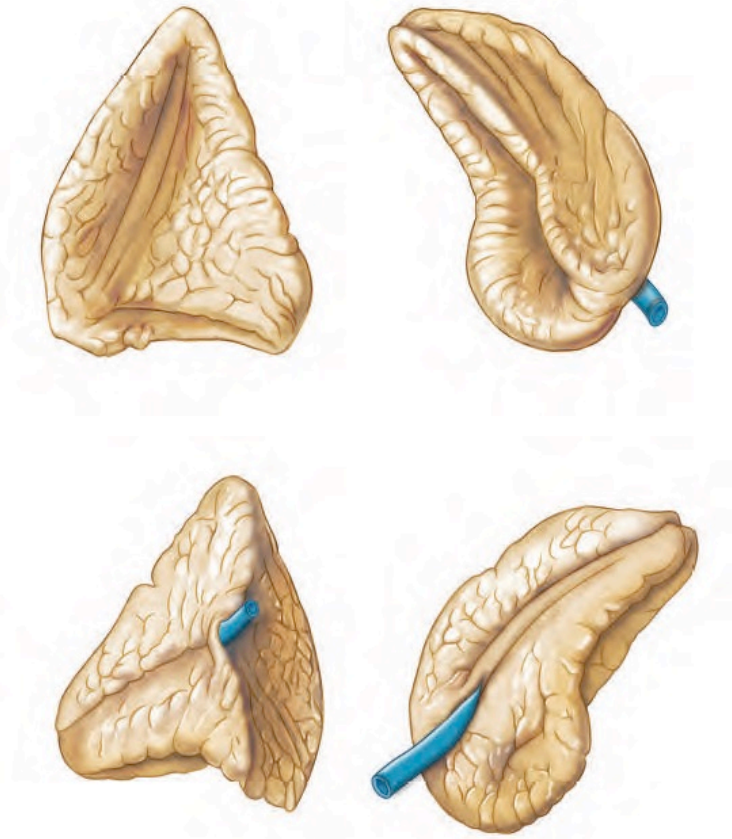


- retroperitoneal
- Inside of renal fascia
- Surrounded by fat
- Between kidney and adrenal gl.
- Distinct connective tissue septum

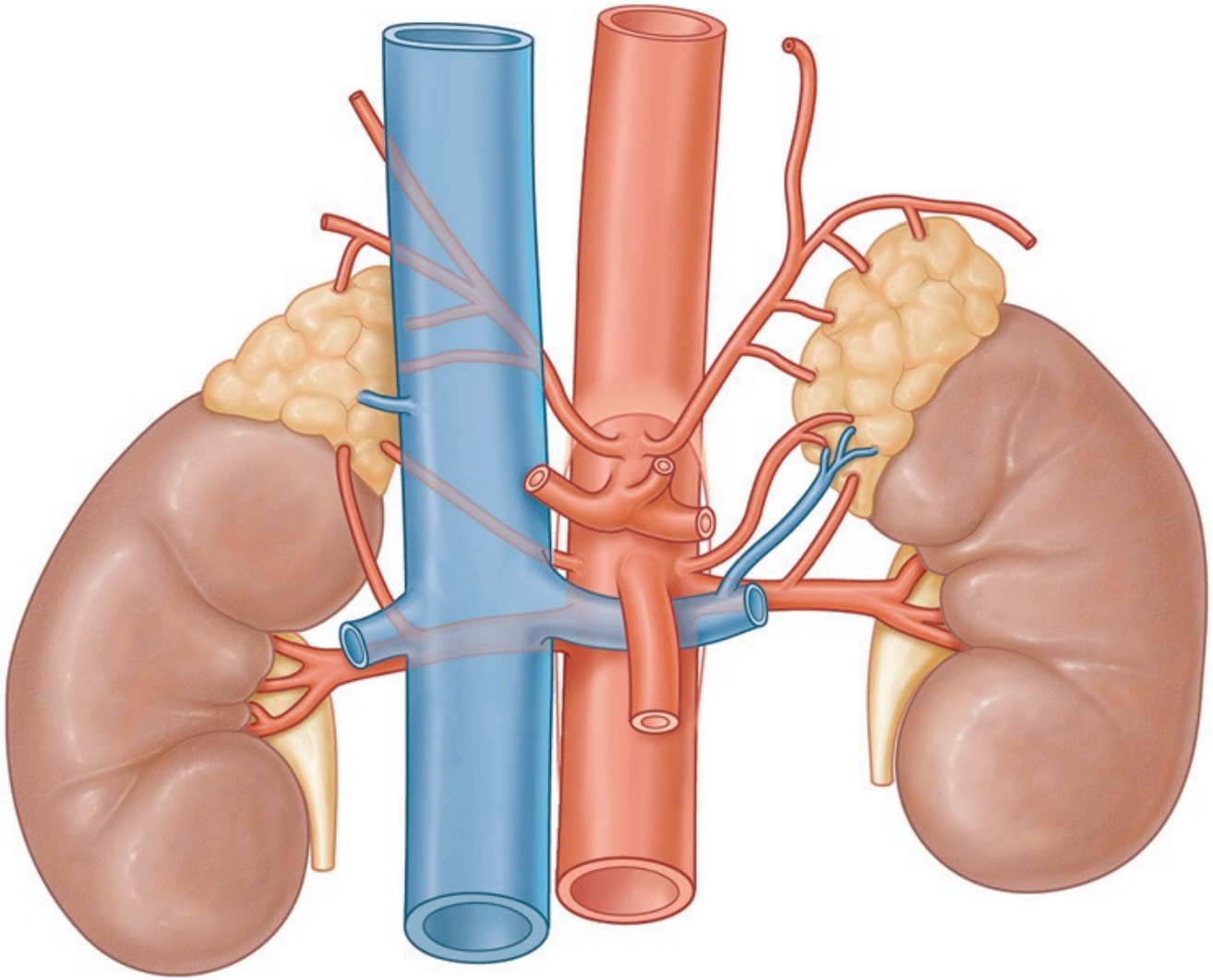
GLANDULAE SUPRARENALES



- right
- V-shape
- left
- Y-shape

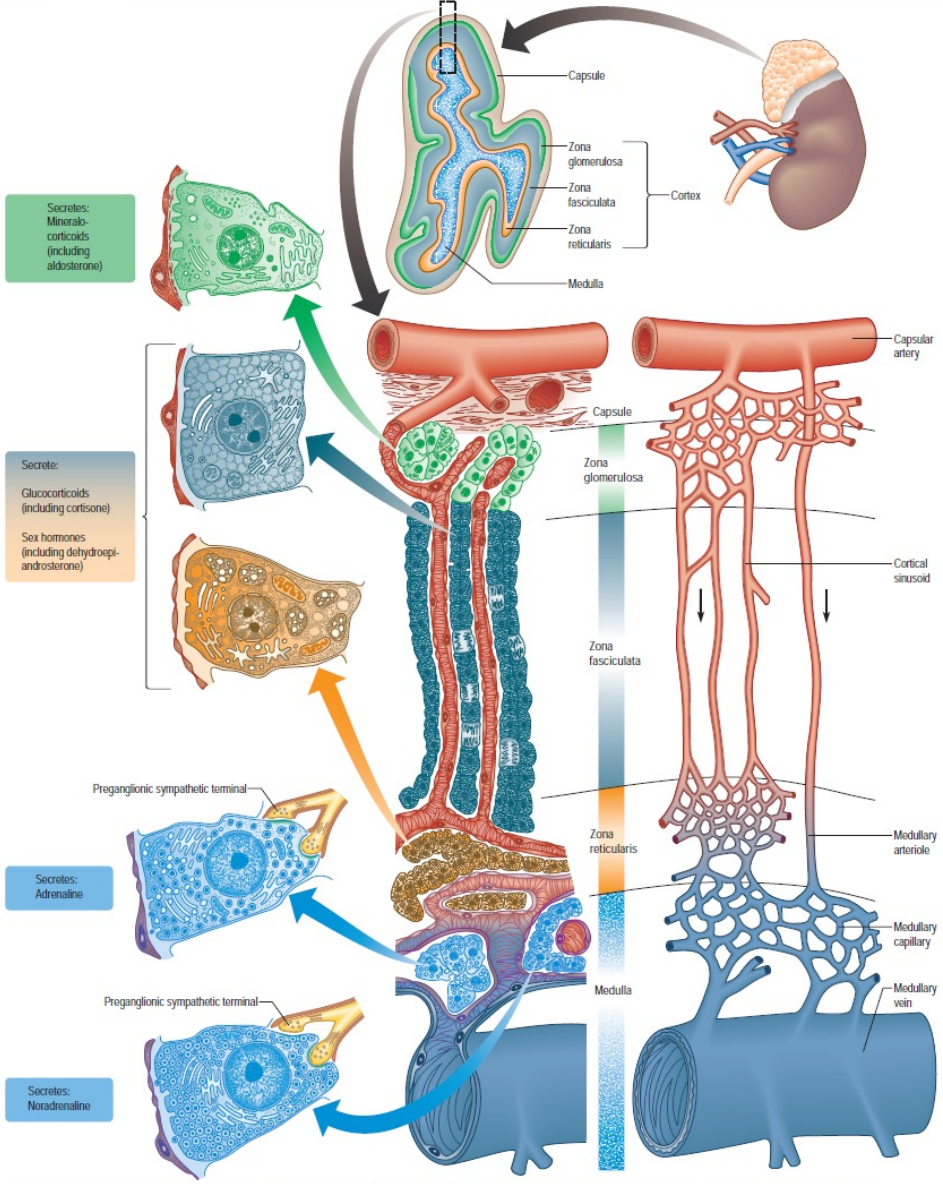


LEFT AND RIGHT SUPRARENAL GL.



- Aa. suprarenales superiores
  - A. phrenica inferior
- A. suprarenalis media
- A. suprarenalis inferior
  - A. renalis
- V. suprarenalis dx.
  - V. cava inferior
- V. suprarenalis sin.
  - V. renalis sin.

VASA SUPRARENALIA



- Cortex
- Zona glomerulosa - mineralocorticoids
- Zona fasciculata - glucocorticoids
- Zona reticularis - sexual hormones
- Medulla
- adrenalin, noradrenalin
- Epinephrine, norepinephrine

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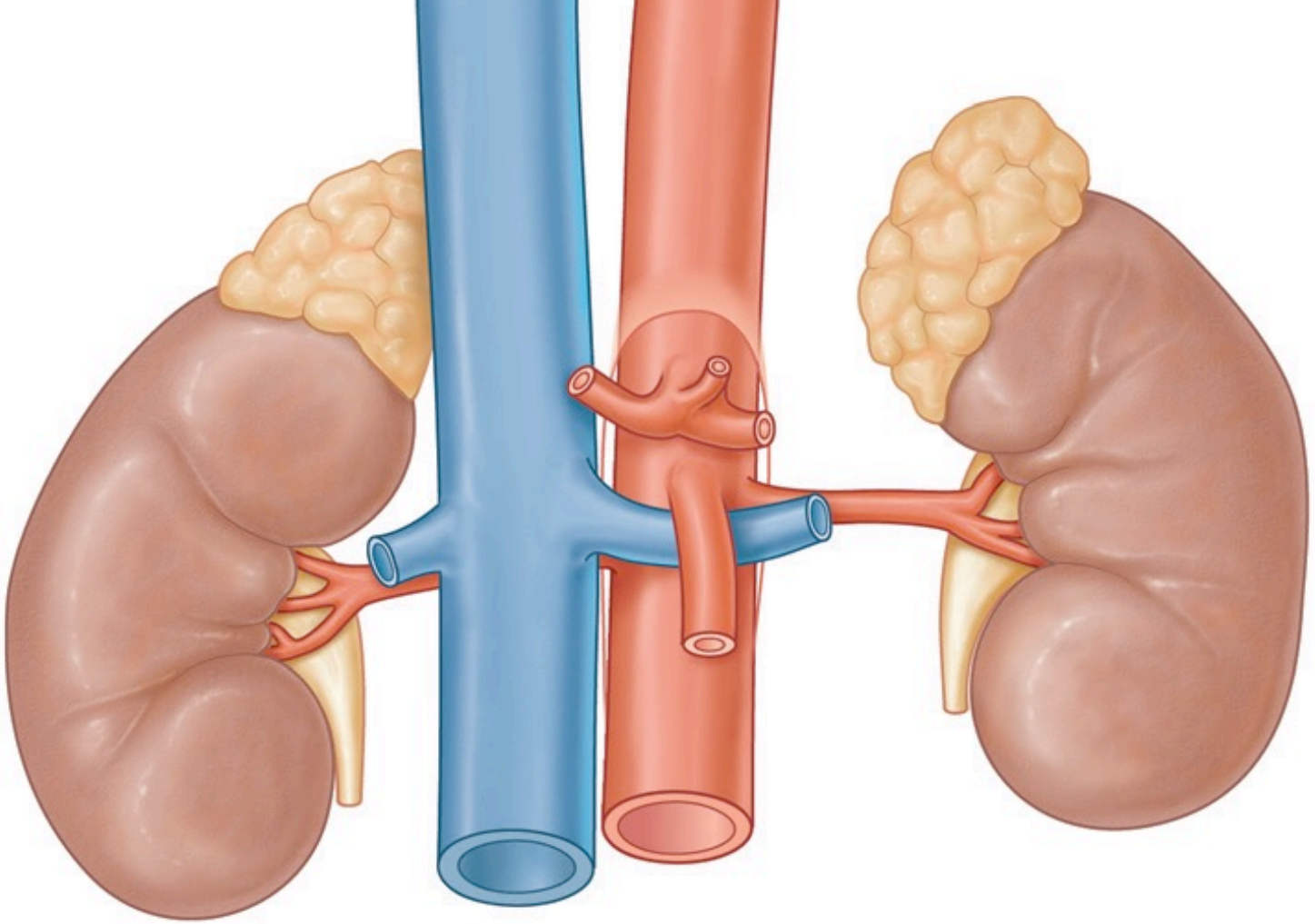
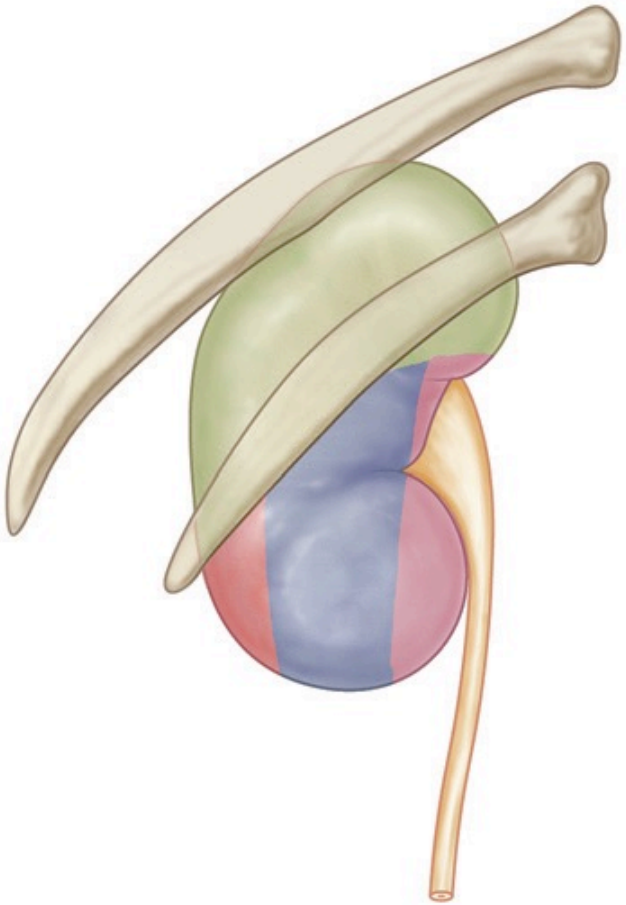
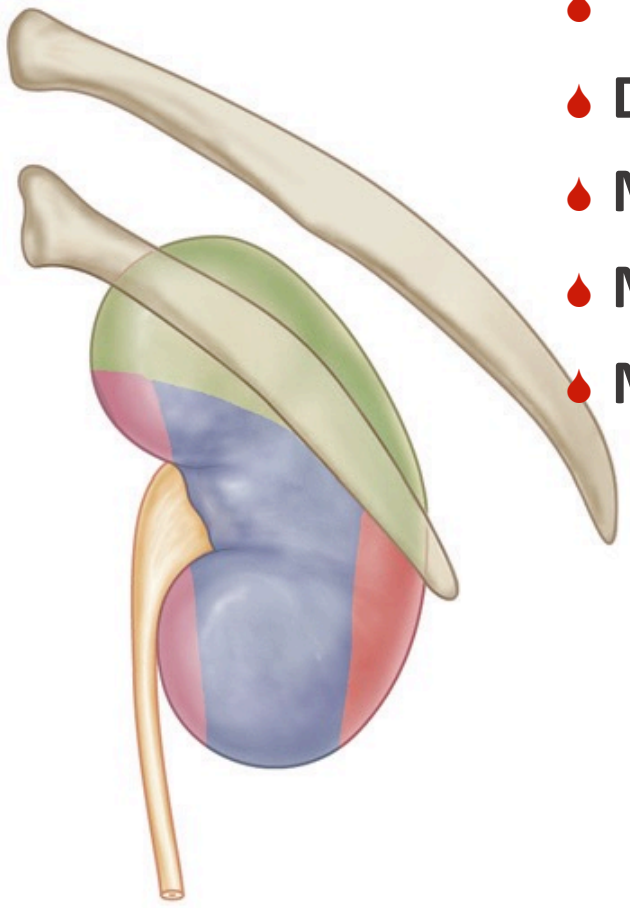
GLL. SUPRARENALES / ADRENALES



- retroperitoneal
- Th12 - L3
- Hilus L1
- Right kidney lower
- 1/3 -1/2 facing diaphragm

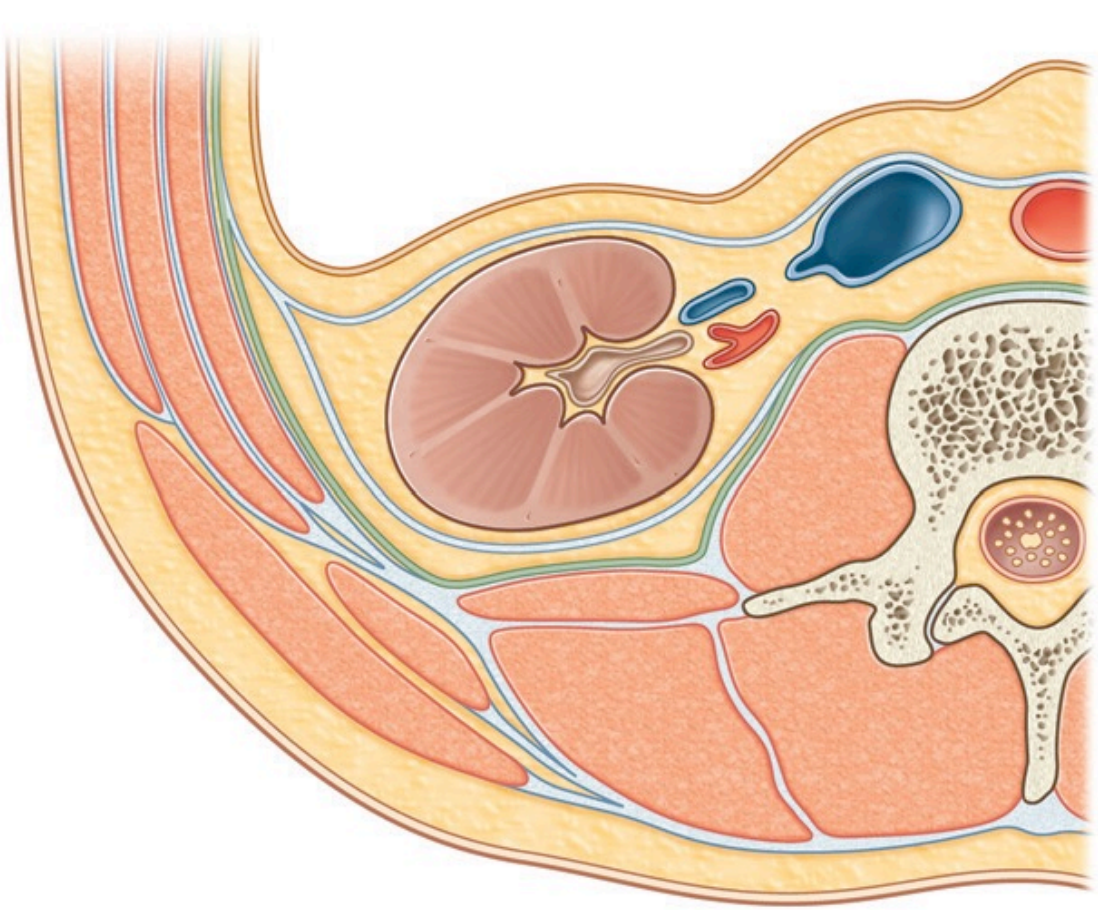
KIDNEY





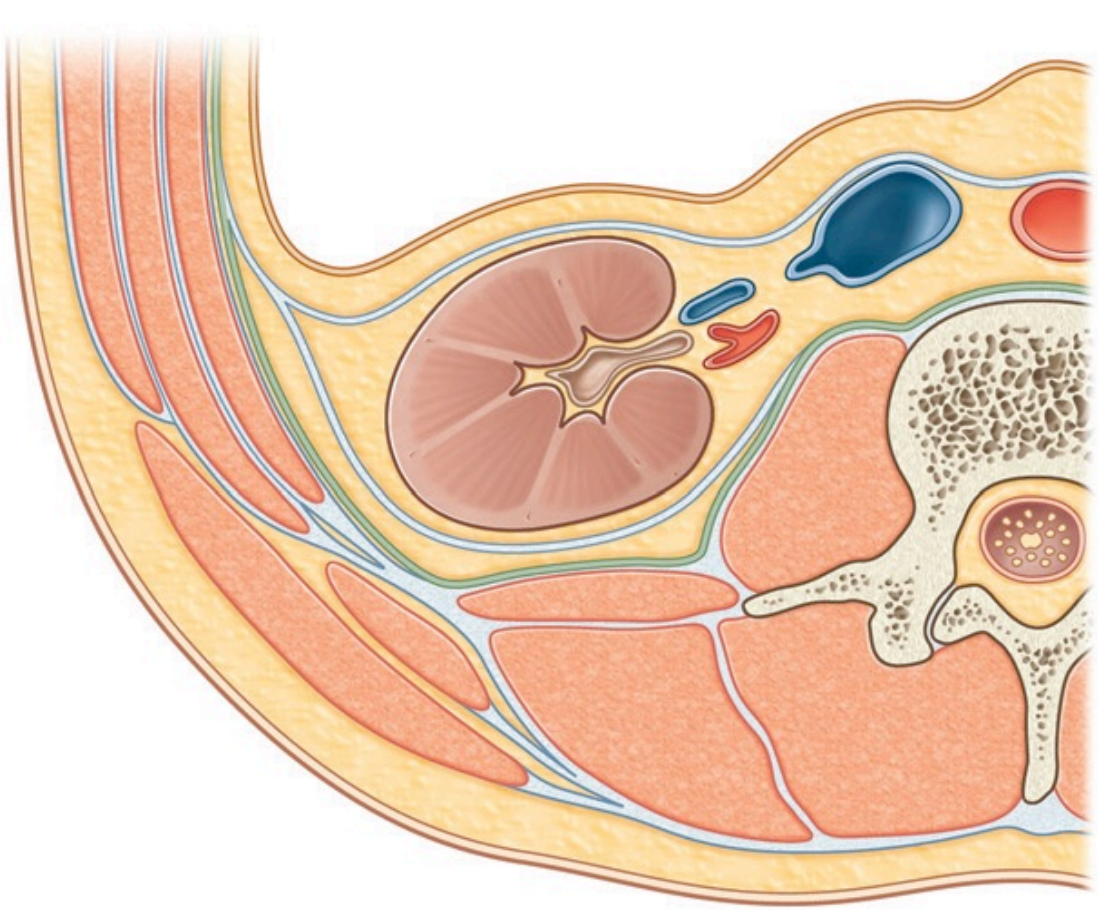
- Diaphragma
- M. psoas maior
- M. quadratus lumborum
- M. transversus abdominis

REFLECTIONS



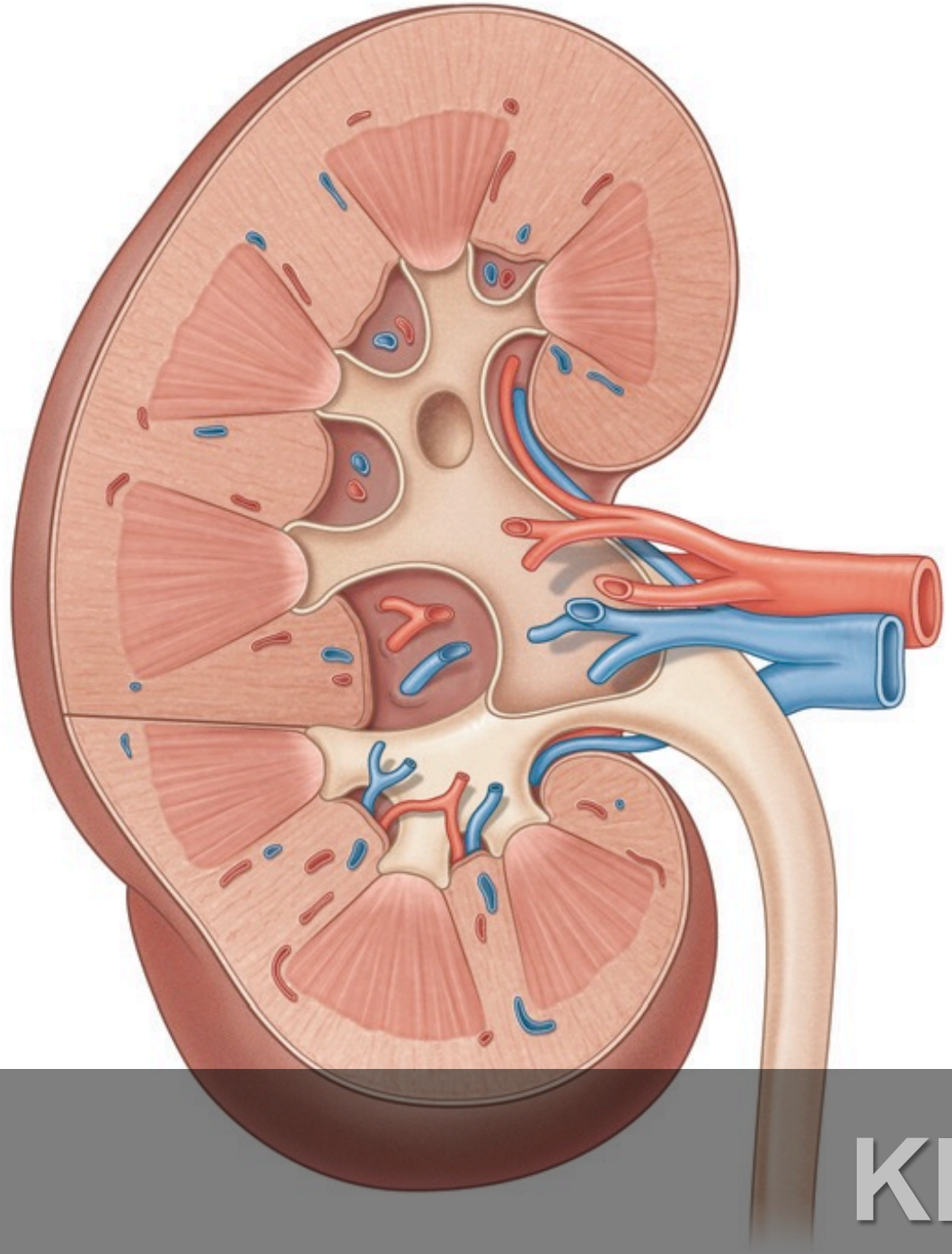
- M. transversus abdominis
- M. quadratus lumborum
- M. psoas major
- Corpus adiposum pararenalis
- Fascia renalis
- Capsula adiposa
- Capsula fibrosa

POSITION

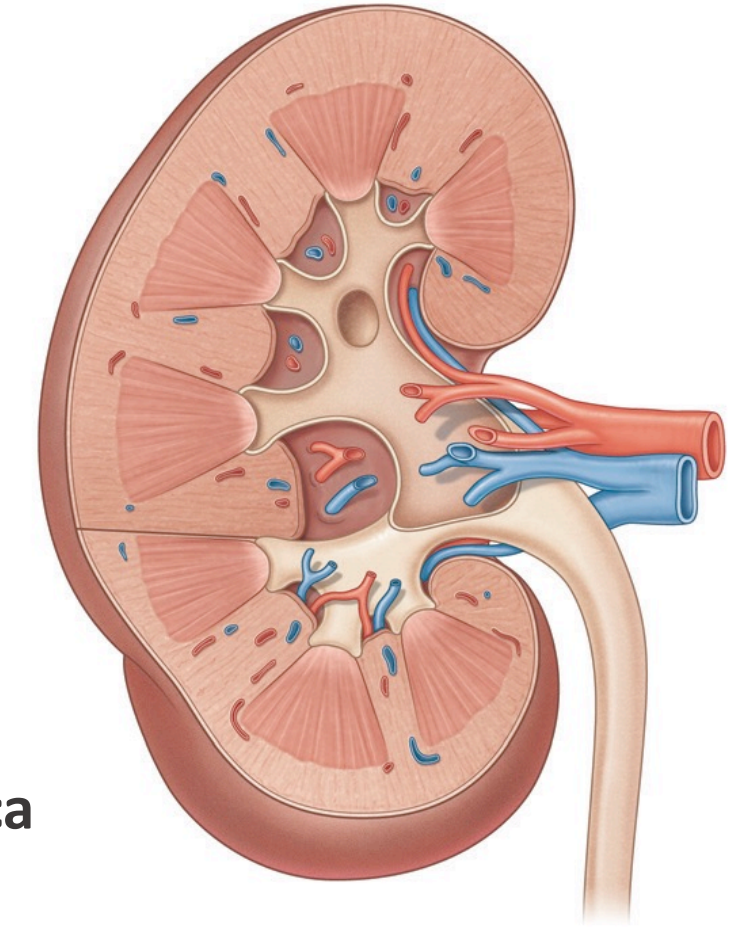


- Upside-down sac
- Cranial diaphragma
- Lateral fusion
- Medial connective tissue
- Caudal opens
- Ren migrans

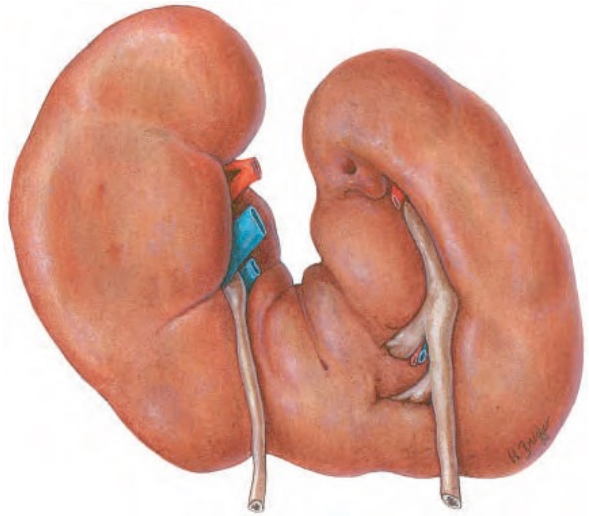
FASCIA RENALIS



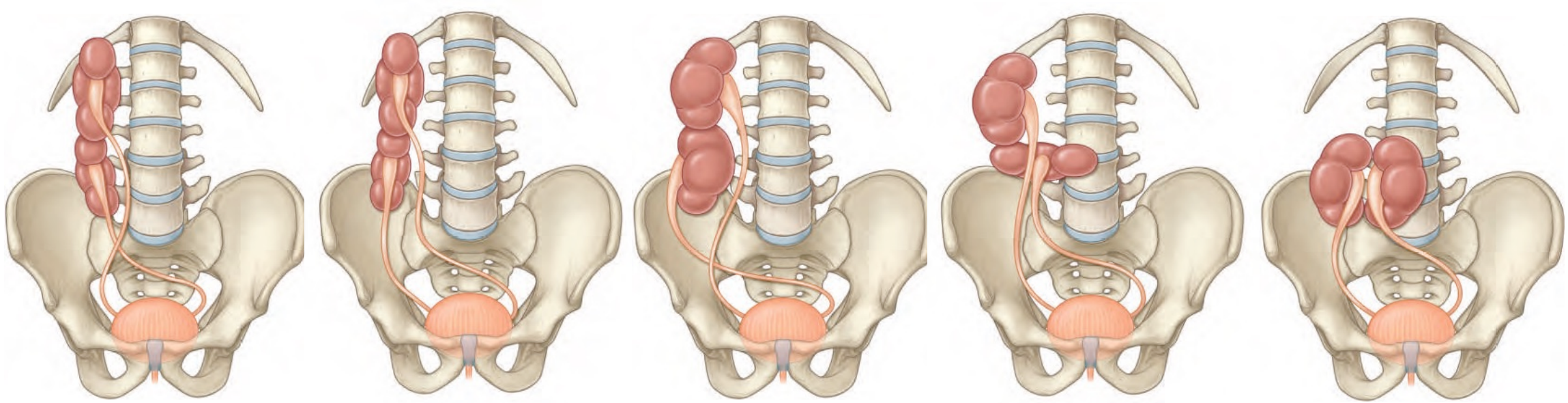
- Capsula
- Cortex
- Columna
- Medulla
- Pyramis
- Papilla
- Calix minor
- Calix major
- Pelvis
- Junctio ureteropelvica



KIDNEY



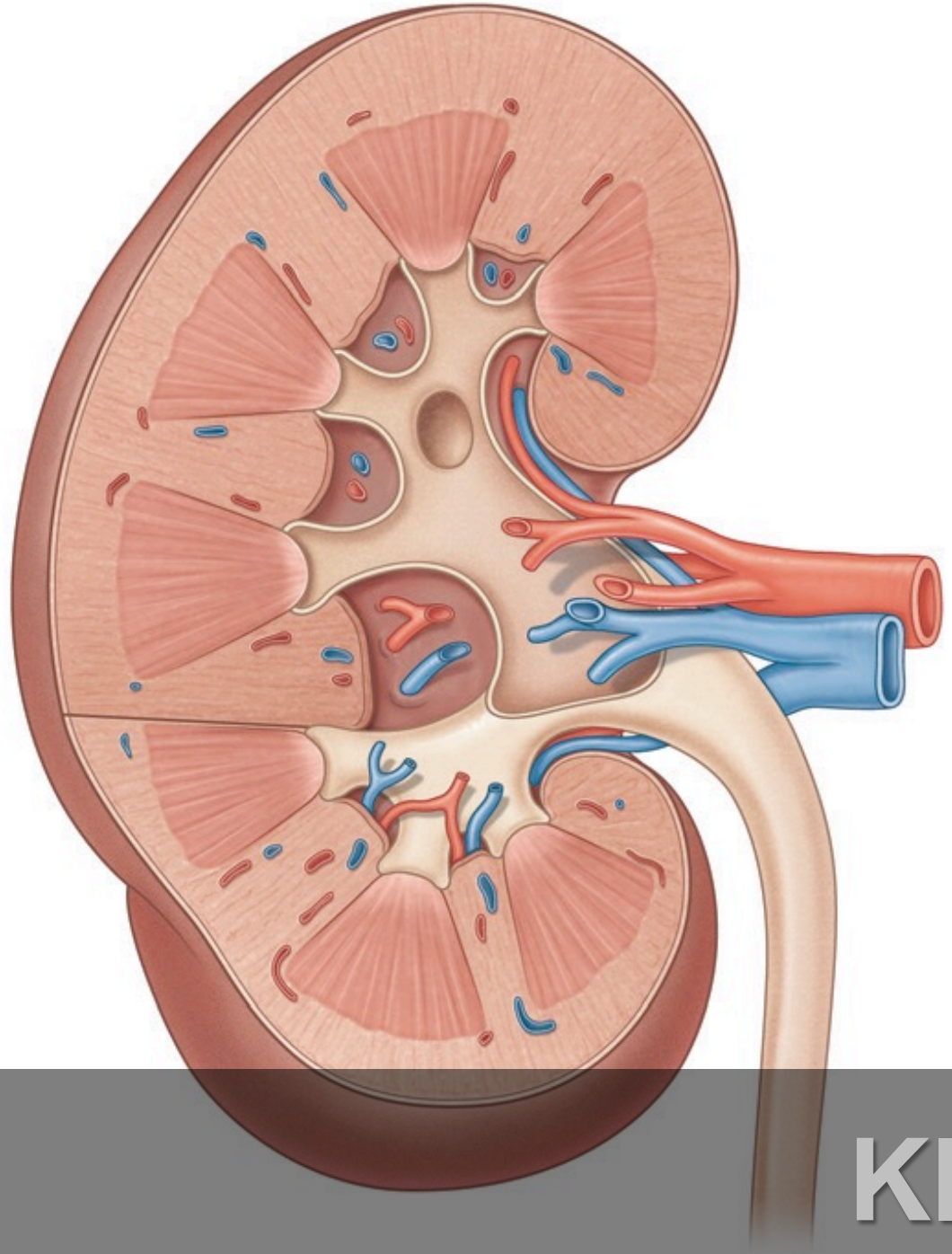
- Position
- Shape
- Number



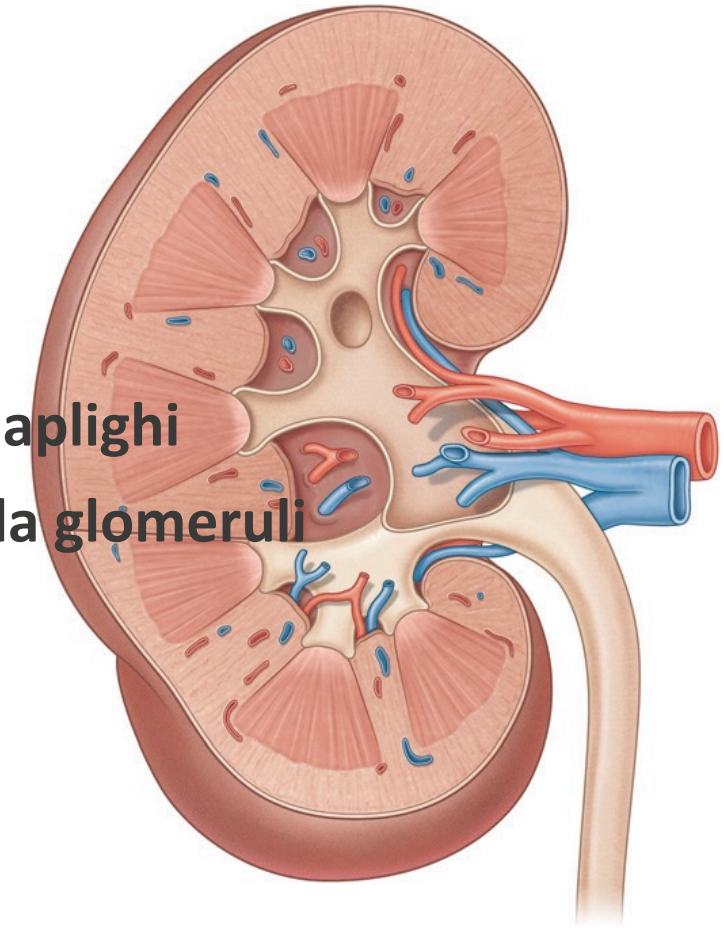
SHAPE VARIANTS

- Ren duplex
- Ren sigmoideus
- Ren discoides
- Ren arcuatus = horseshoe kidney
- „L-shaped“ kidney

SHAPE ANOMALIES



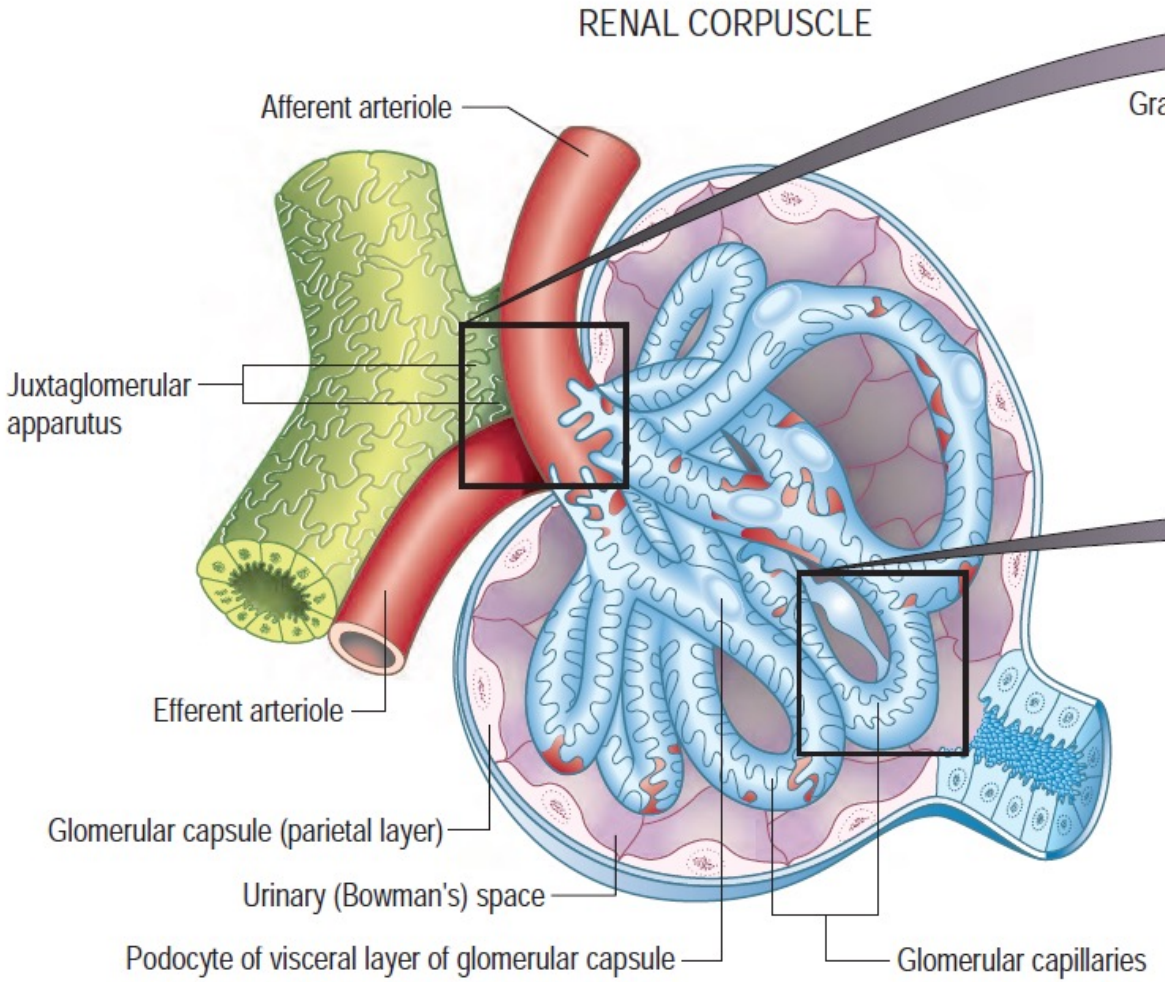
- Tubulary gland
- Exkret - urine - urina
- Lobus renis
- Lobulus renis
- Nephron
- Corpusculum renis Maplighi
- Gloemerulus + capsula glomeruli
- Tubulus proximalis
- Henle-loop
- Tubulus distalis
- Tubulus colligens
- Ductus papillaris



KIDNEY

CORPUSCULUM RENIS MALPIGHI

- Glomerulus + capsula glomeruli
- Glomerulus - rete mirabile arteriosum
  - Vas afferens
    - Pory in endothelium
  - Vas efferens
- Capsula glomeruli
- external and internal sheeth
  - Bowmann sac
  - Podocytes - inner surface



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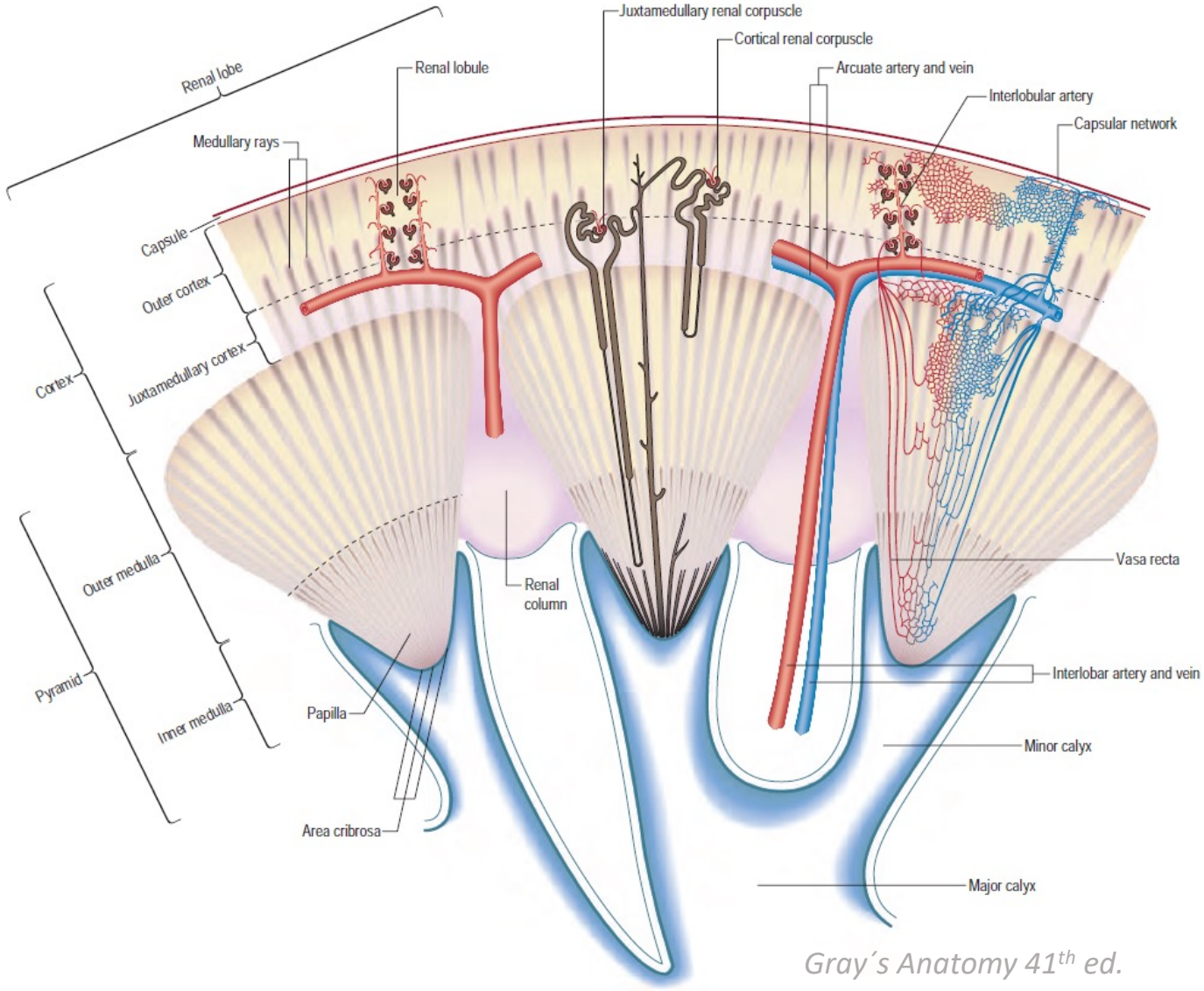
PARENCHYMA RENIS

- CORTEX
- MEDULLA
- Glomerulus
- Bowmanův váček
- Tubulus proximalis - cortex
- Henle-loop - medulla
- Tubulus distalis - cortex
- Tubulus colligens - medulla
- Ductus papillaris - ad papillam
- Calyx renis



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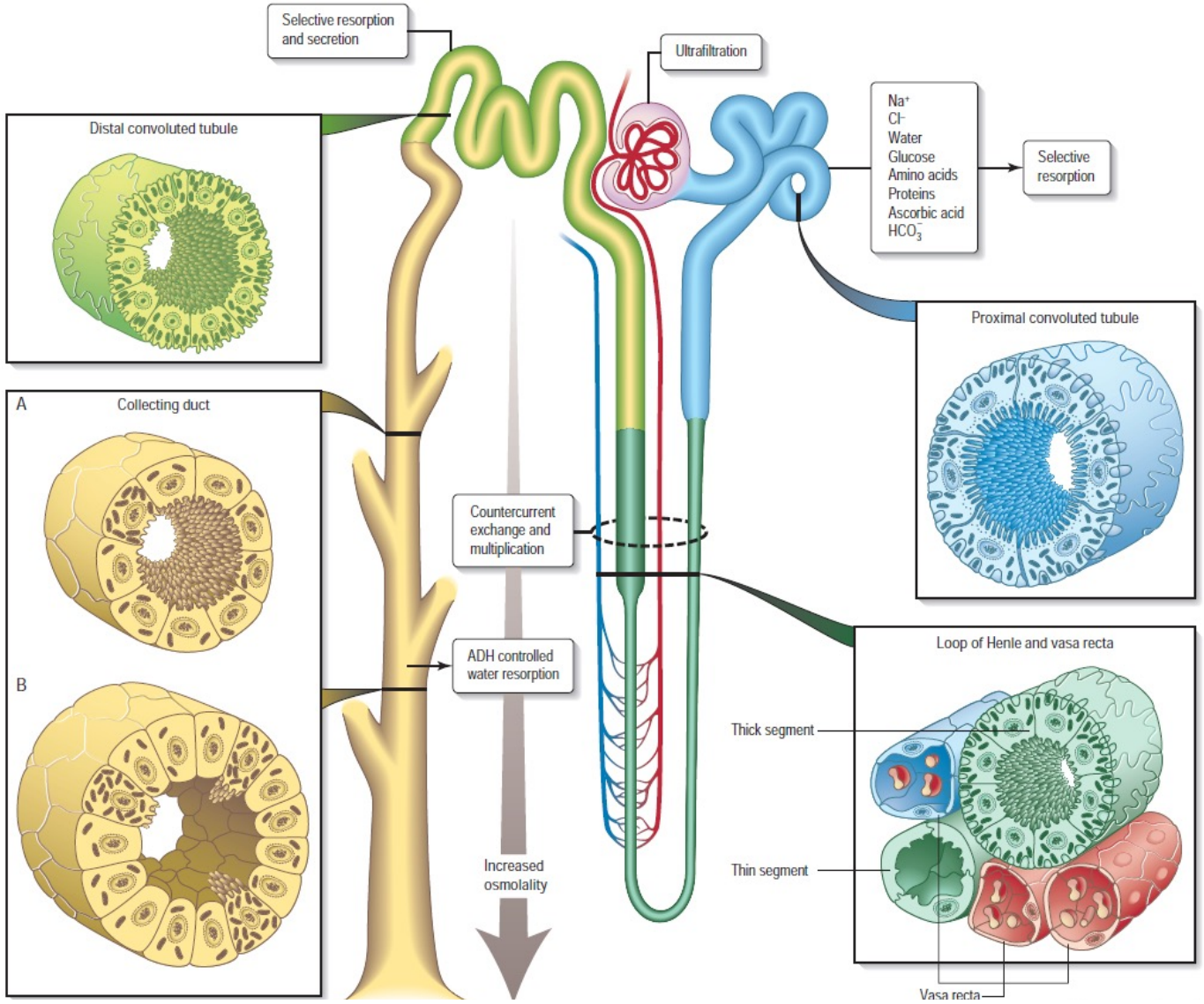
FUNCTION

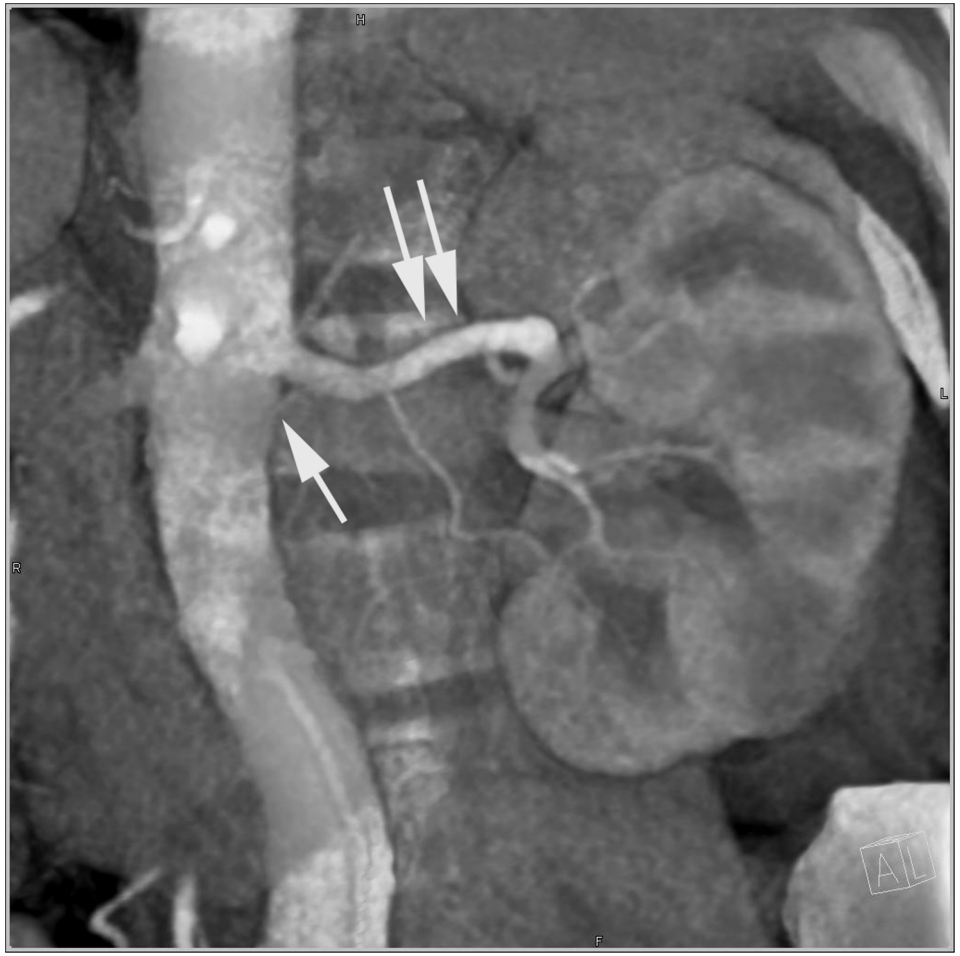
- excretion
- Corpusculum renis
  - Filtration of primary urine
  - 170 -200 ml/day (1 gomerulus)
- resorption
  - reverse
  - 99,5%
  - Aldosteron - Na
  - Antidiuretic hormone - water
- Hormonal production
- Juxtaglomerular apparatus
  - Renin (vasokonstrikce)
  - Erythropoetin



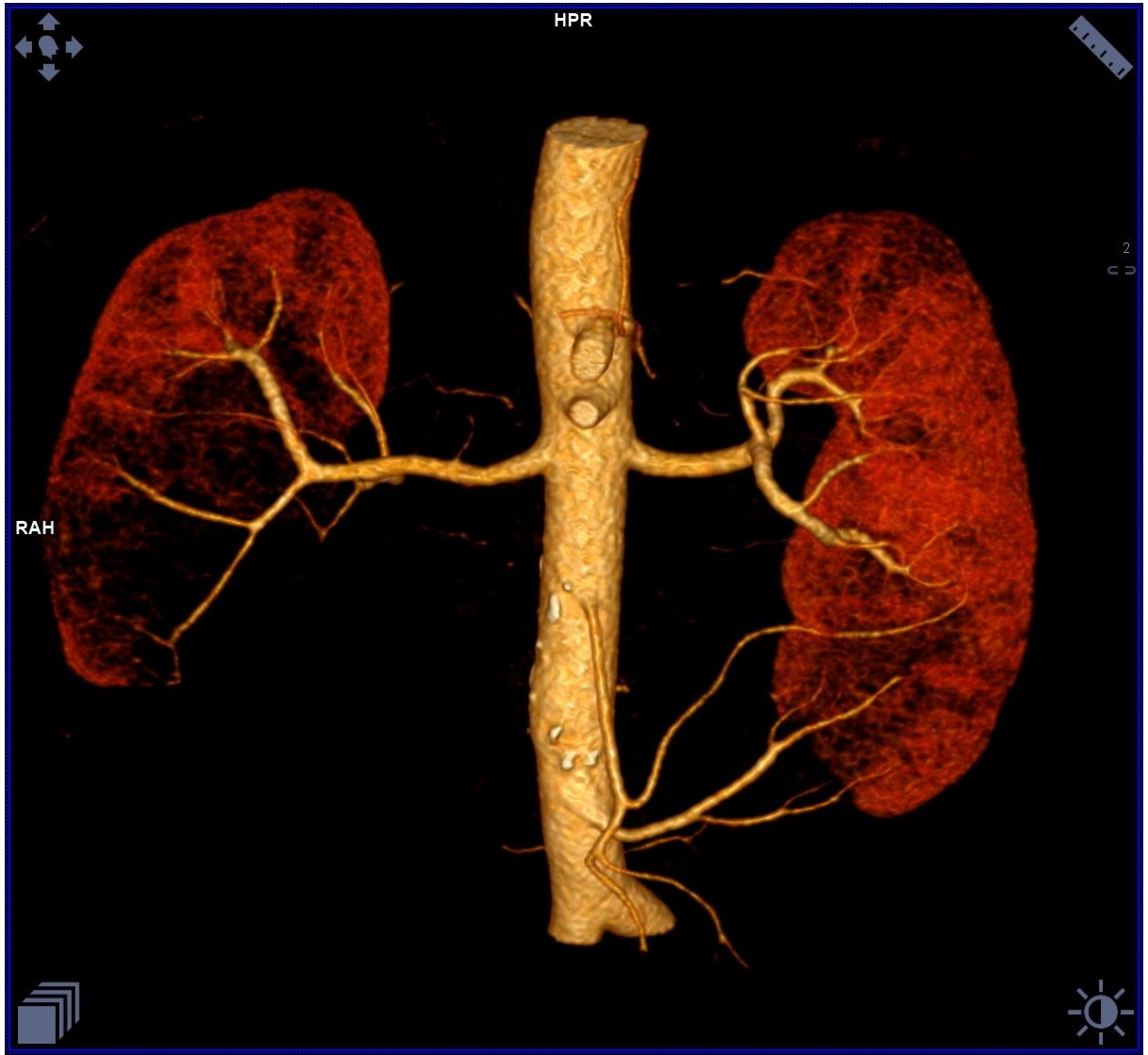
ARTERIES AND VEINS

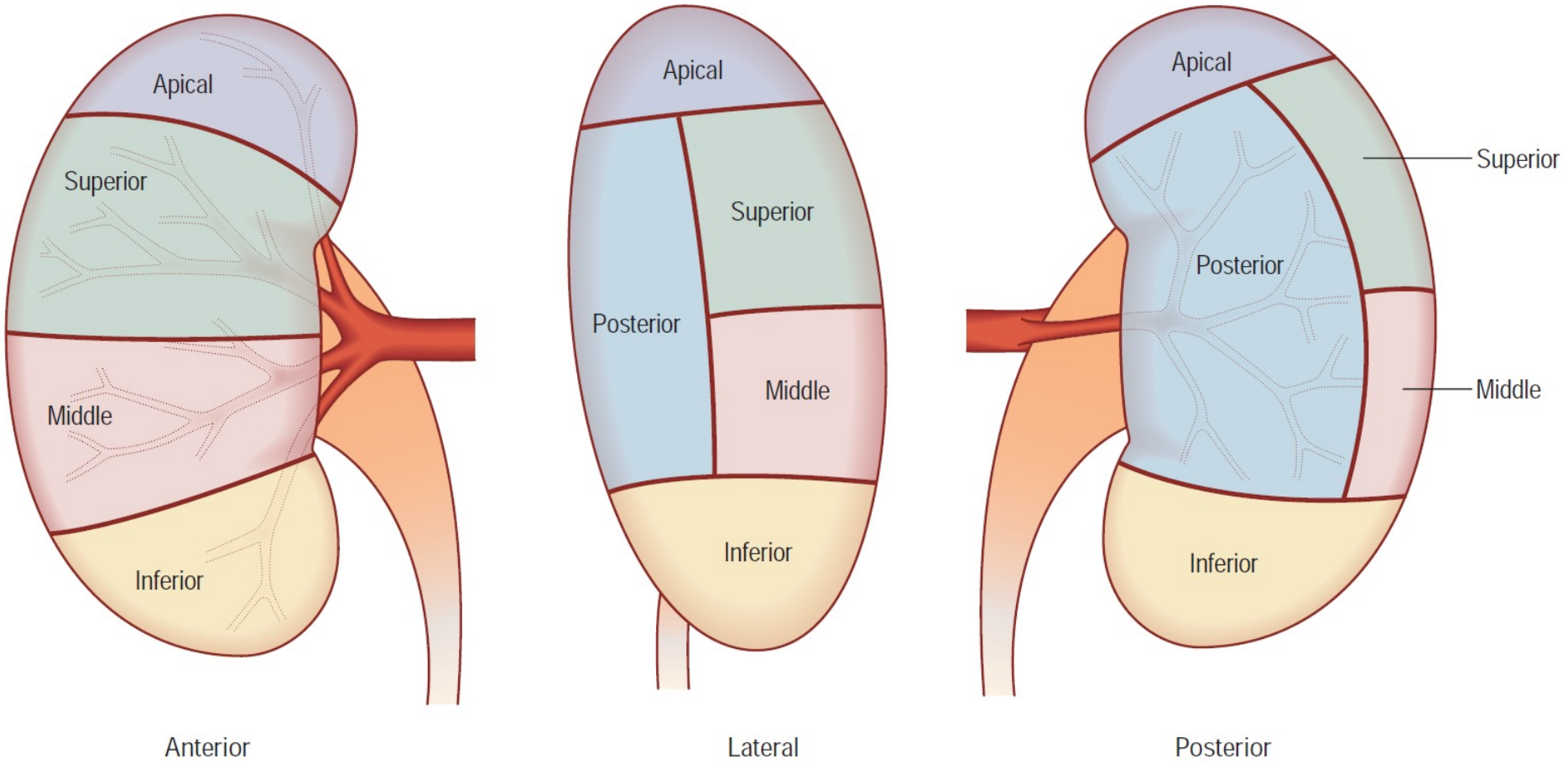
- A. renalis
- v. renalis

- A. interlobaris
- A. arcuata
- A. interlobularis
  - glomeruli
- v. interlobularis
  - Rr. capsulares
- Medulla
  - arteriola recta
  - venula recta



CT angiography

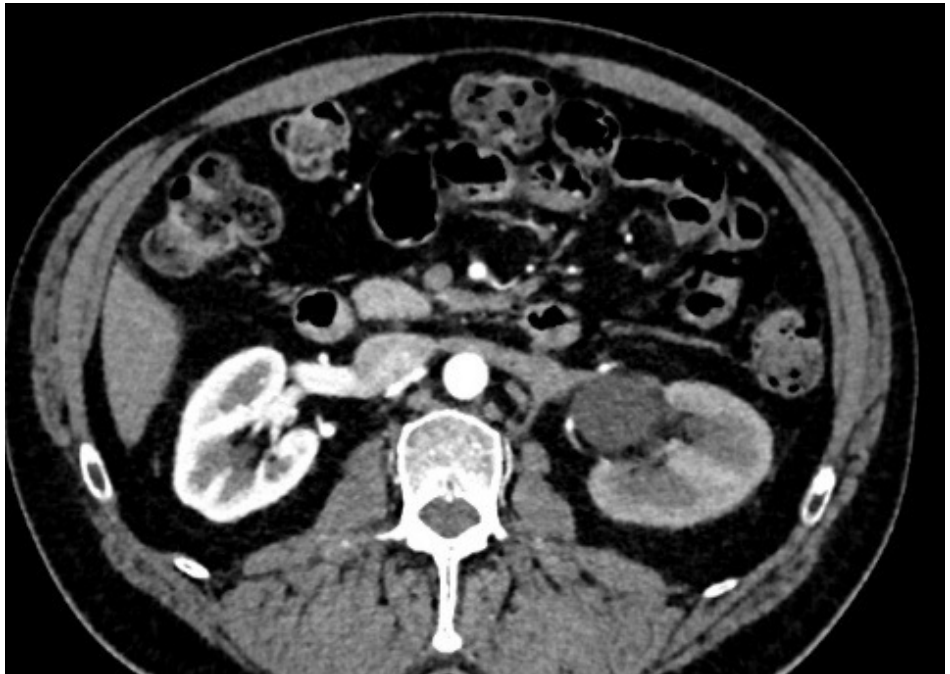


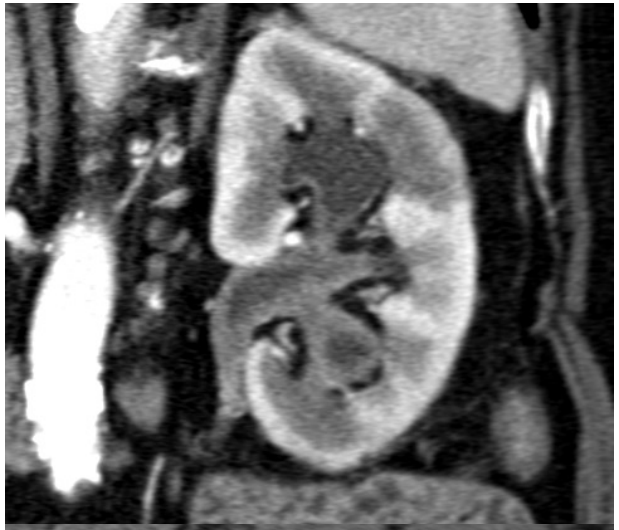


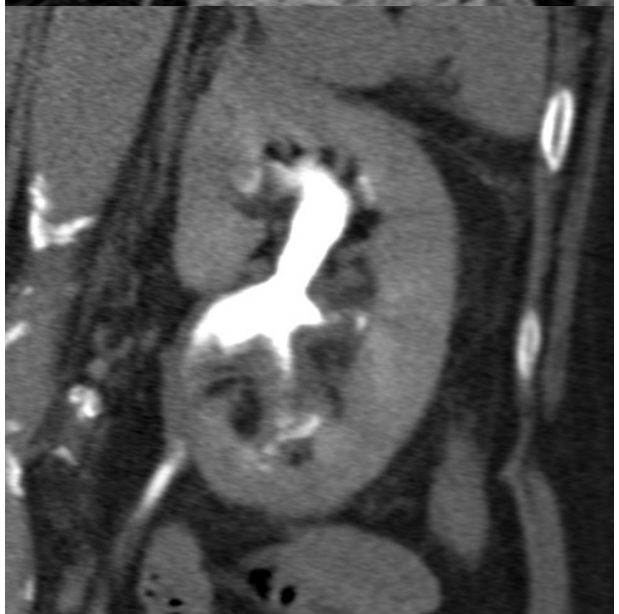
RENAL VASCULAR SEGMENTS

COLLECTION SYSTEM

- Calices renales
- Pelvis renalis
- dosrsally







- Dendritic
- ampullary

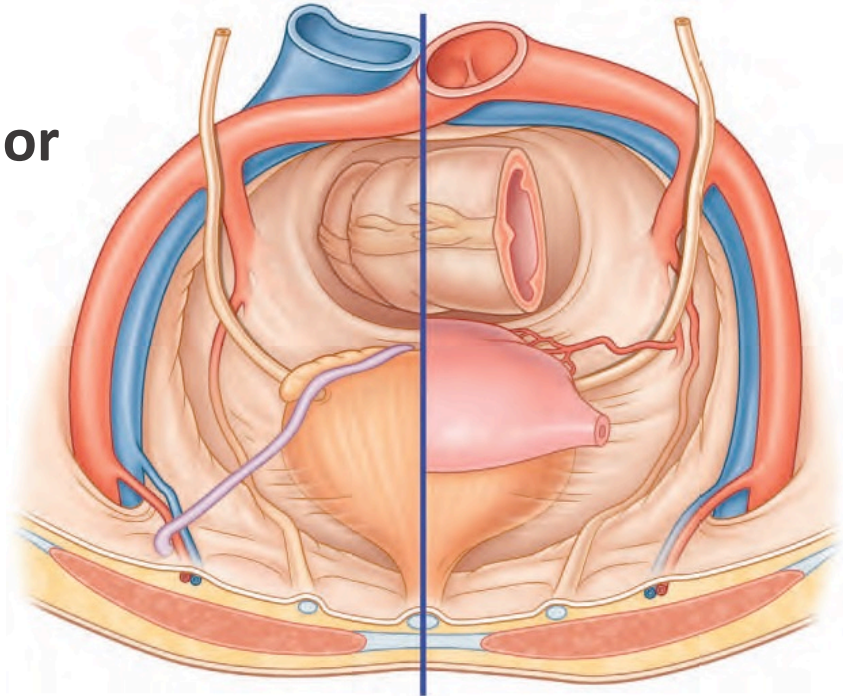
PELVIS RENIS

- Pelvis duplex
- Ureter duplex
- Ureter fissus

VARIANTS

URETER

- length 25 - 30 cm
- width 5- 6 mm
- Pars abdominalis
  - Apertura pelvis superior
  - Vasa iliaca
  - shrinkage
- Pars pelvica
- Portio parietalis



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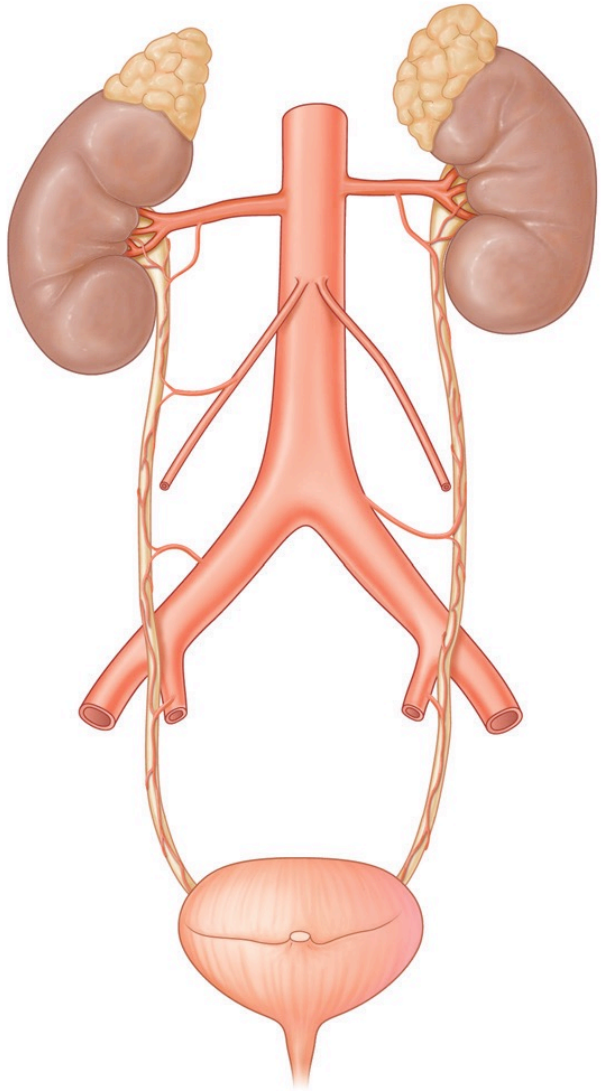
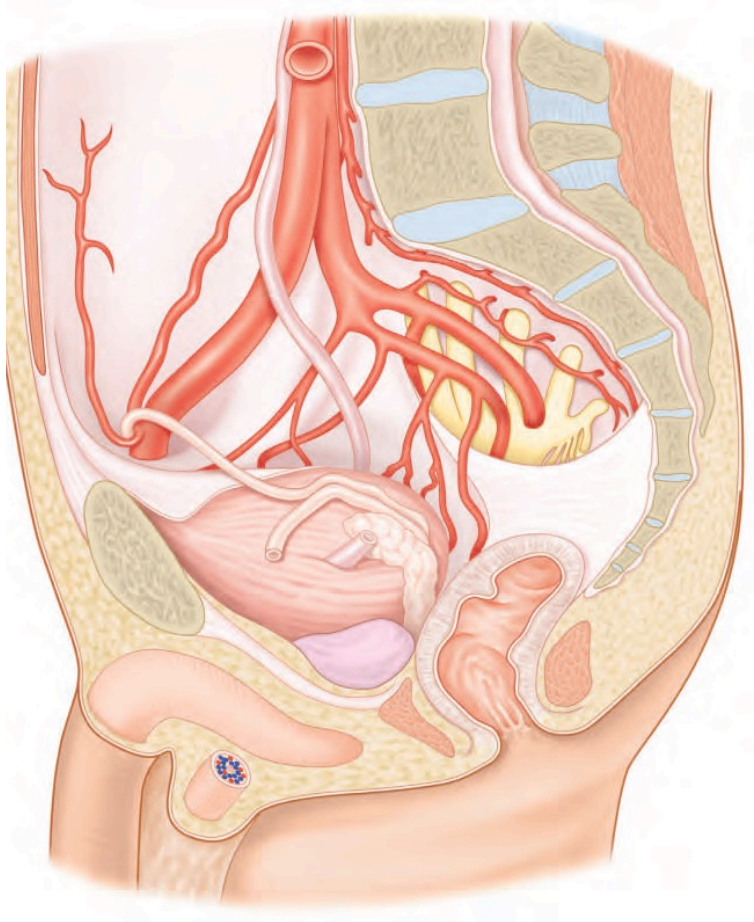
URETER

- Tunica mucosa
- Tela submucosa
- Tunica muscularis
  - Outer circular
  - Inner longitudinal
- Tunica adventitia

- Colica renalis





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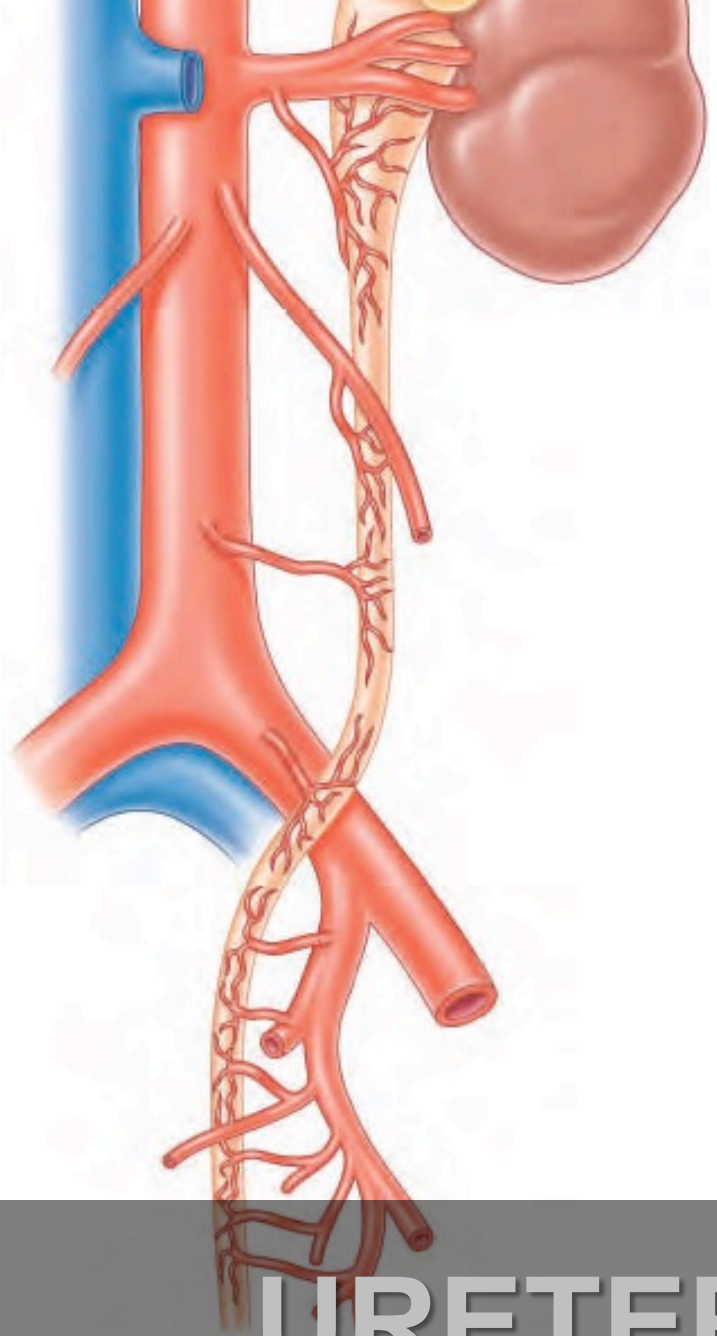
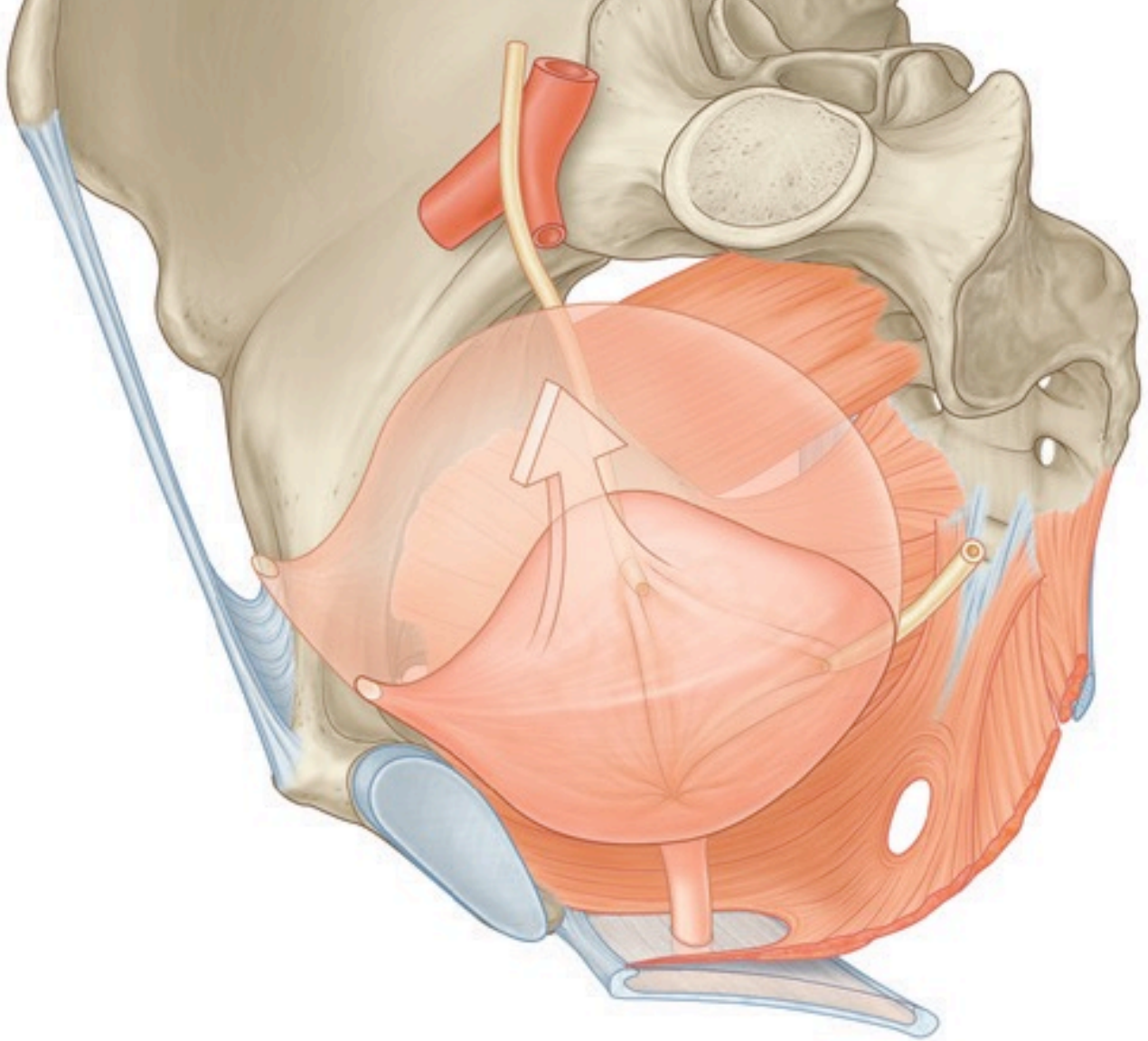


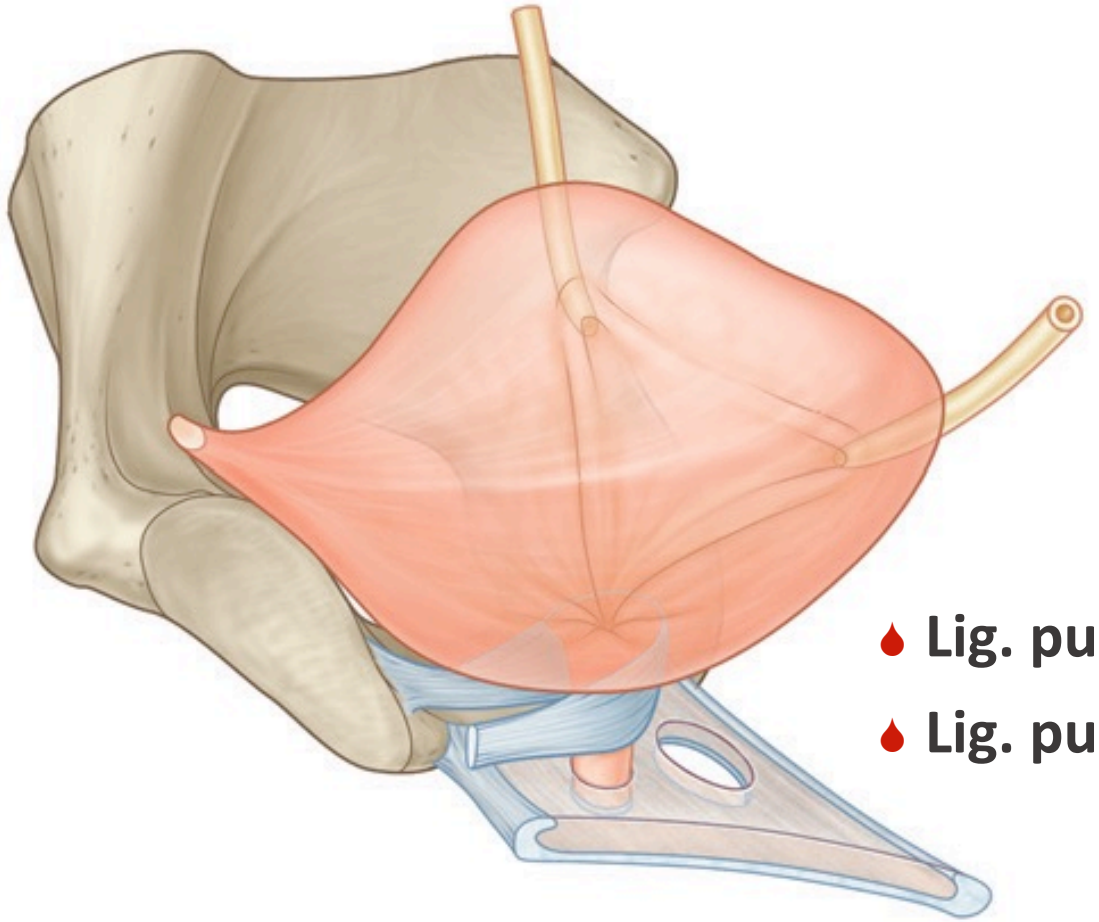
- multiple
- A. renalis
- A. ovarica/testicularis
- Aorta abdominalis
- A. iliaca communis
- A. iliaca interna
- A. vesicalis superior
- Etc

URETER VASCULAR SUPPLY

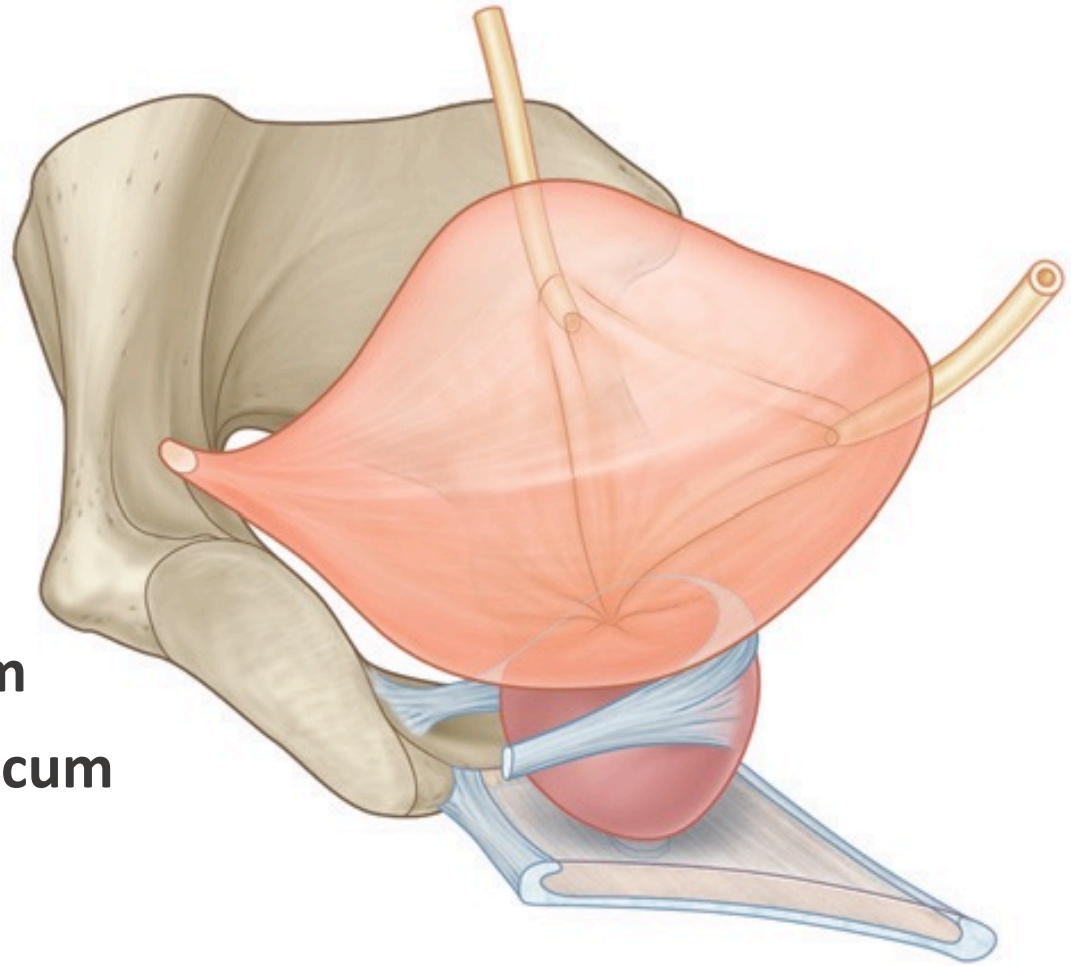


- capacity 250 - 300 ml
  - praeperitoneal
  - Sectio alta
  - Excavatio retrovesicalis
- Ligamentum umbilicale medianum
- Apex
- Corpus
- Fundus

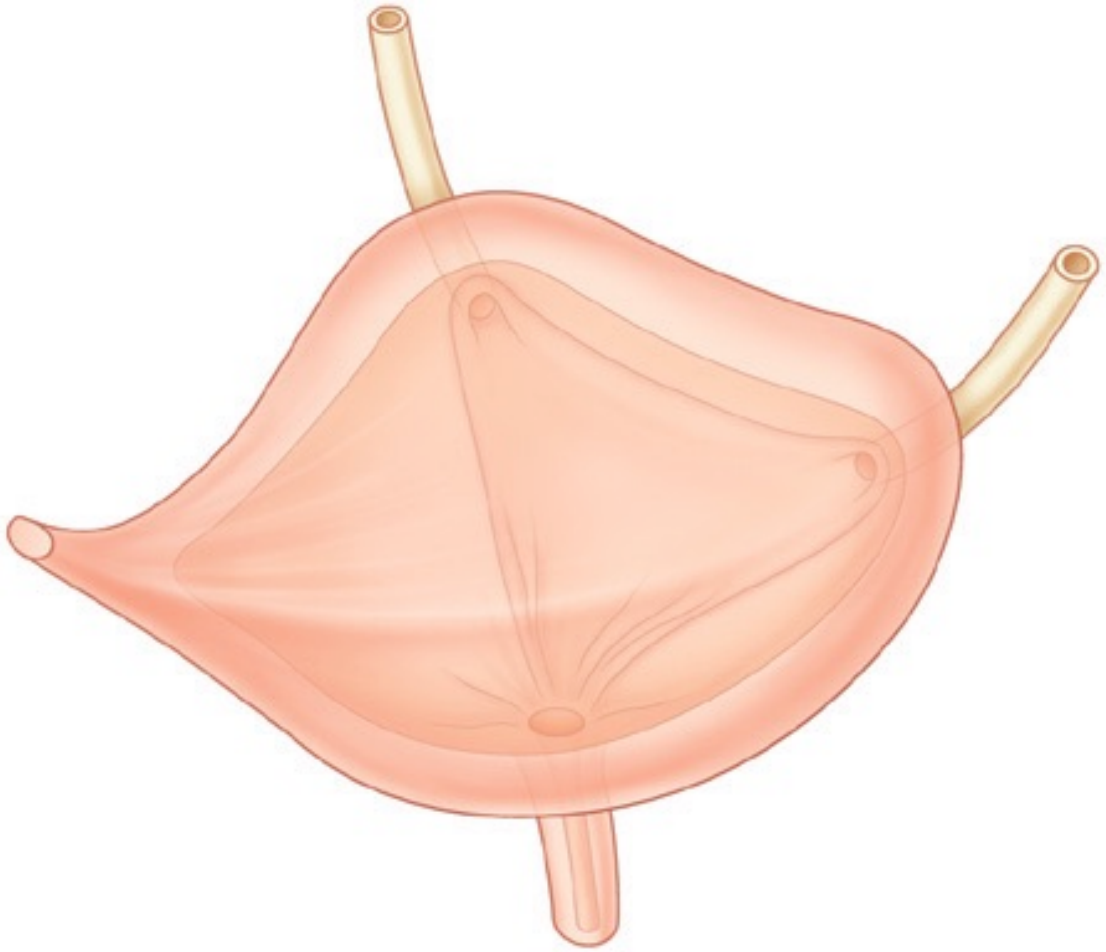
VESICA URINARIA



- Lig. pubocystic**um**
- Lig. puboprostatic**um**



VESICA URINARIA

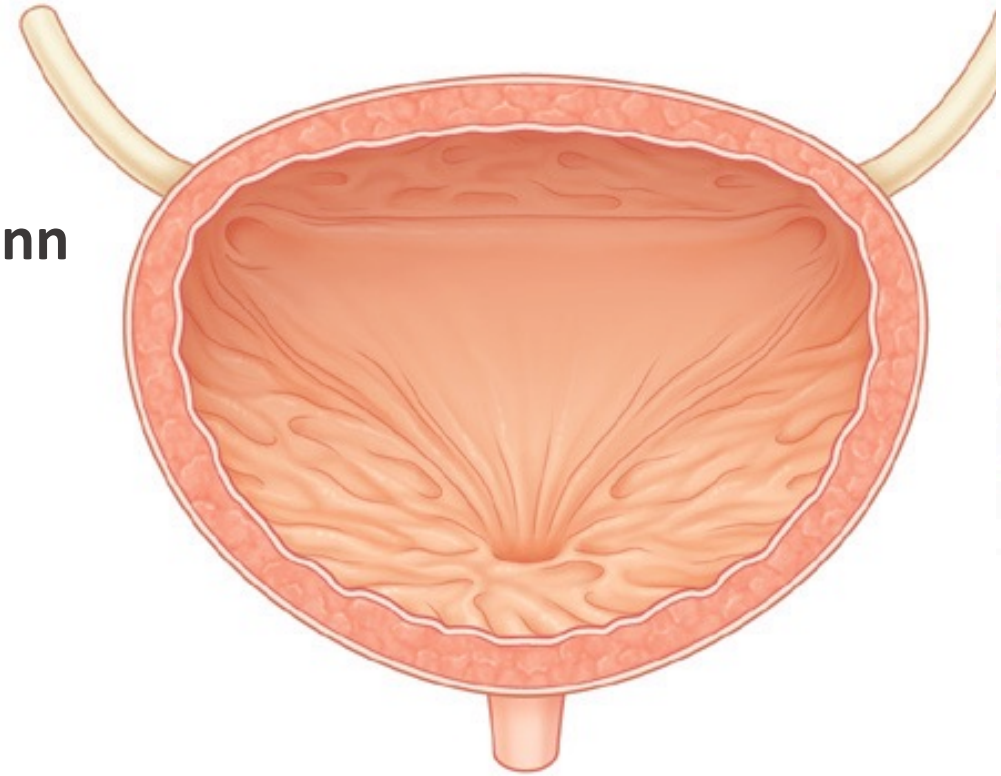


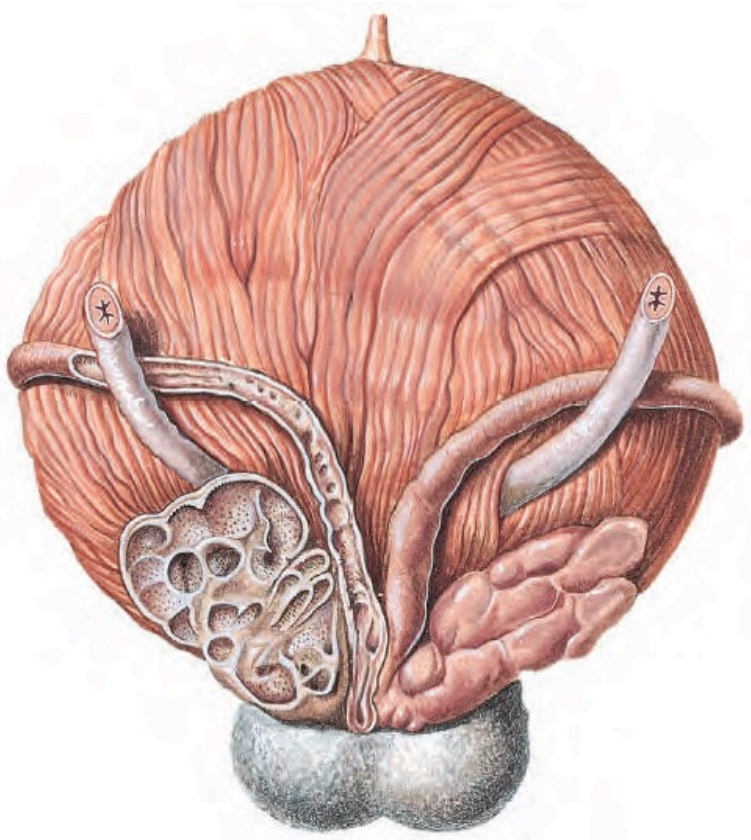
- Ligamentum umbilicale medianum
- Apex
- Corpus
- Fundus
- Trigonum vesicae
  - *Ostium ureteri dx.*
  - *Ostium ureteri sin.*
  - *Ostium urethrae*
- Plica interureterica
  - *Fossa retrotrigonalis*

VESICA URINARIA

VESICA URINARIA

- **Tunica mucosa**
  - **Transition epithelium**
  - **plicae**
- **Tela submucosa - loose conn**
- **Tunica muscularis**
  - 3 layers
  - M. detrusor
  - M sphincter vesicae
  - SpiraL
  - VENTILE
- **Tunica adventicia**
  - PARACYSTICUM





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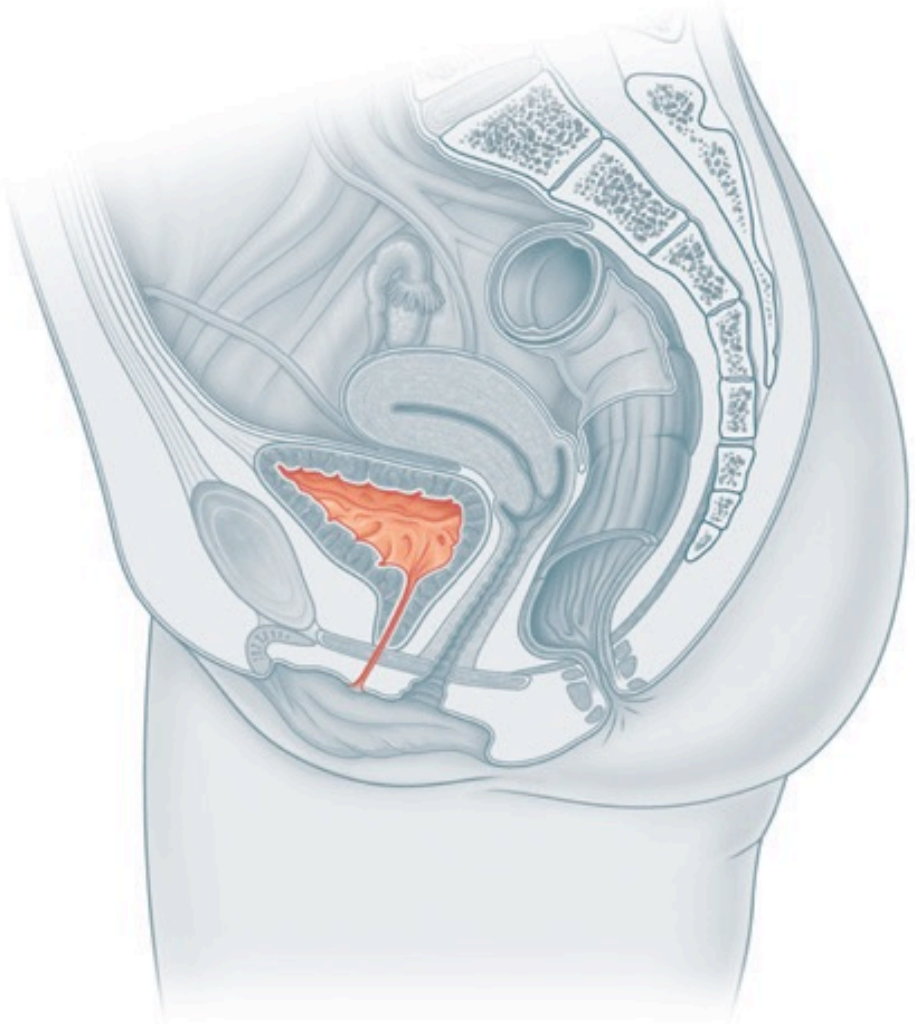

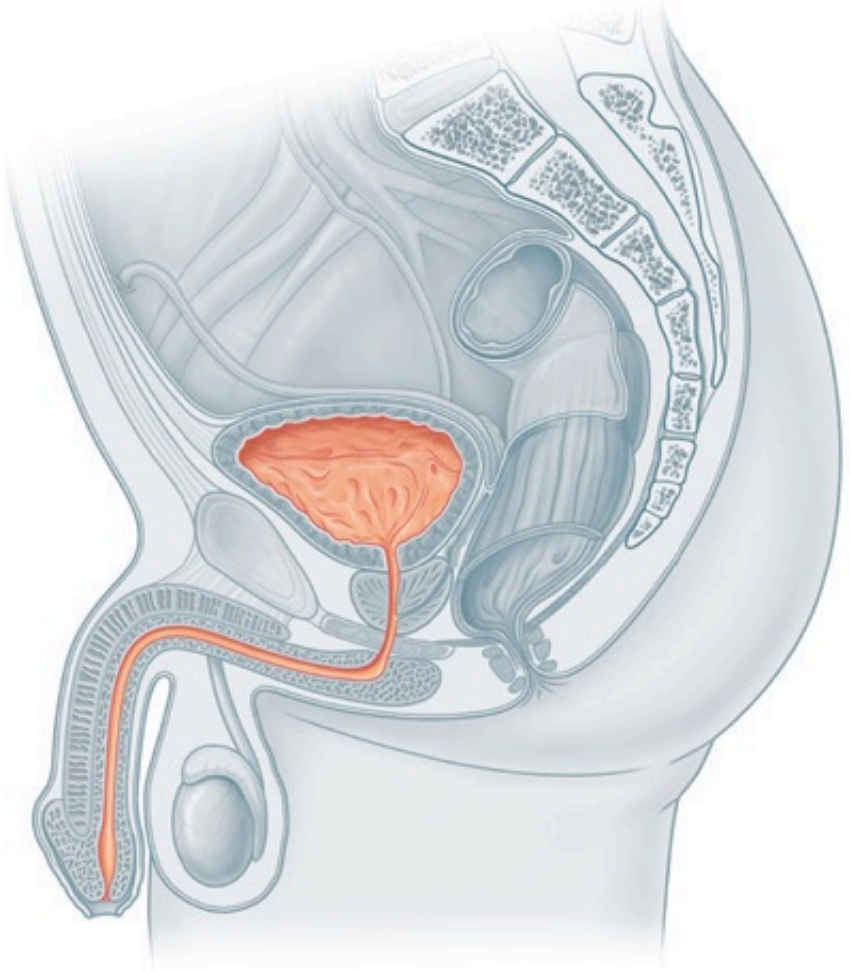

RECESSUS RETROVESICALIS

URETHRA

- Ostium urethrae internum
- Ostium urethrae externum
- Tunica mucosa
  - Epitel přechodní - horní část
  - Epitel vrstevnatá dlaždicový - dolní část
  - Tela submucosa
  - Tunica muscularis
  - Vazivo - periurethrium

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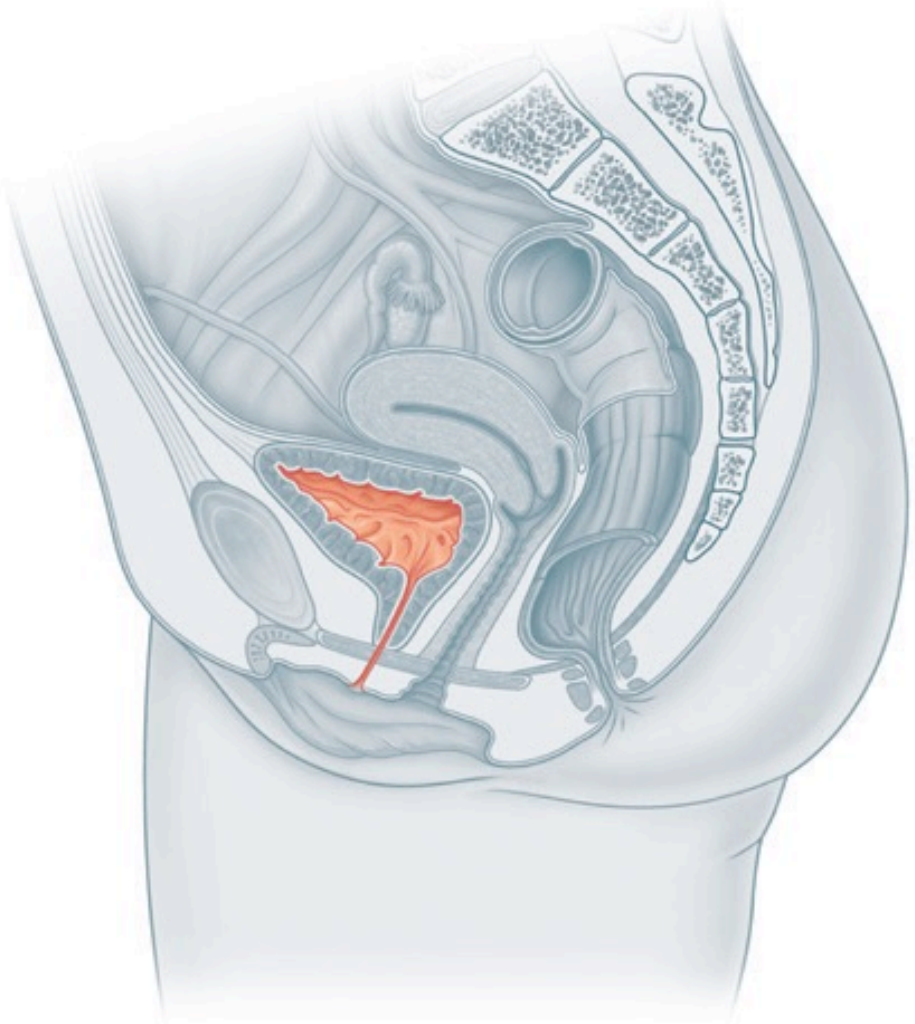

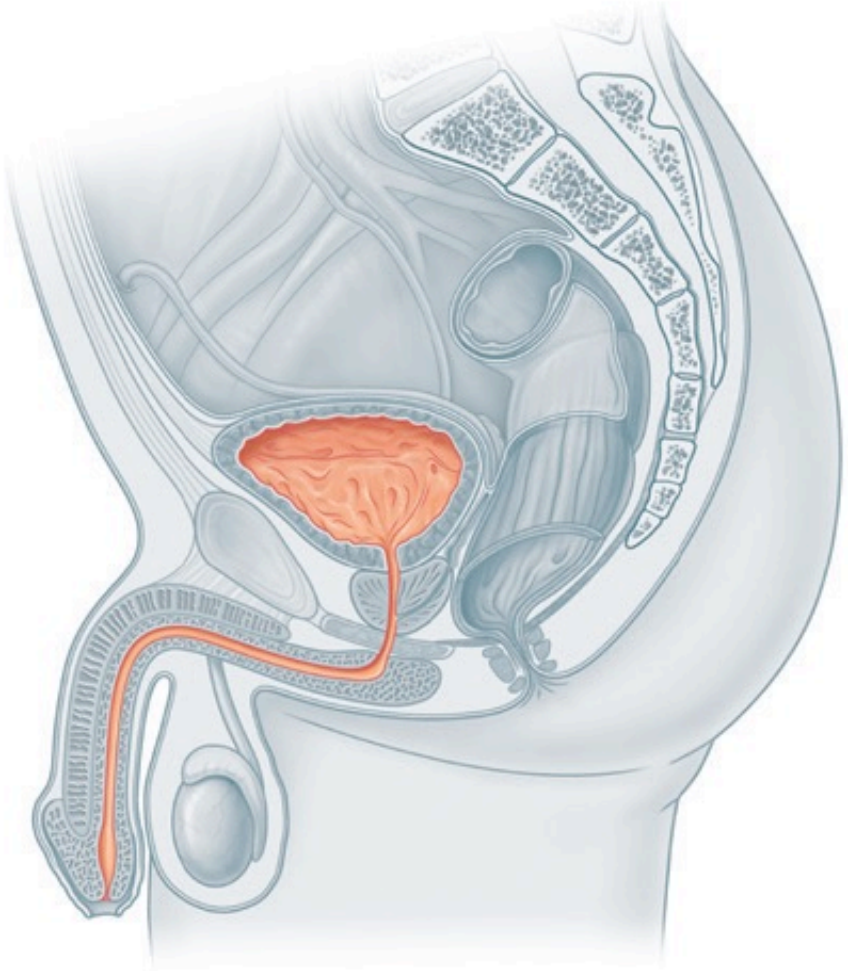

URETHRA

URETHRA FEMININA

- Urethra feminina
  - 3-4 cm
  - 8 mm
  - Pars intramuralis
    - M sphincter vesicae urinariae - smooth
  - Pars pelvina
  - Pars perinealis
  - M. sphincter urethrae - stripped
- Glandulae urethrales - mucous
- Ductus paraurethralis - 1-2 cm to urethra

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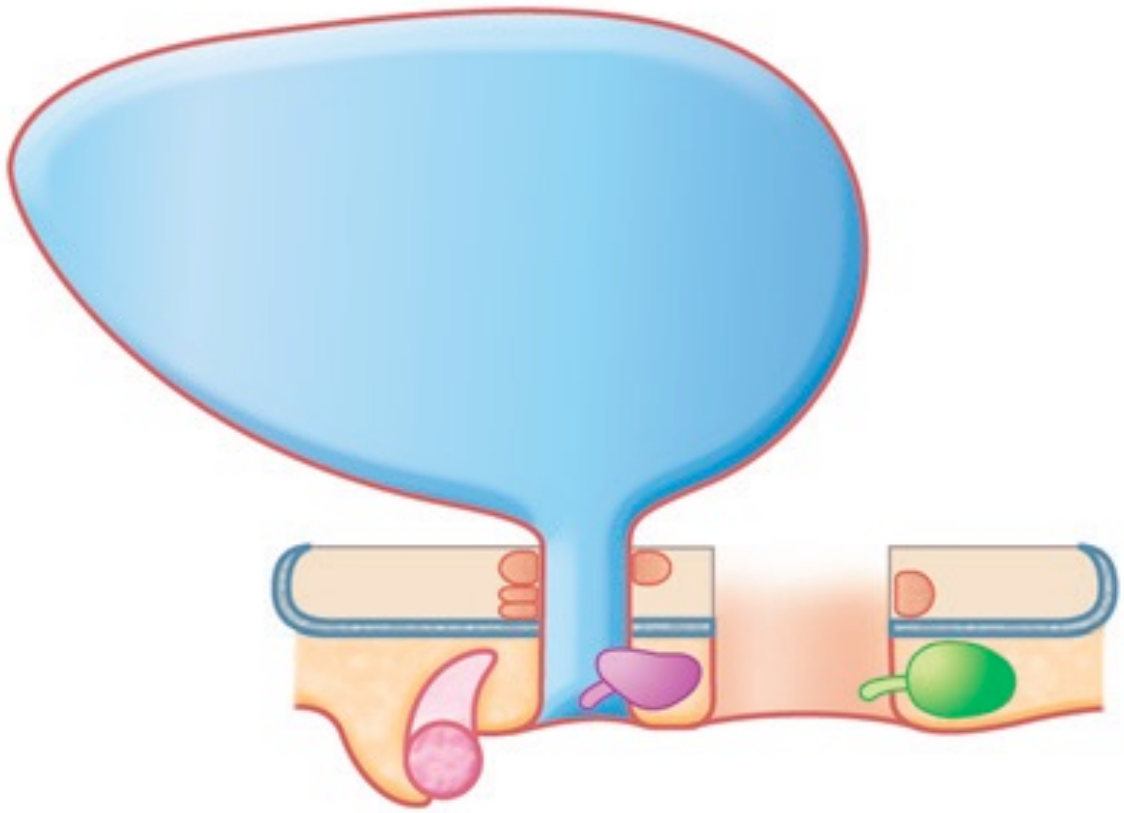
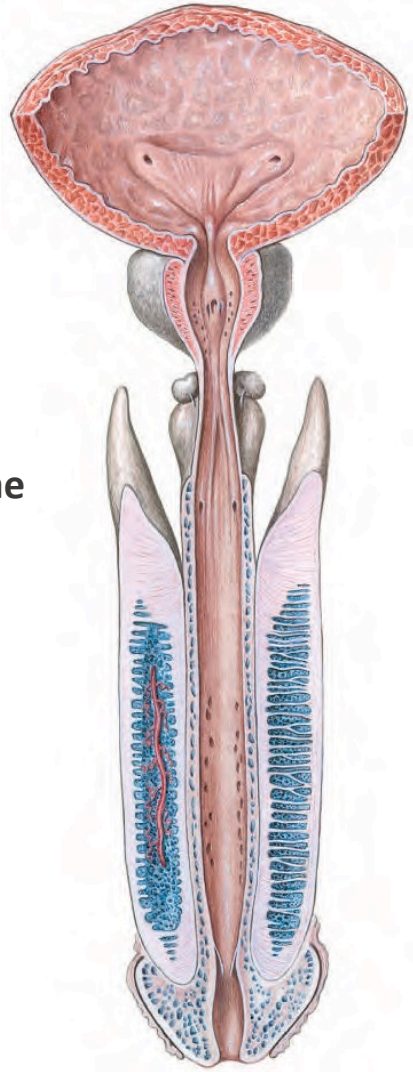


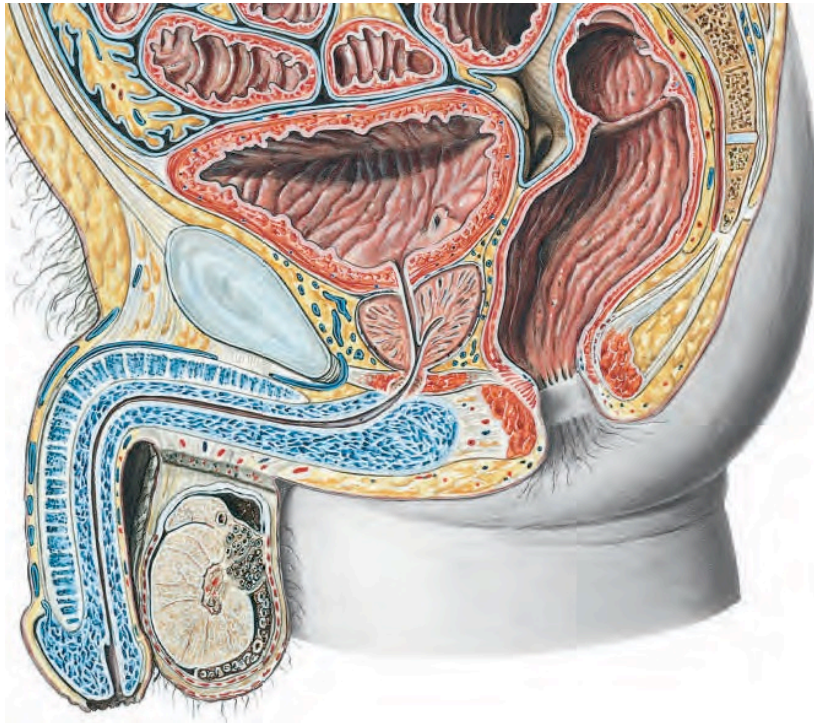
- M. sphincter urethrae internus
- M. sphincter uretrae externus
- Gll. paraurethrales - Skene

URETHRA FEMININA

URETHRA MASKULINA / VIRILIS

- Urethra masculina
  - 20 -25 cm
  - 2x bend
  - Pars intramuralis
    - M sphincter vesicae urinariae - smooth
  - Pars prostatica
    - Colliculus seminalis - ductus eiaculatorius + gl prostaticae
    - Ductus eiaculatorius - dc. defferens et vesicula seminalis
    - Utriculus prostaticus - zbytek po ductus Muelleri
  - Pars mebranacea
    - M. sphincter urethrae - stripped
  - Pars spongiosa
    - Gl. bulbourethrales
    - Gl. urethrales





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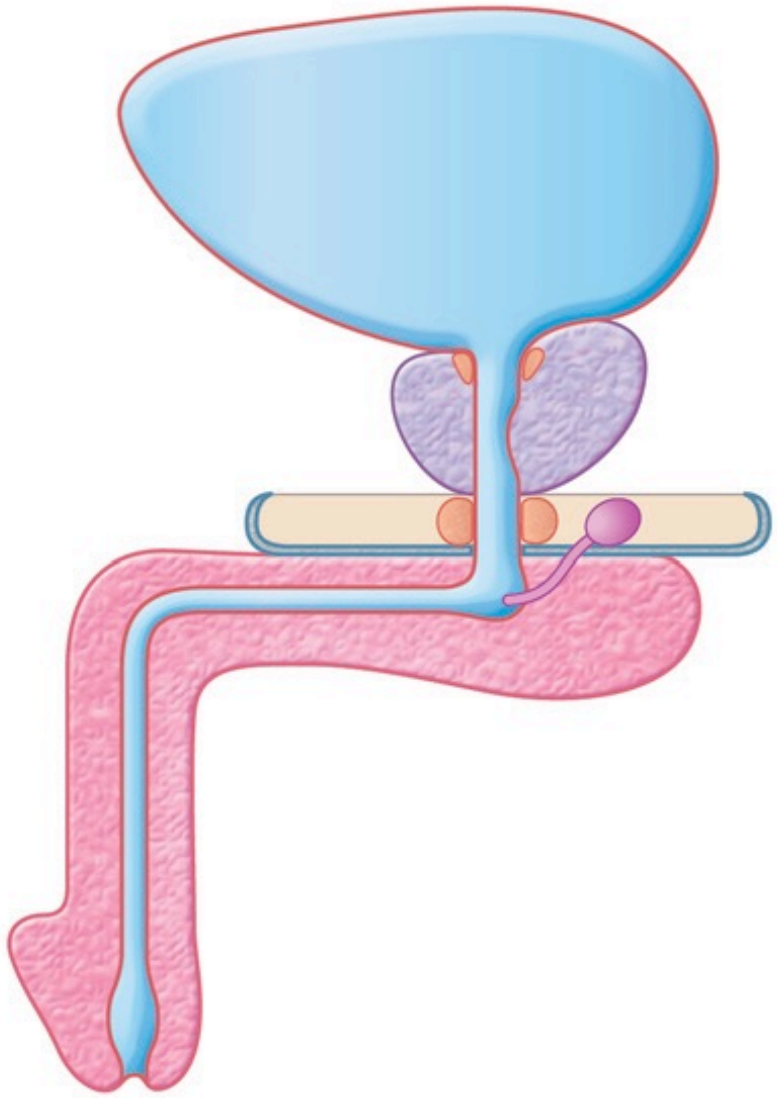

- M. sphincter urethrae internus
- *Pars intramuralis*
- Prostata
- *Pars prostatica*
- M. sphincter urethrae externus
- *Pars membranacea*
- *Pars spongiosa (pendula)*
  - Gll. bulbouretrales

URETHRA VIRILIS