

Anatomy of the kidney

Renal block-Anatomy-Lecture 1



Editing file



Objectives

Color guide :

Only in boys slides in **Green**

Only in girls slides in **Purple**

important in **Red**

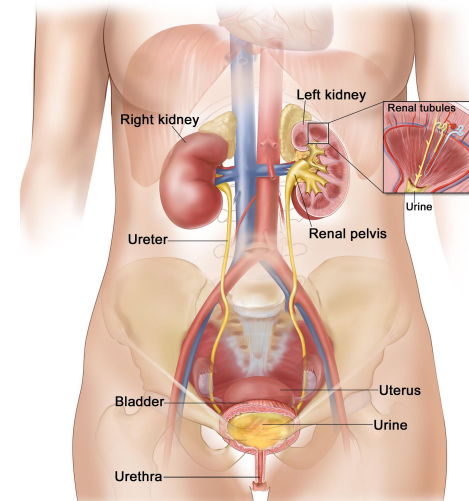
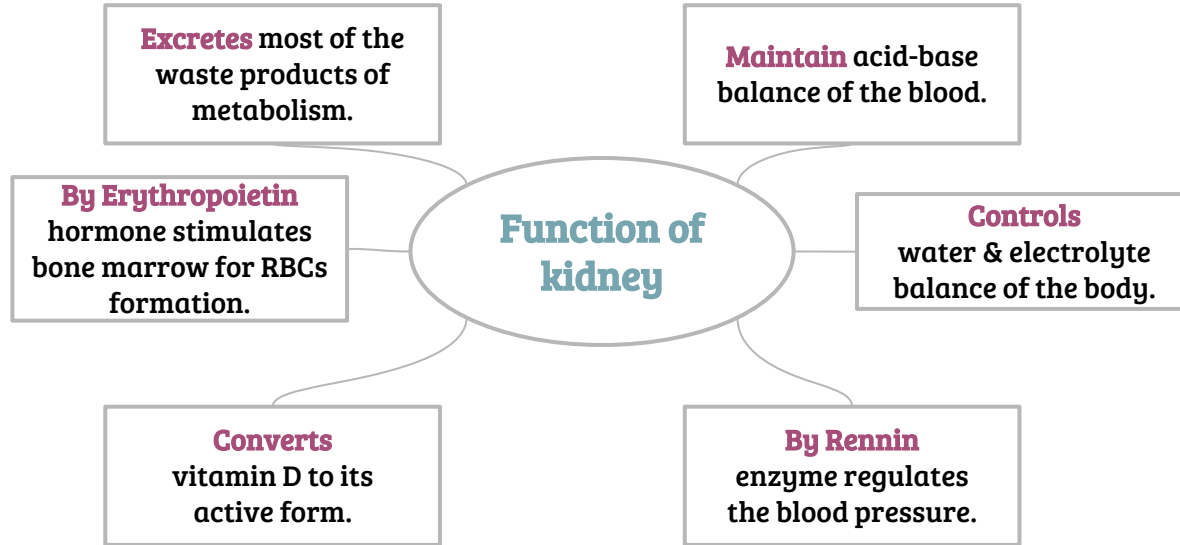
Notes in **Grey**

By the end of this course you should be able to discuss :

- **Components of the urinary system**
- **Kidney :**
 1. **Shape & Position**
 2. **Surface anatomy**
 3. **External features**
 4. **Hilum & its contents**
 5. **Relation**
 6. **Internal features**
 7. **Blood supply**
 8. **Lymph drainage**
 9. **Nerve supply**

Introduction

- Every day, each kidney filters **liters** (around 150 L per day) of fluid from the bloodstream.
- Although the **lungs** and the **skin** also play roles in excretion, The kidneys bear the major responsibility for eliminating nitrogenous (nitrogen-containing) wastes, toxins, and drugs from the body.

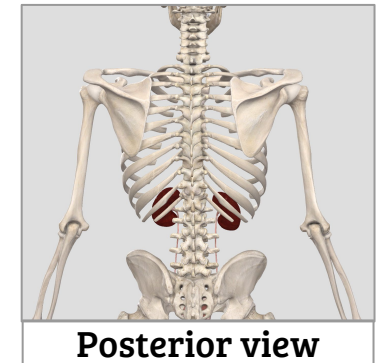
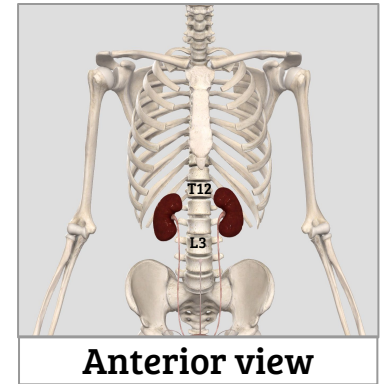
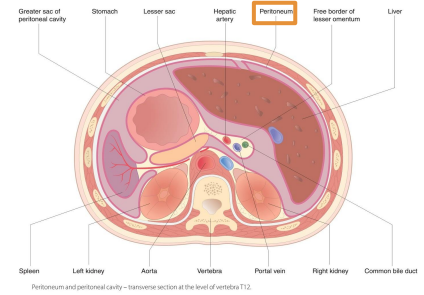


The kidney :

- Kidneys are **reddish brown** in color.
- Lie **behind** the **peritoneum** (retroperitoneal) on the posterior abdominal wall on either side of the **vertebral column**.
- They are largely under cover of the costal margin.
kidney lies between T12-L3
- With contraction of the diaphragm (during inspiration) the kidney moves downward as much as 2.5 cm.

Comparison between :

	Right kidney	Left kidney
Location	lies slightly lower than the left due to the large size of the right lobe of the liver.	Upper than the right
Upper border of the kidney	Lies at the level of 11th intercostal space	Lies at the level of 11th rib

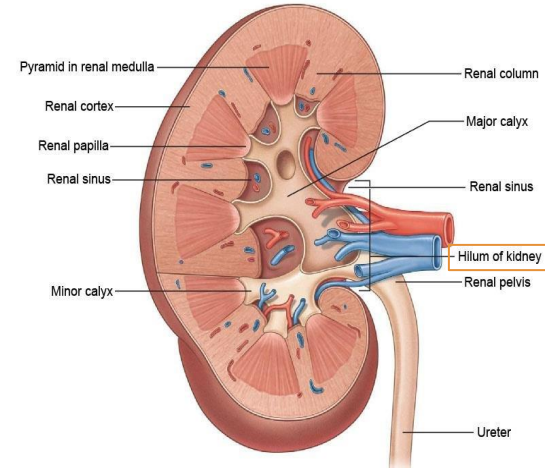


Describe the shape of kidney?

- The **lateral** border is convex, while the **medial** border is convex at both ends but it is concave at its middle where it shows a vertical slit called the hilum.

Hilum:

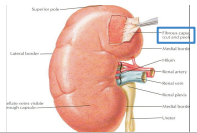
- The hilum extends into a large cavity called the renal sinus.
- The hilum transmits the from the front backward **V.A.U.A.**
 - Renal vein** (most anterior)
 - 2 branches of renal artery**
 - Ureter.** (“we consider ureter as most posterior”)
 - 3rd branch of renal artery**



Covering of the kidney

* The last 3 structures support the kidney in position.

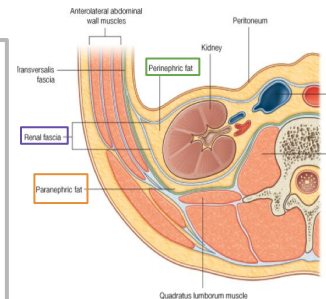
- Fibrous capsule:**
It surrounds the kidney



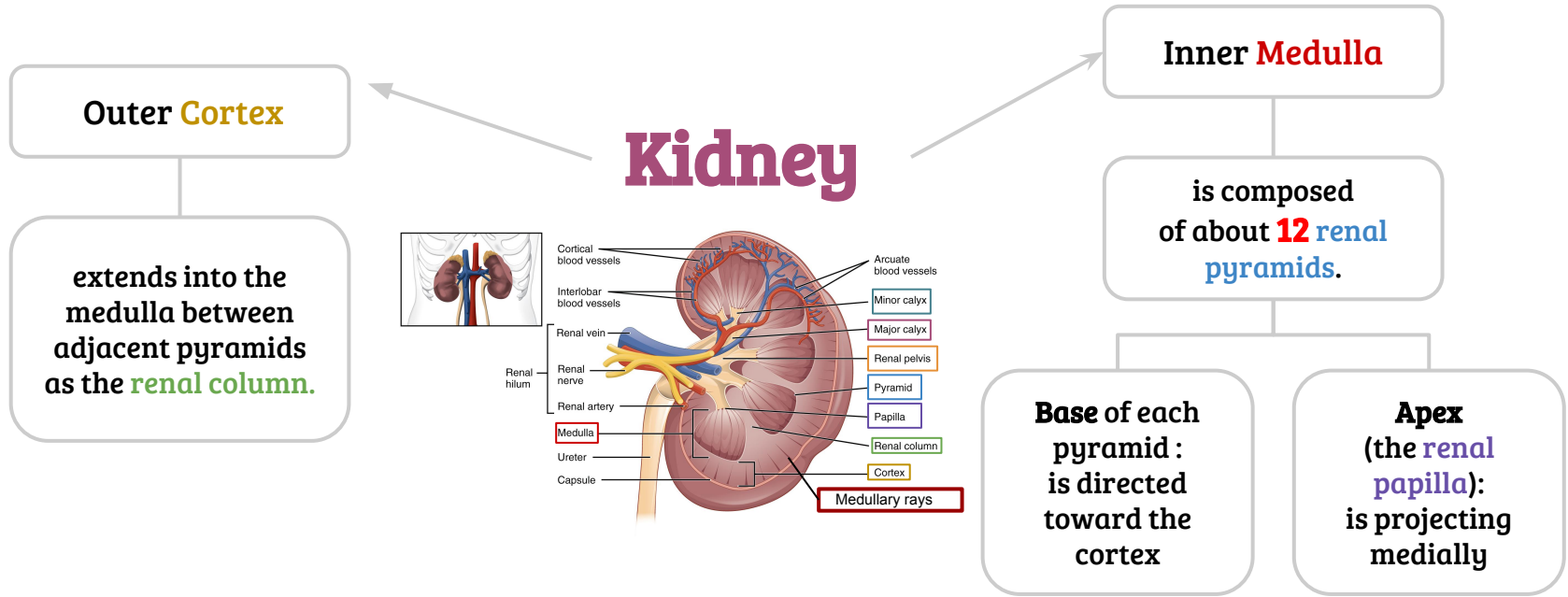
- Perirenal (perinephric) fat :**
It covers the fibrous capsule

- Renal fascia:**
It encloses the kidneys and suprarenal glands (but the suprarenal glands is in special compartment)

- Pararenal (paranephric) fat :**
It lies external to the renal fascia, and forms part of the retroperitoneal fat.



Renal structure:

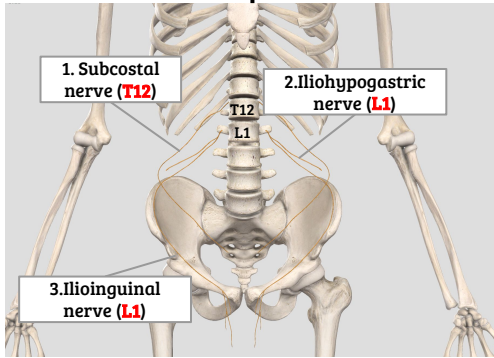


- Extending from the bases of the renal pyramids into the cortex are striations known as **medullary rays**.
- The renal sinus within the hilum, contains the upper expanded end of the ureter (dilated part of ureter), the **renal pelvis**.
- Renal pelvis divides into two or three **major calyces**, which divides into two or three **minor calyces**.

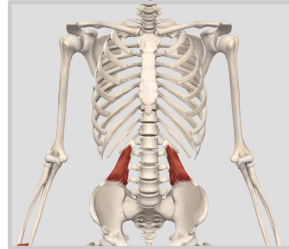
Posterior relations to the kidney

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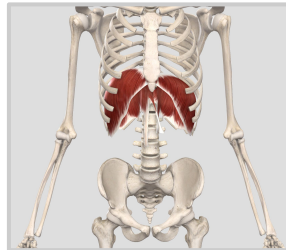
3 nerves



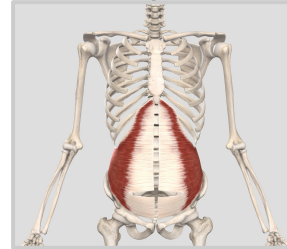
4 muscles



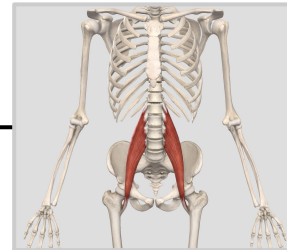
Quadratus lumborum



Diaphragm

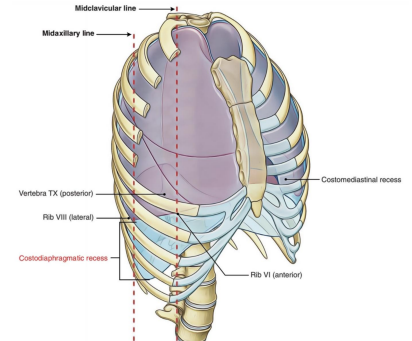
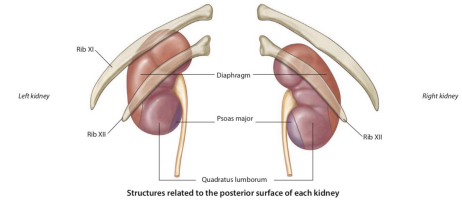


Transversus abdominis



Psoas major

- **Twelfth rib** (Left kidney reaches 11th rib)
- **Costodiaphragmatic pleural recess.**

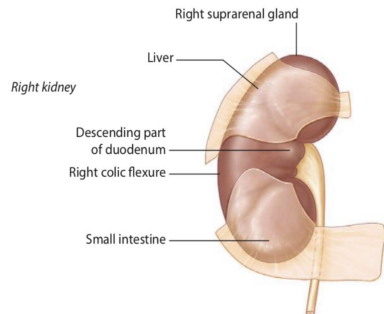


Anterior relations to the kidney

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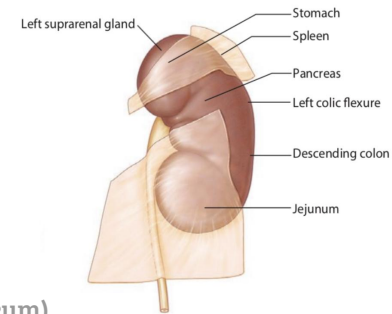
Right kidney

1. **Right** suprarenal gland
2. **Liver***
3. **2nd** part of the **duodenum**
4. **Right** colic flexure
5. Coils of **small intestine***



Left kidney

1. **Left** suprarenal gland
2. **Stomach***
3. **Spleen***
4. **Pancreas**
5. **Left** colic flexure
6. **Descending colon** "continuation of L.Colic flexure"
7. Coils of **jejunum***



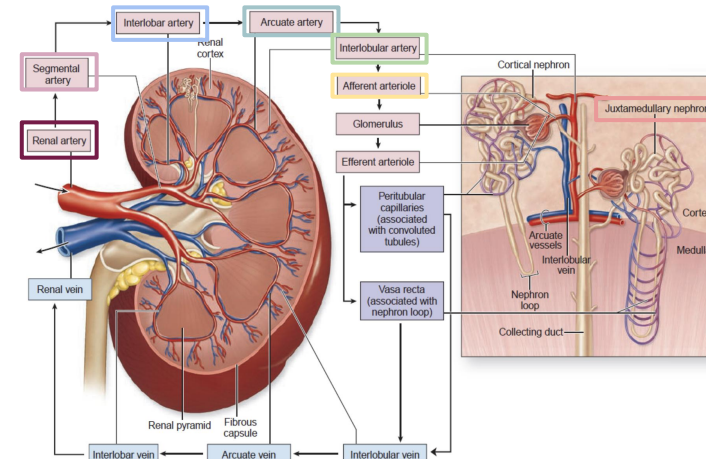
***IMPORTANT** (Not directly, with peritoneum)

Blood supply (arteries)

- 1 → The **renal artery** arises from the aorta at the level of the **2nd lumbar** vertebra.
- 2 → Each renal artery divides into : **5 segmental arteries** that enter the hilum of the kidney, four in front and one behind the renal pelvis. They are distributed to different segments of the kidney.
- 3 → **Lobar artery** arises from each segmental artery, one for each renal pyramid.
- 4 → Each lobar artery gives off **2 or 3 interlobar arteries**.
 - The interlobar arteries run toward the cortex on each side of the renal pyramid.
- 5 → Interlobar arteries give off the **arcuate arteries** at the junction of the cortex & medulla.
- 6 → The arcuate arteries give off several **interlobular arteries**.
- 7 → Interlobular artery gives off **afferent glomerular arterioles**.

- Each **nephron** is associated with **2** capillary beds: The **glomerulus** & The **peritubular** capillary bed.
- The glomerulus is both fed and drained by **arterioles**:

1. The **afferent** arteriole, which arises from an **interlobular artery**, is the "feeder vessel"
2. the **efferent** arteriole receives blood that has passed through the glomerulus.



Segments of the :

Found only in male's slides

Renal artery

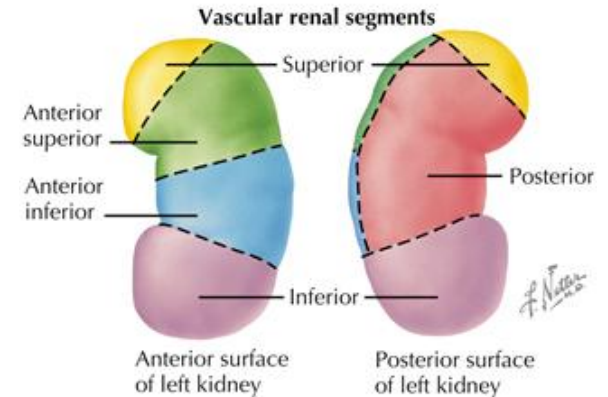
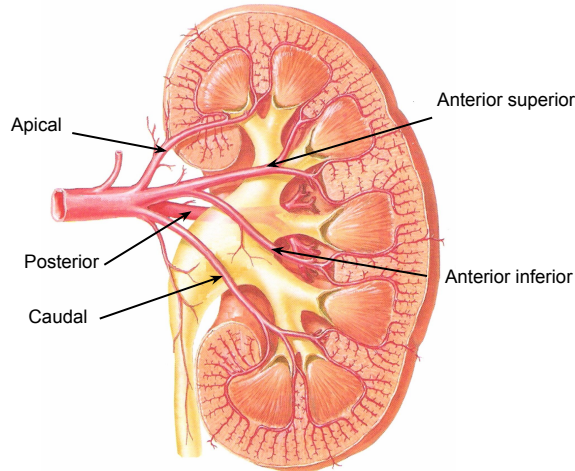
Divides into **5** segmental branches:

1. Apical
2. Anterior superior
3. Posterior
4. Anterior inferior
5. Caudal

The kidney

consists of **5** segments each has its own blood supply:

1. Apical (*superior*)
2. Anterior superior
3. Posterior
4. Anterior inferior
5. Caudal (*inferior*)

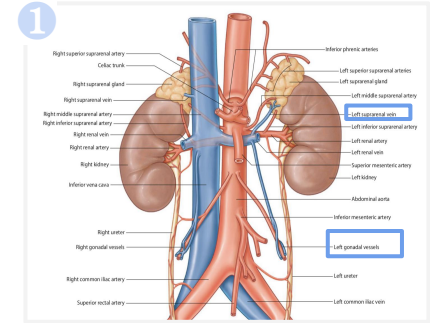


1. Venous Drainage

- Renal vein emerges from the hilum **in front** of the renal artery and **drains into the IVC**. The **L. renal vein enters the IVC a little above the R. vein**.
- The **LEFT renal vein**
 - It's (**7.5cm**) three times **longer** than the right (**2.5 cm**). So, for this reason the left kidney is the preferred side for live donor nephrectomy.
 - It's receives the left **gonadal** "enters the left renal vein from below" & the left **suprarenal** "enters the left renal vein from above" veins.
 - It runs from its origin in the renal hilum, from **left to right** behind: Splenic vein, Body of pancreas. Then it across anterior to the **abdominal aorta**, just below the origin of the **superior mesenteric artery**.
- The **RIGHT renal vein** lies behind the 2nd part of the duodenum. Sometimes it lies behind the lateral part of the head of the pancreas.

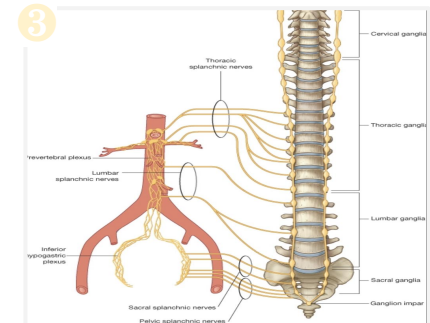
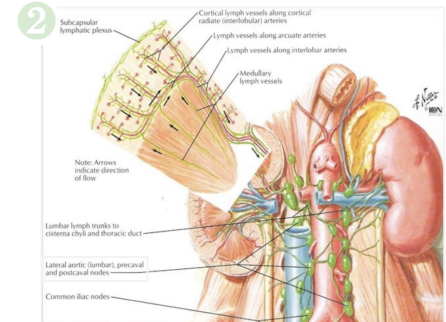
2. Lymph Drainage

- Lateral aortic** (lumbar) lymph nodes around the origin of the renal artery.



3. Nerve Supply

- Renal **sympathetic** plexus.
- The afferent fibers that travel through the renal plexus enter the spinal cord in the **10th, 11th, and 12th thoracic** nerves.



MCQs

Question 1: The upper border of the R. Kidney lies at the level of:

- A. 12th intercostal space
- B. 11th intercostal space
- C. 12th rib
- D. 11th rib

Question 2: The area where the renal artery enters the kidney and the renal vein and ureter exits the kidney is called the _____.

- A. Renal hilum
- B. Renal medulla
- C. juxtamedullary area
- D. Renal papilla

Question 3: The most anterior structure in the Hilum:

- A. 2 branches of Renal artery
- B. 3rd branch of renal artery
- C. Ureter
- D. Renal vein

Question 4: which of these isn't one of posterior relation of the kidney?

- A. Iliioinguinal nerve
- B. Subcostal nerve
- C. Liver
- D. Psoas major

Question 5: All of these are one of the anterior relations of the L. kidney Except:

- A. Stomach
- B. Liver
- C. Spleen
- D. Pancreas

Question 6: the interlobular arteries gives off _____.

- A. Arcuate arteries
- B. Efferent glomerular arterioles
- C. Afferent glomerular arterioles
- D. Both b & c

Question 7: the left renal vein is longer, and receives blood from _____ veins.

- A. L. Gonadal
- B. Hepatic
- C. L. Suprarenal
- D. Both a & c

Question 8: Renal pelvis divides into two or three _____.

- A. Renal papilla
- B. Major calyces
- C. Renal sinus
- D. Renal column

Team members

Boys team:

- Faisal Alqifari
- Salman Alagla
- Ziyad Al-jofan
- Ali Aldawood
- Khalid Nagshabandi
- Omar Alammari
- Sameh nuser

Girls team :

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- Taif Alotaibi
- Noura Al Turki
- Amirah Al-Zahrani
- Alhanouf Al-haluli
- Sara Al-Abdulkarem
- Renad Al Haqbani
- ★ Nouf Al Humaidhi
- Jude Al Khalifah
- Nouf Al Hussaini
- Rahaf Al Shabri
- Danah Al Halees
- ★ Rema Al Mutawa
- Amirah Al Dakhilallah
- Maha Al Nahdi
- Ghaida Al Braithen

Team leaders

- Abdulrahman Shadid
- Ateen Almutairi



Anatomy team
med 438

THANKS!

Contact us:



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