

# **Gross Anatomy of Kidney - I**

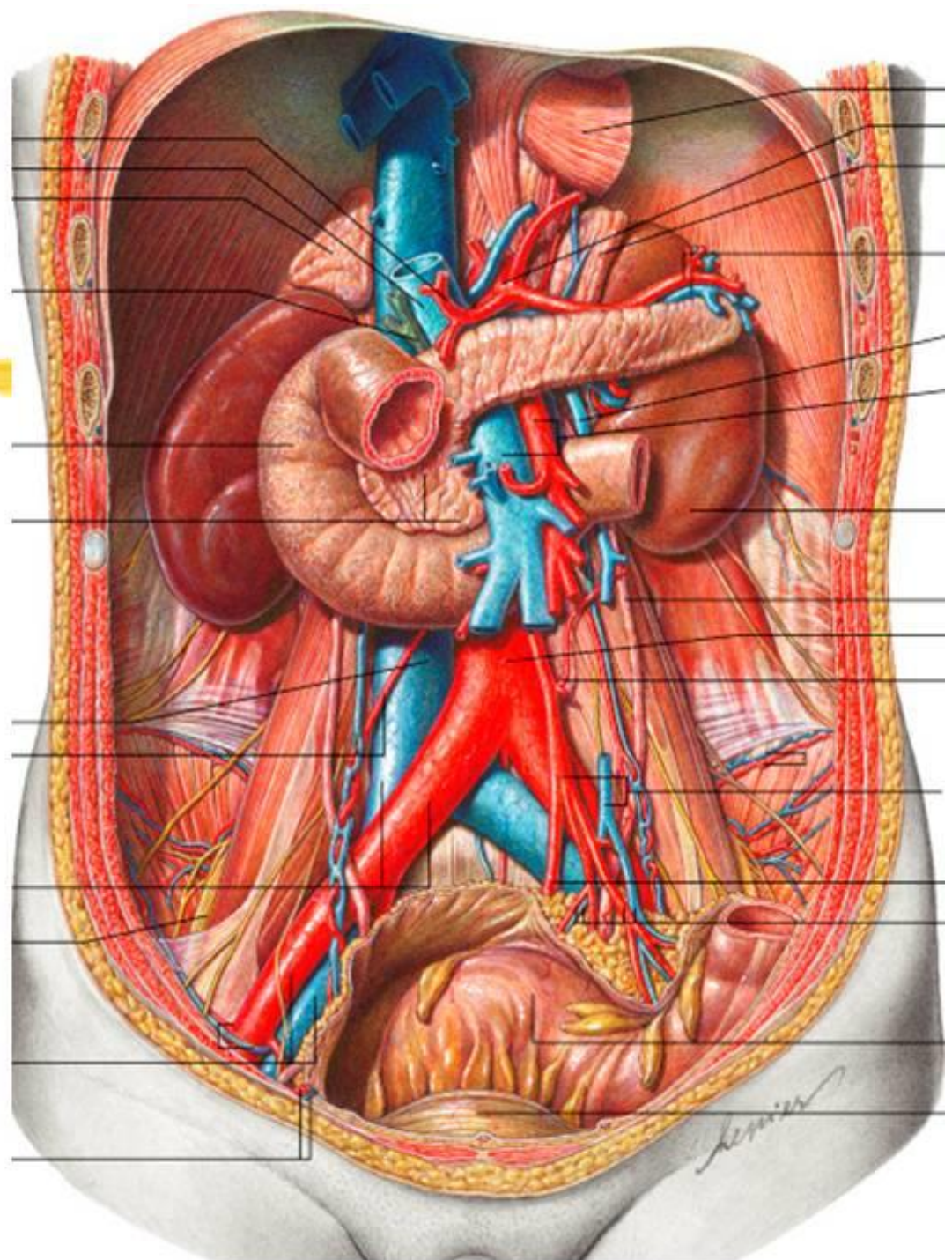
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# Kidneys



# Learning objectives

**At the end of this teaching session all the students should be able to:**

- ✚ Describe the location, dimensions and axis of the kidneys**
- ✚ Enumerate & describe the parts and external features**
- ✚ Describe and diagrammatically display the anterior & posterior relations**
- ✚ Enumerate the coverings of the kidneys**
- ✚ Discuss the horizontal and vertical tracing of renal fascia**
- ✚ Locate the renal angle**
- ✚ Enumerate the supports of kidney**

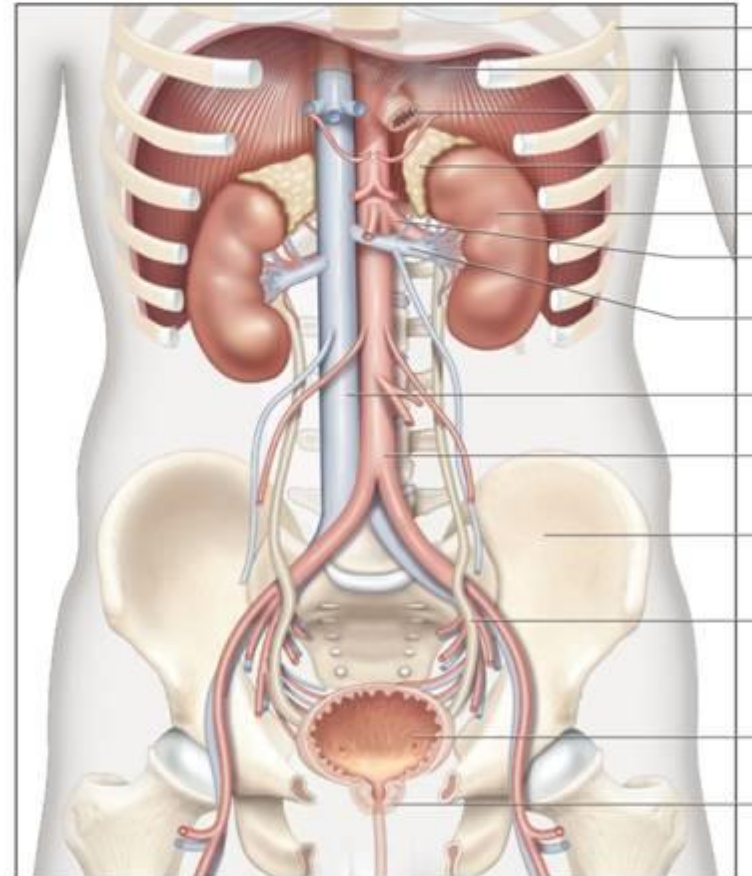
# Kidneys - functions

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1. They maintain **water balance, acid base balance, electrolyte balance**
2. They help to remove toxic metabolic waste **eg. urea, creatinine**
3. Produces hormones-
  - ☒ **renin - regulation of blood flow & blood pressure**
  - ☒ **erythropoietin – maturation of red blood cells**
  - ☒ **1' 25' hydroxycholecalciferol – control of calcium metabolism**

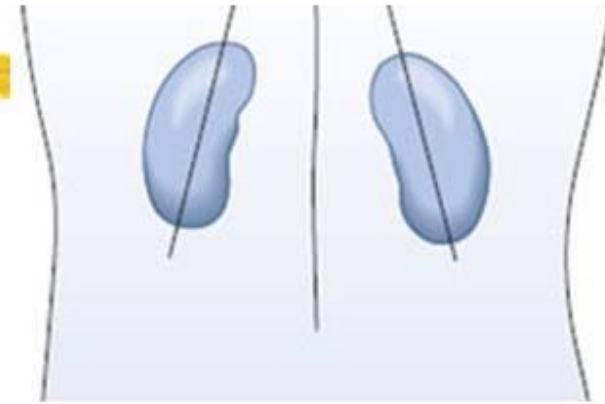
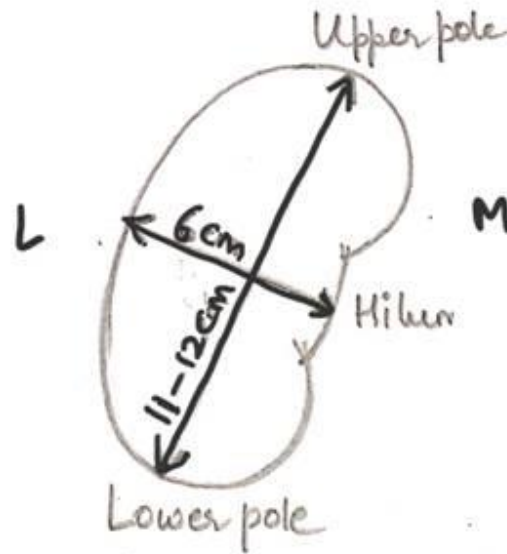
# Location

- ✚ paired viscera
- ✚ on posterior abdominal wall
- ✚ retroperitoneal
- ✚ right is lower than left
- ✚ vertebral extent---T12 – L3
- ✚ descends about 2 cm with inspiration

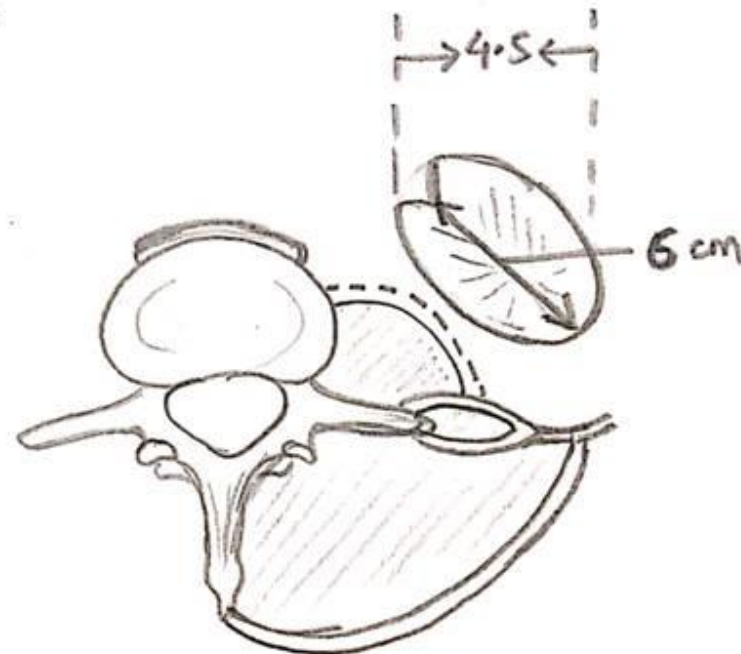


# Shape, Dimensions and Axis

- Bean shaped
- Length - 12 cm
- Width – 6 cm
- Thickness – 3 cm



- Long axis – downwards and laterally
- Transverse axis – laterally backwards  
(hilum faces forwards)



# Parts of Kidneys

## ■ 2 ends

- Upper pole –
- Lower pole

## ■ 2 borders

- Lateral border
- Medial border ( with special feature called hilum)

## ■ 2 surfaces

- Anterior surface
- Posterior surface

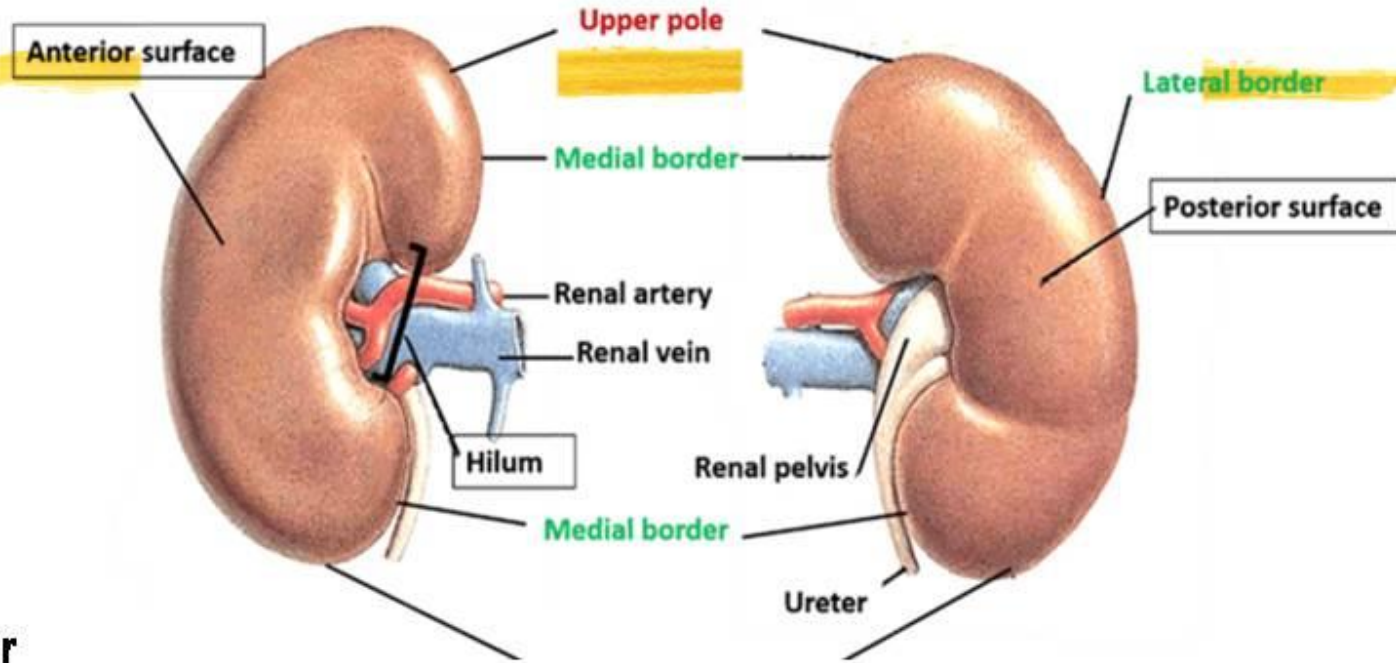


Image showing - Parts of kidney

# Poles of kidney

## ✚ Upper pole –

- at the level of T 12
- Related to suprarenal gland

## ✚ Lower pole –

- at the level of L 3

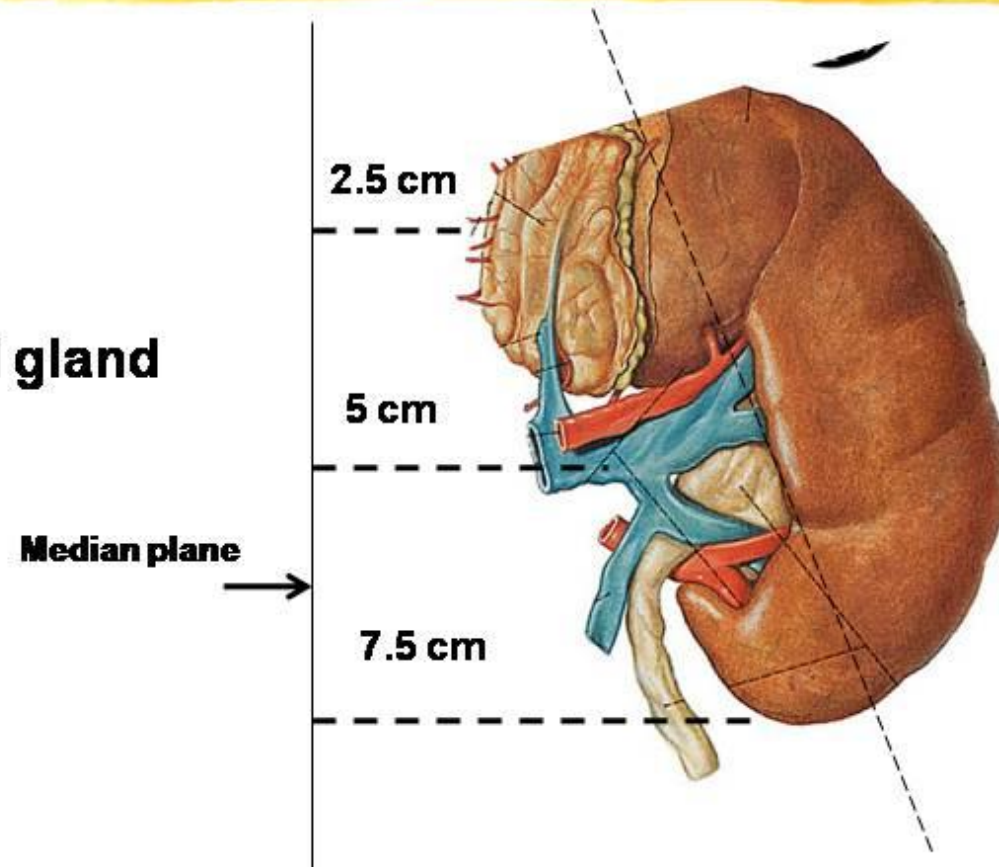


Diagram showing distance of upper pole, hilum & lower pole from median plane



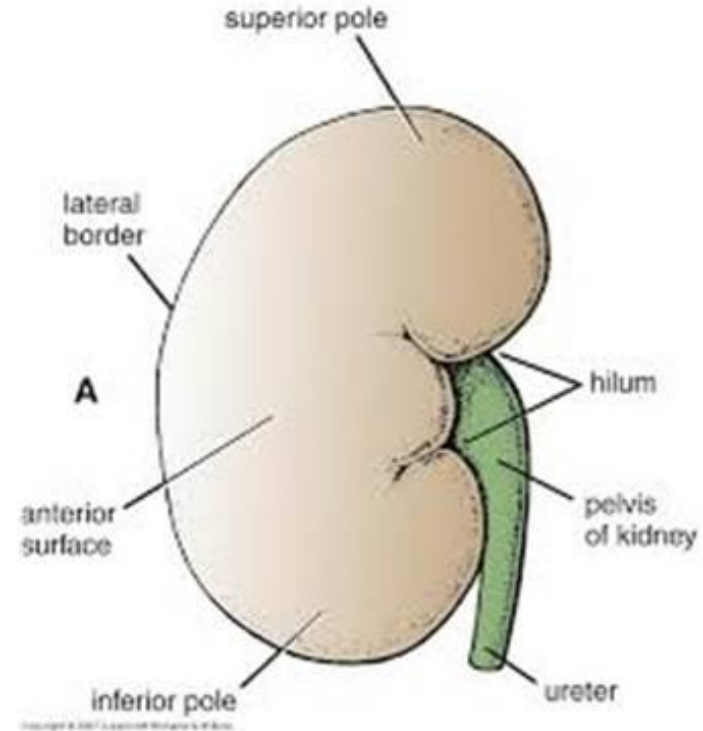
# Borders of kidney

## ❁ Lateral border-

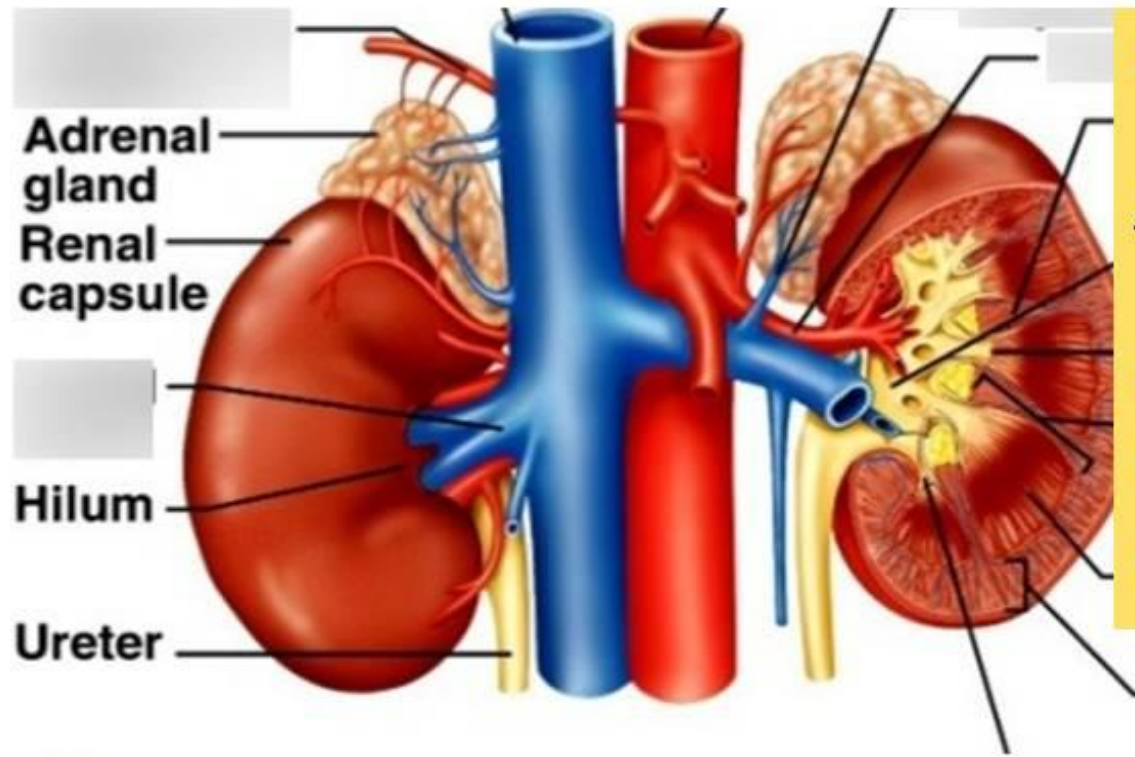
- **Convex , thicker, more posteriorly placed**

## ■ **Medial border –**

- **Convexocancavoconvex**
- **Hilum in the middle – at the level of L1**



# Hilum of the kidney



## Structures at HILUM:

Anterior to posterior

- Renal vein
- Renal artery
- Pelvis of ureter

✚ gateway to the kidneys

✚ 5 cm from median plane

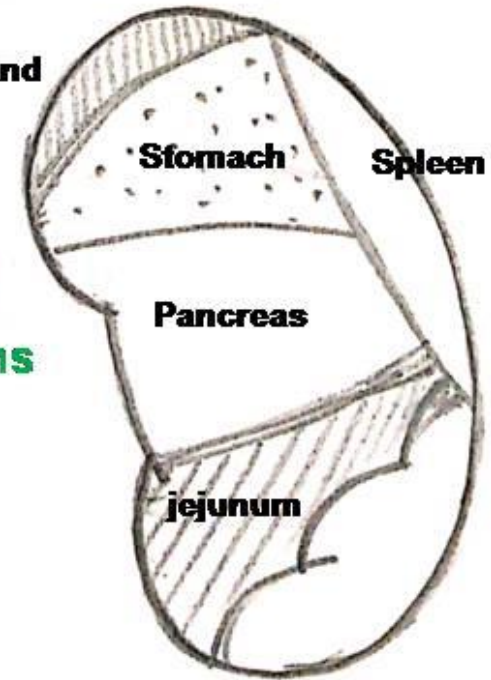
✚ arrangement of structures at the hilum helps to identify anterior from posterior

# Anterior Surface of Kidney

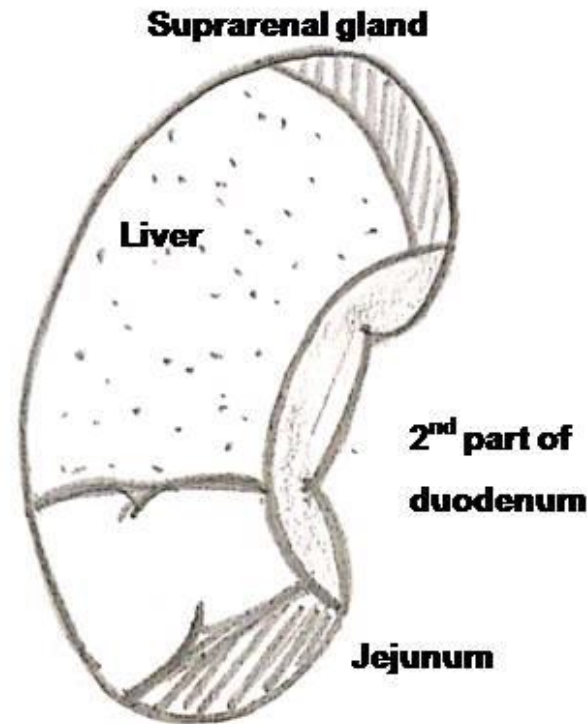


- Convex
- Directed forwards & laterally
- Relations differ on both sides
- Partially covered with peritoneum

## Anterior relations of Left Kidney



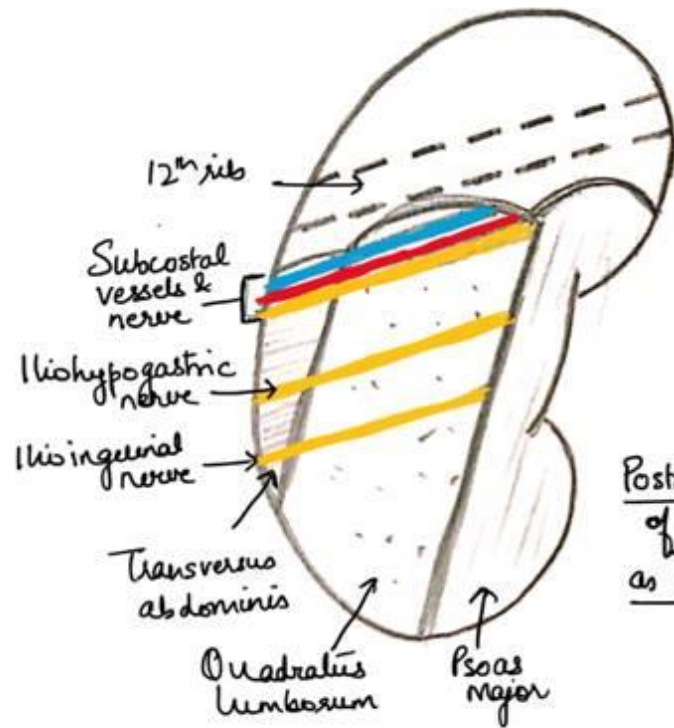
## Anterior relations of Right Kidney



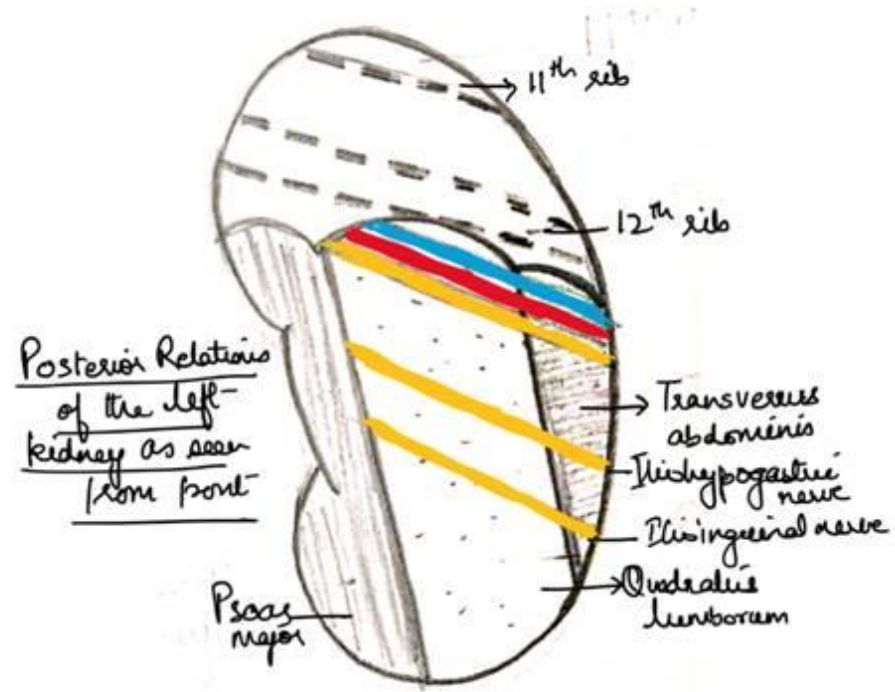
Splenic flexure of colon

Hepatic flexure of colon

# Posterior Surface of Kidney



Posterior Relations  
of Right kidney  
as seen from  
front



Posterior Relations  
of the left  
kidney as seen  
from front

## ❁ Flat

- Directed backwards & medially, Non peritoneal

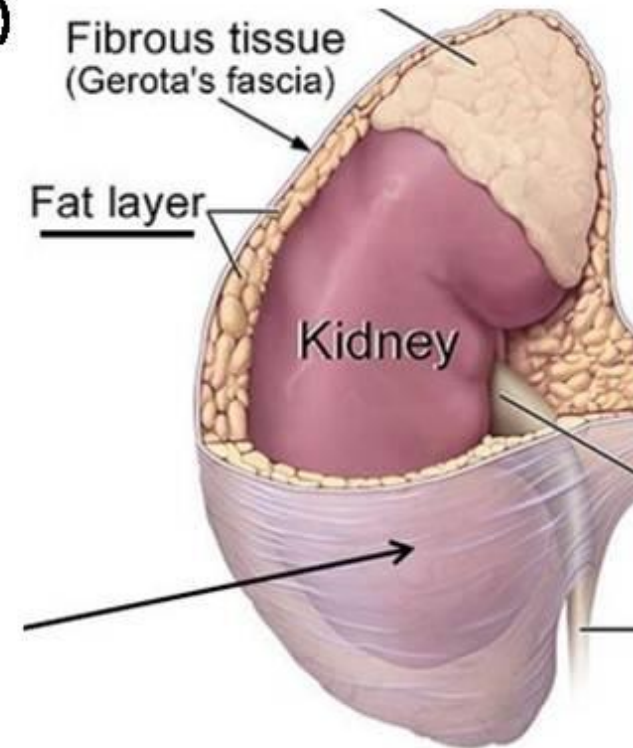
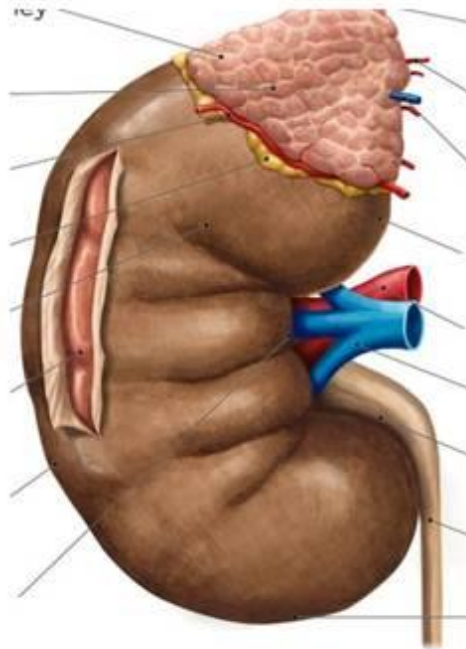
## ■ Relations-

- 4 muscles
- 3 nerves
- Subcostal vessels
- Ribs- 12<sup>th</sup> on right , 11<sup>th</sup> & 12<sup>th</sup> on left

# Coverings of Kidney

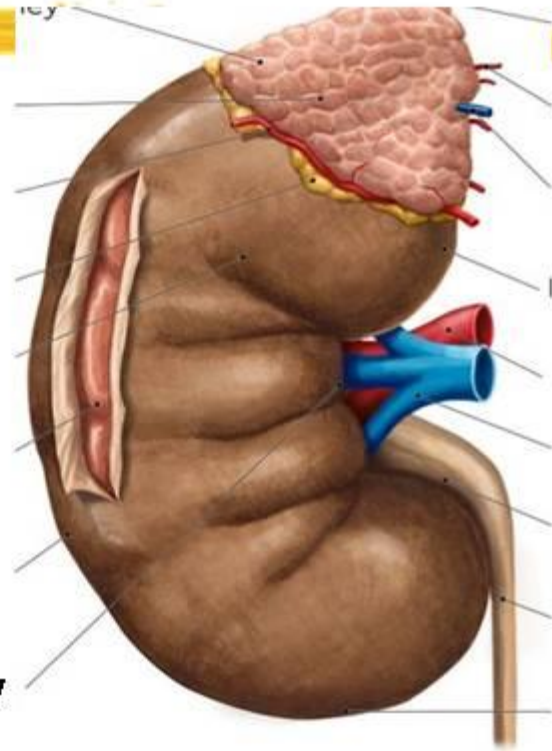
✚ inside out the coverings are:

1. Fibrous capsule (True capsule)
2. Perinephric Fat
3. Renal fascia / Fascia of Gerota (False capsule)
4. Paranephric Fat



# 1. Fibrous capsule

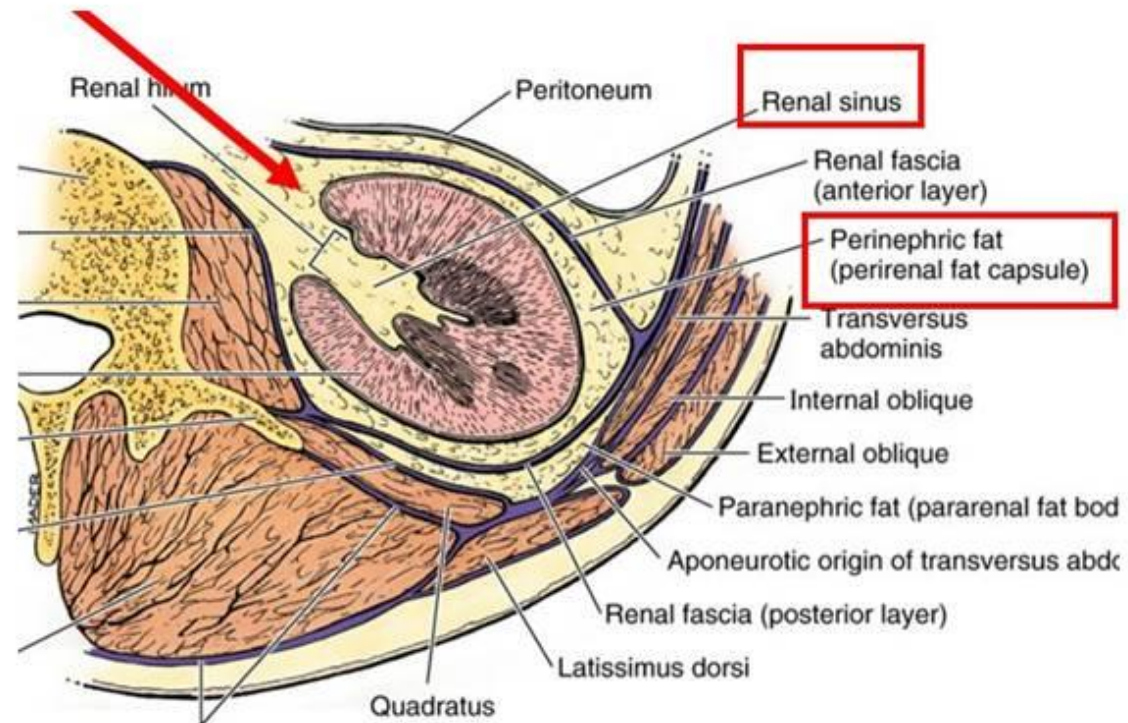
- Condensation of stroma
- covers entire kidney-
- Lines renal sinus
- Ensheathes pelvis of ureter, major calyces & minor calyces
- Can be stripped off from healthy kidney
- CLINICAL SIGNIFICANCE
  - Nephropexy
  - Decapsulation



## 2. Perinephric Fat

✿ Outside the true capsule

✿ fills the RENAL SINUS



### 3. Renal fascia/ Fascia of Gerota (False Capsule)

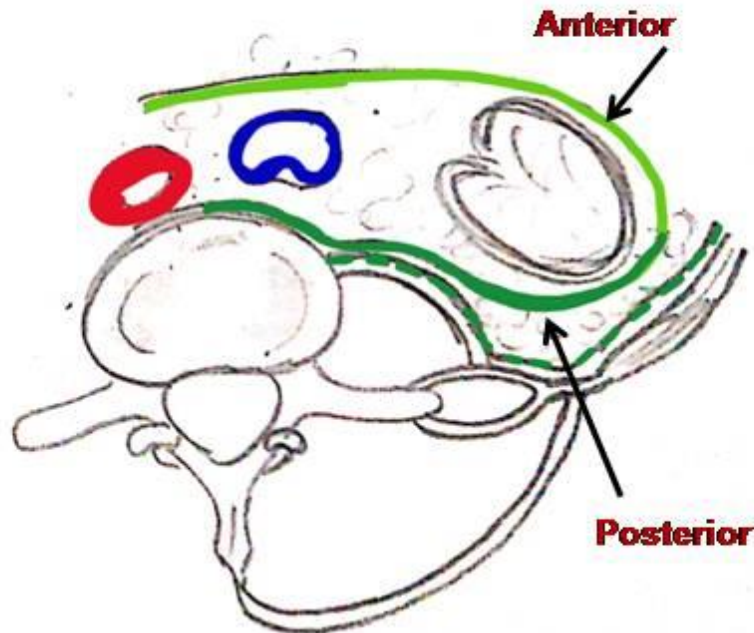
Anterior layer – Fascia of Toldt

Posterior Layer – fascia of Zuckercandl

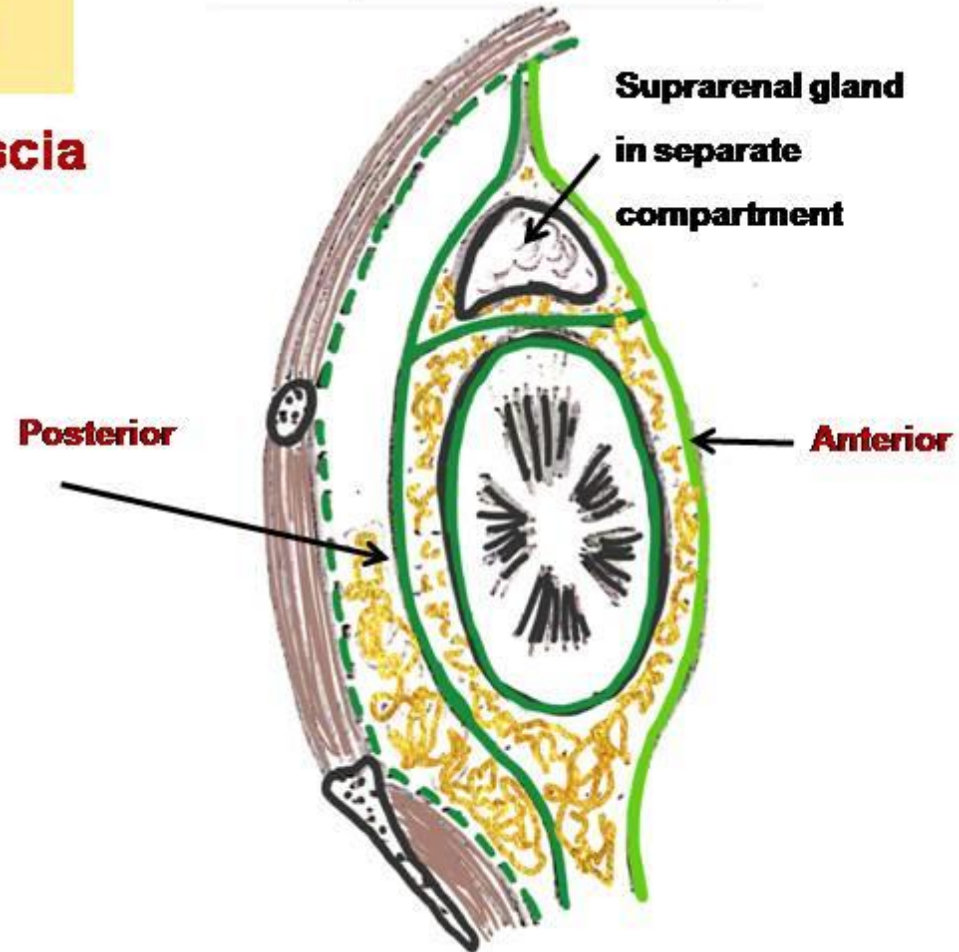
#### Tracing the renal fascia



#### Horizontal Tracing



#### Vertical Tracing

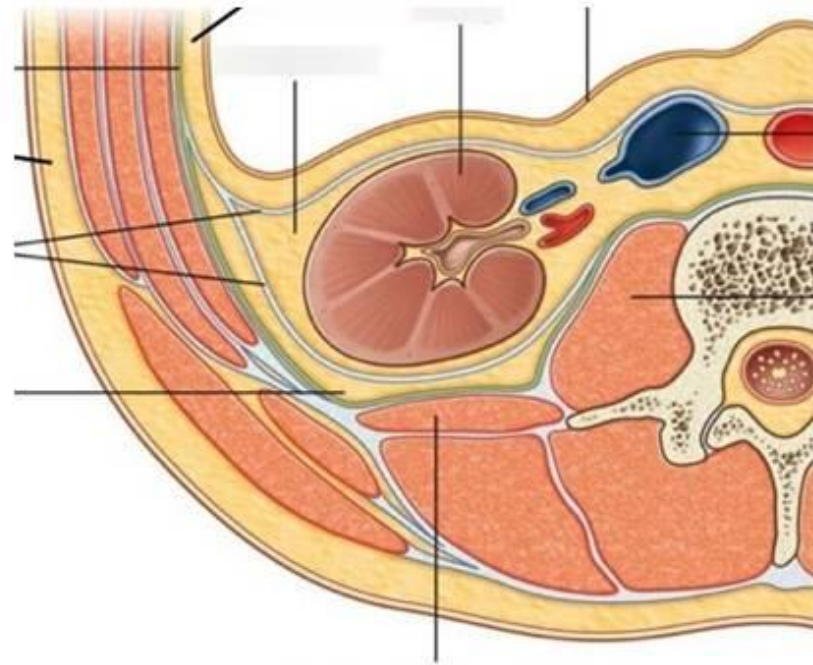




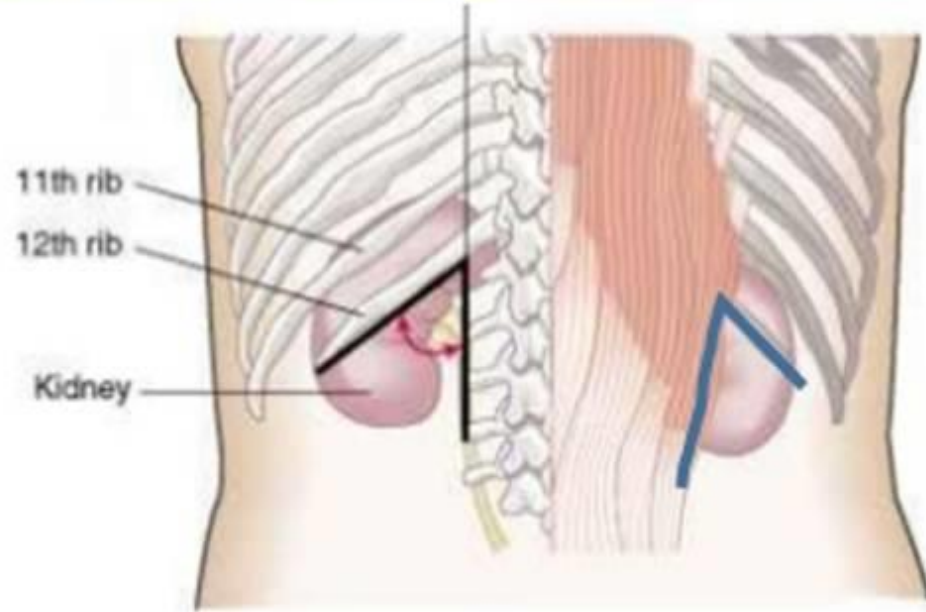
## 4. Paranephric Fat

✿ Outside the renal fascia  
(false capsule)

✿ more abundant posteriorly



# Renal Angle



Renal angle

- Angle between the lower border of the 12<sup>th</sup> rib and lateral border of erector spinae.
- It overlies the lower part of kidney.
- Tenderness can be felt in this area in case of perinephric abscess.

# **What supports the kidney ?**



- 1. Pressure exerted by surrounding viscera**
- 2. Tone of abdominal muscles**
- 3. Renal fascia & fat surrounding kidneys**
- 4. Renal artery and vein which are attached at the hilum**

# Can the kidneys be palpated?

- ❑ Kidney: not palpable in normal adult.
- ❑ May be able to feel lower right kidney pole in very thin person.



Technique for palpating the left kidney.



Technique for palpating the right kidney (top).

**Two hands- one on anterior abdominal wall, other in loin –  
BIMANUAL EXAMINATION**