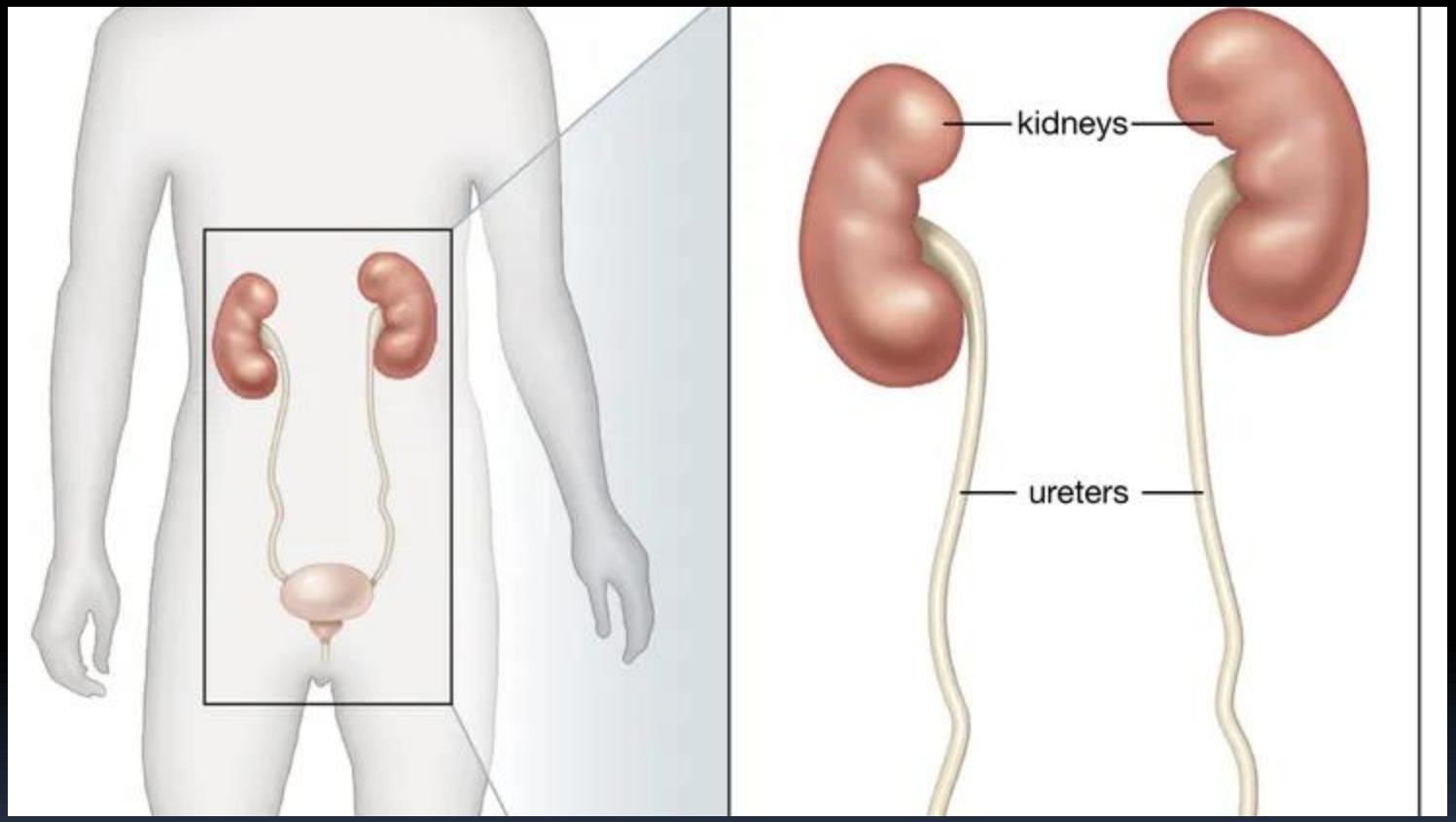
Physiology of Renal System

6th Lecture

2nd Term


kidneys
ureters

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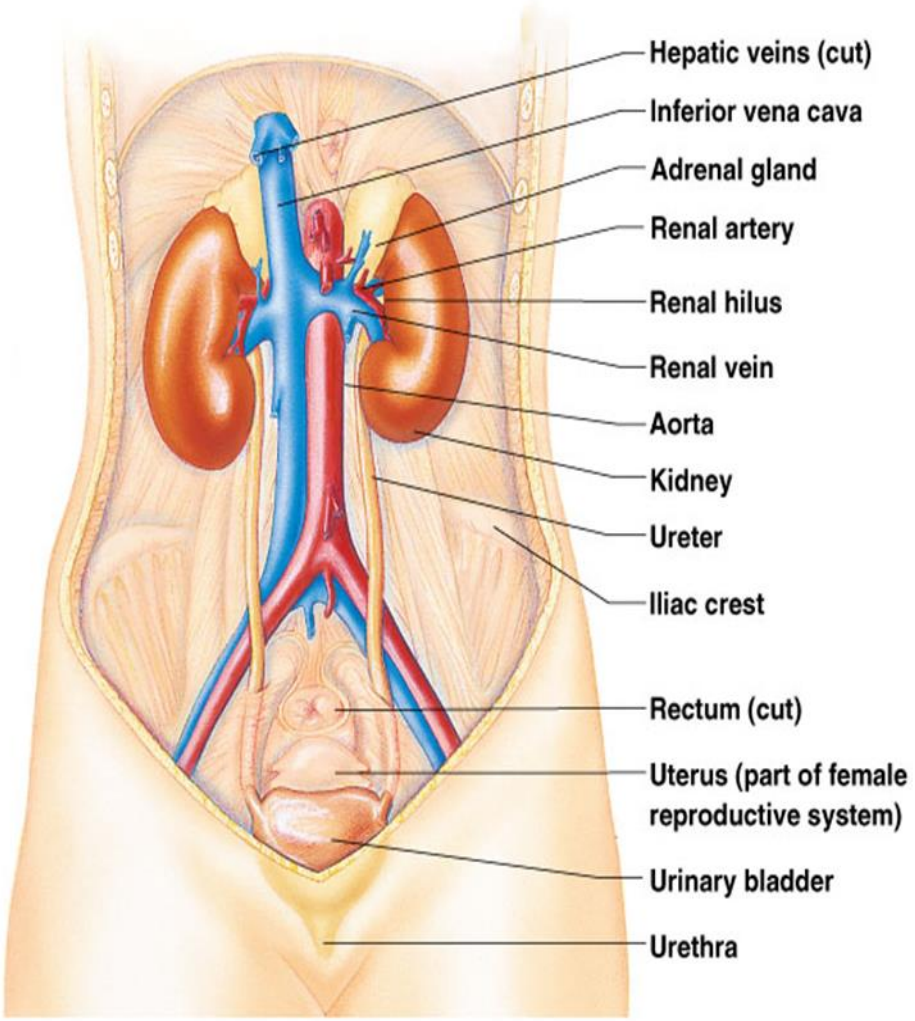
Organs of the Urinary system

Kidneys (2)

Ureters (2)

Urinary bladder (1)

Urethra (1)



Location of the Kidneys

Dimensions

- **Reddish-brown, bean shaped**
- **12cm long, 6cm wide, 3cm thick**

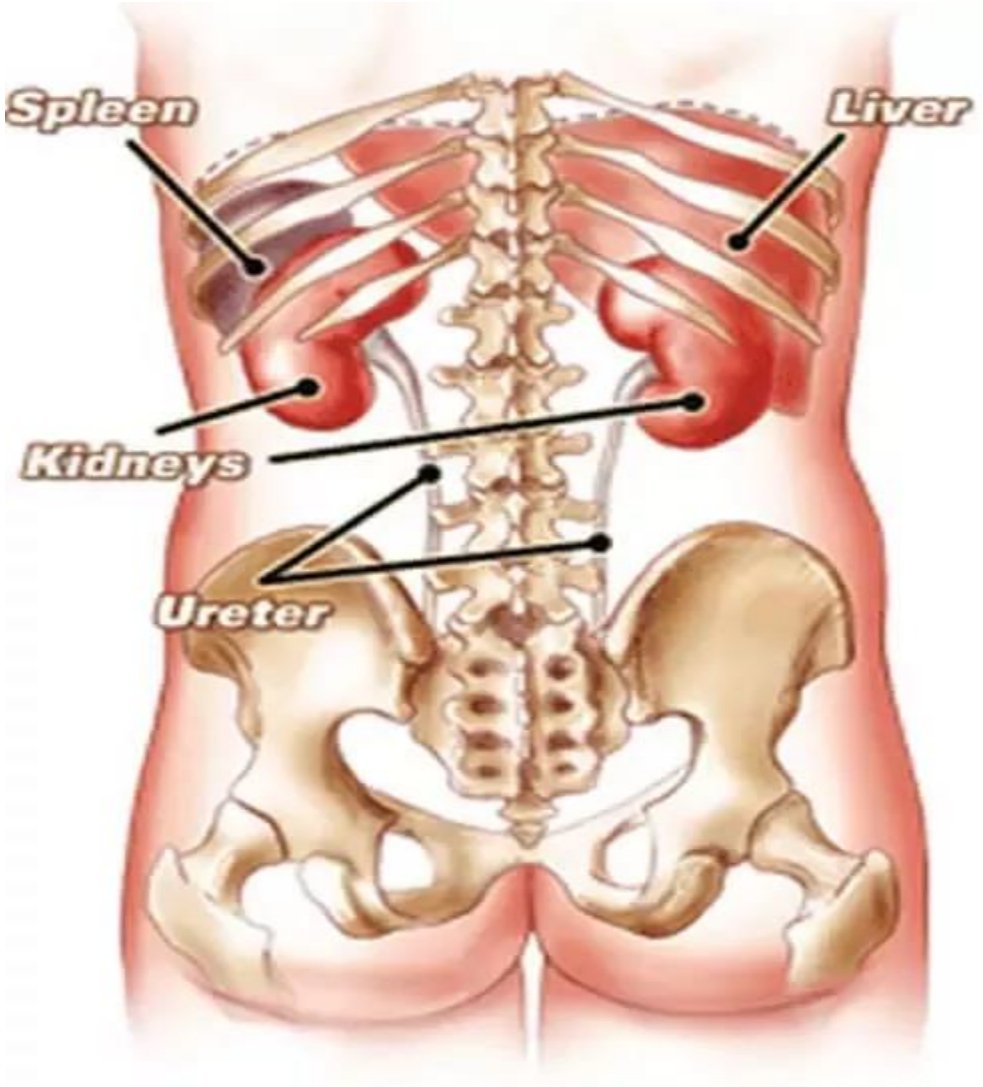
High on posterior abdominal wall

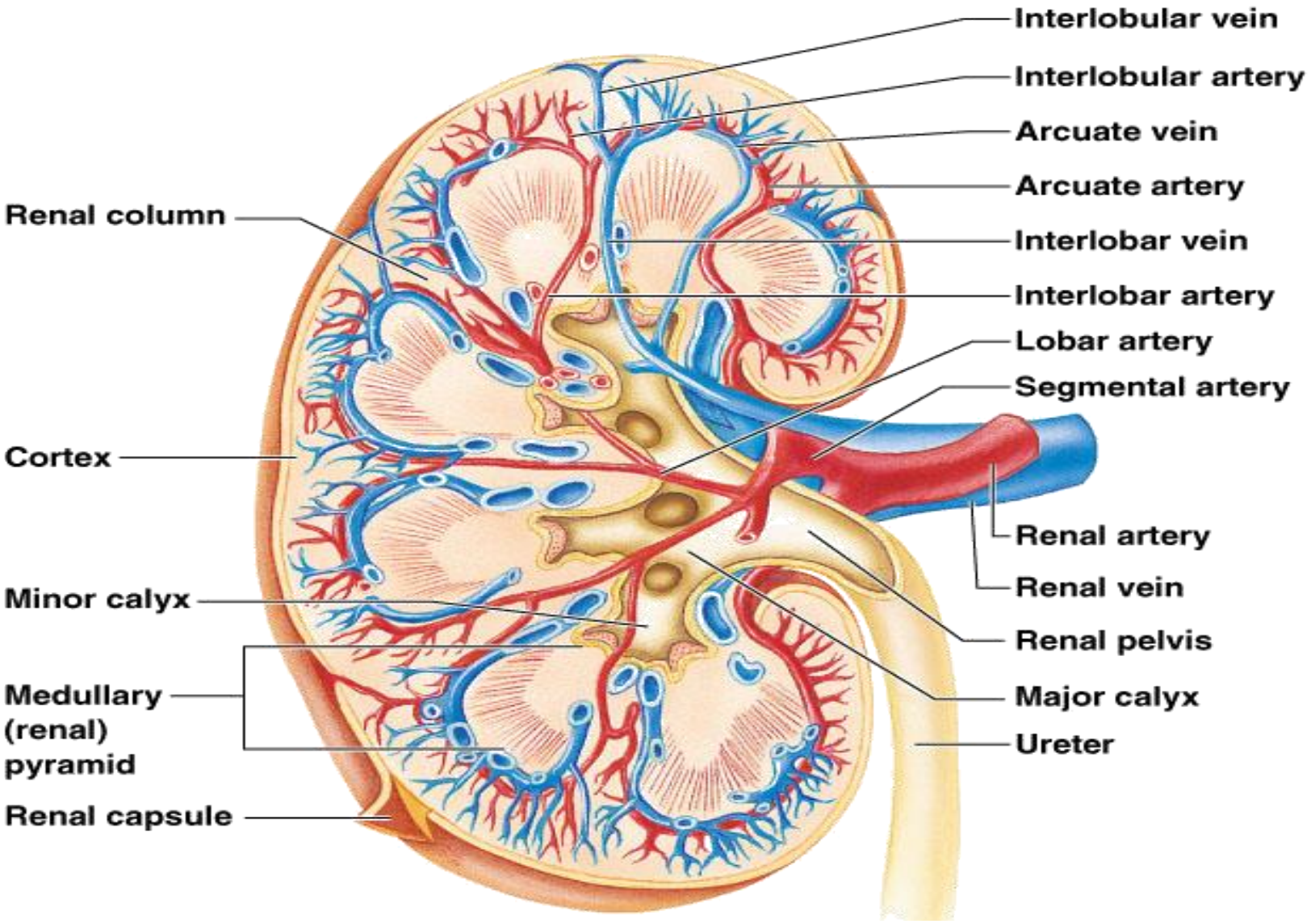
- **at the level of T_{12} to L_{3}- superior lumbar region**

The right kidney is slightly lower than the left ,convex laterally

Attached to ureters, renal blood vessels, and nerves at renal hilus (medial indention)

Atop each kidney is an adrenal gland


Spleen
Liver
Kidneys
Ureter


Interlobular vein
Interlobular artery
Arcuate vein
Arcuate artery
Interlobar vein
Interlobar artery
Lobar artery
Segmental artery
Renal artery
Renal vein
Renal pelvis
Major calyx
Ureter
Renal column
Cortex
Minor calyx
Medullary (renal) pyramid
Renal capsule

Functions of the Urinary System

Elimination of waste products

- **filtering gallons of fluid from the bloodstream every day creating "filtrate"**

- **"filtrate" includes: metabolic wastes, ionic salts, toxins, drugs**

Maintenance of blood

Red blood cell production- by producing hormone erythropoietin to stimulate RBC production in bone marrow.

Blood pressure (vessel size)- by producing renin which causes vasoconstriction.

Blood volume (water balance)- ADH released from Anterior Pituitary targets the kidney to limit water loss when blood pressure decreases or changes in blood composition.

Blood composition (electrolyte balance)- water follows salt; aldosterone reclaims sodium to the blood.

Blood pH- regulates H+ ions and HCO_3^- ions

Blood Flow in the Kidneys

Rich blood supply to filter blood and adjust blood composition.

~¼ of blood supply passes through the kidneys each minute.

Blood enters the kidneys under extremely high pressure.

Renal artery arises from abdominal aorta, divides into Segmental artery at hilus.

Inside renal pelvis, Segmental artery divides into Lobar artery, which branch into Interlobar artery travelling thru the renal column to reach the renal cortex.

At the medulla-cortex junction, the Interlobar artery curves over the medullary pyramids as the Arcuate artery.

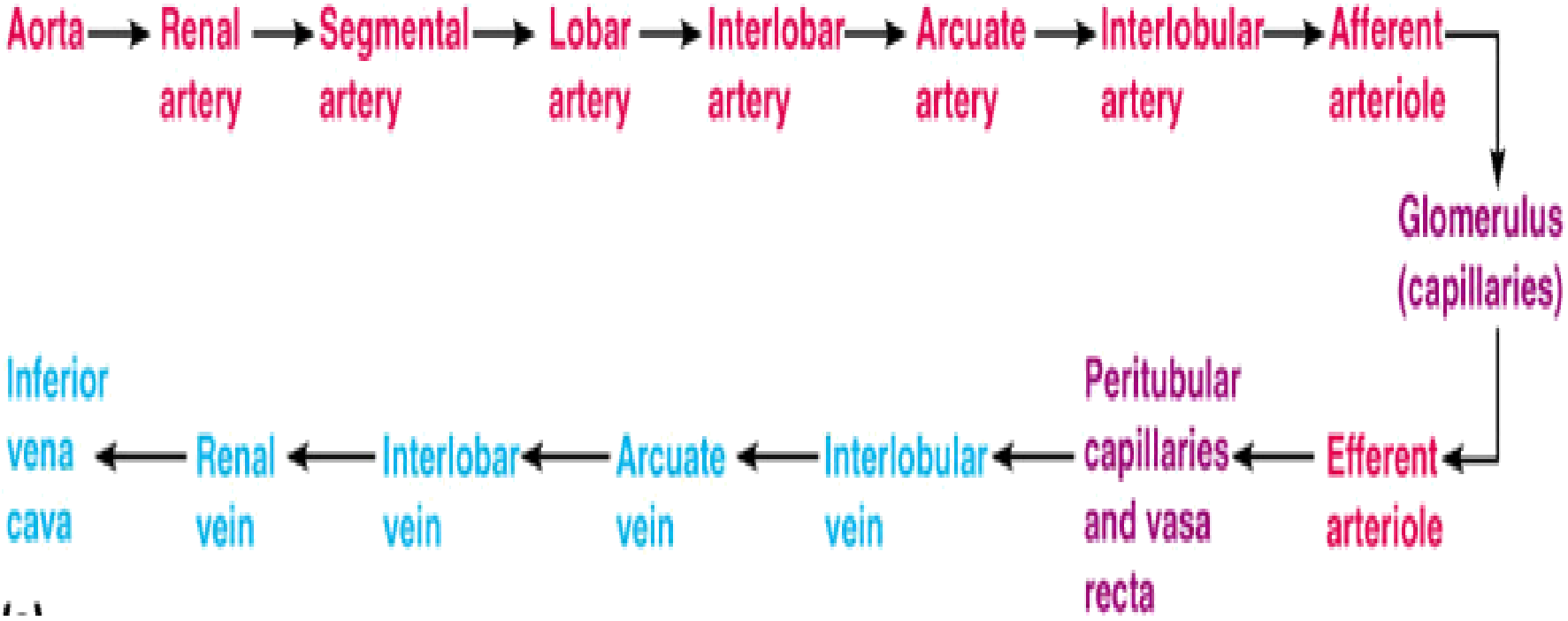
Small Interlobular arterioles branch off of the Arcuate artery and move away from the renal cortex and into the Nephron of the kidney.

The final branches of the interlobular arteries are called afferent arterioles.

Afferent arterioles lead to the glomerulus, a network of capillaries that are involved in filtration.

Leading away from the glomerulus, blood less filtrate travels through the efferent arterioles and into the peritubular capillaries.

From there, blood moves through similar veins that parallel the arteries at their respective locations.


Aorta
Renal artery
Segmental artery
Lobar artery
Interlobar artery
Arcuate artery
Interlobular artery
Afferent arteriole
Glomerulus (capillaries)
Efferent arteriole
Peritubular capillaries and vasa recta
Interlobular vein
Arcuate vein
Interlobar vein
Renal vein
Inferior vena cava