

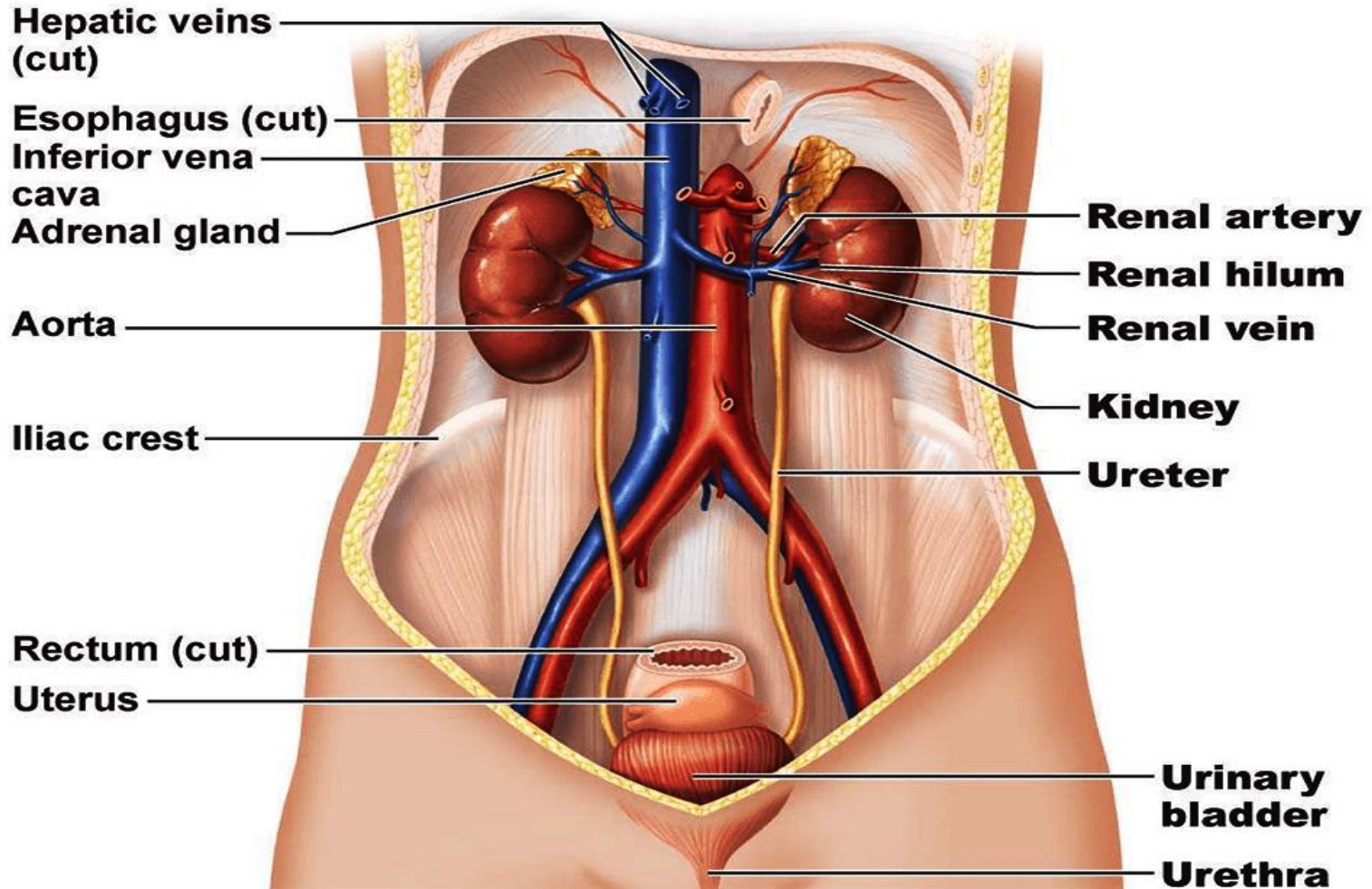


Urinary system

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- The urinary system consists of the kidneys, ureters, urinary bladder, and urethra. The kidneys filter the blood to remove wastes and produce urine. The ureters, urinary bladder, and urethra together form the urinary tract, which acts as a plumbing system to drain urine from the kidneys, store it, and then release it during urination. Besides filtering and eliminating wastes from the body, the urinary system also maintains the homeostasis of water, ions, pH, blood pressure, calcium. (Homeostasis is an automated mechanism whereby concentrations of chemicals and fluids within the biological systems of an organism are stabilized).
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Urinary System



- Blood is transported to the kidneys via the renal artery. A system of filtration units within the kidney regulates levels of dilution (water), salts and other small molecules in the filtrate. Any excess or undesired products travel through each ureter and are deposited into the reservoir of the bladder, while purified blood re-enters the circulatory system by way of the renal vein. Urine is stored in the bladder until the urinary nervous system releases the contents through the urethra and out of the body. The passing of urine is known as micturition or urination.

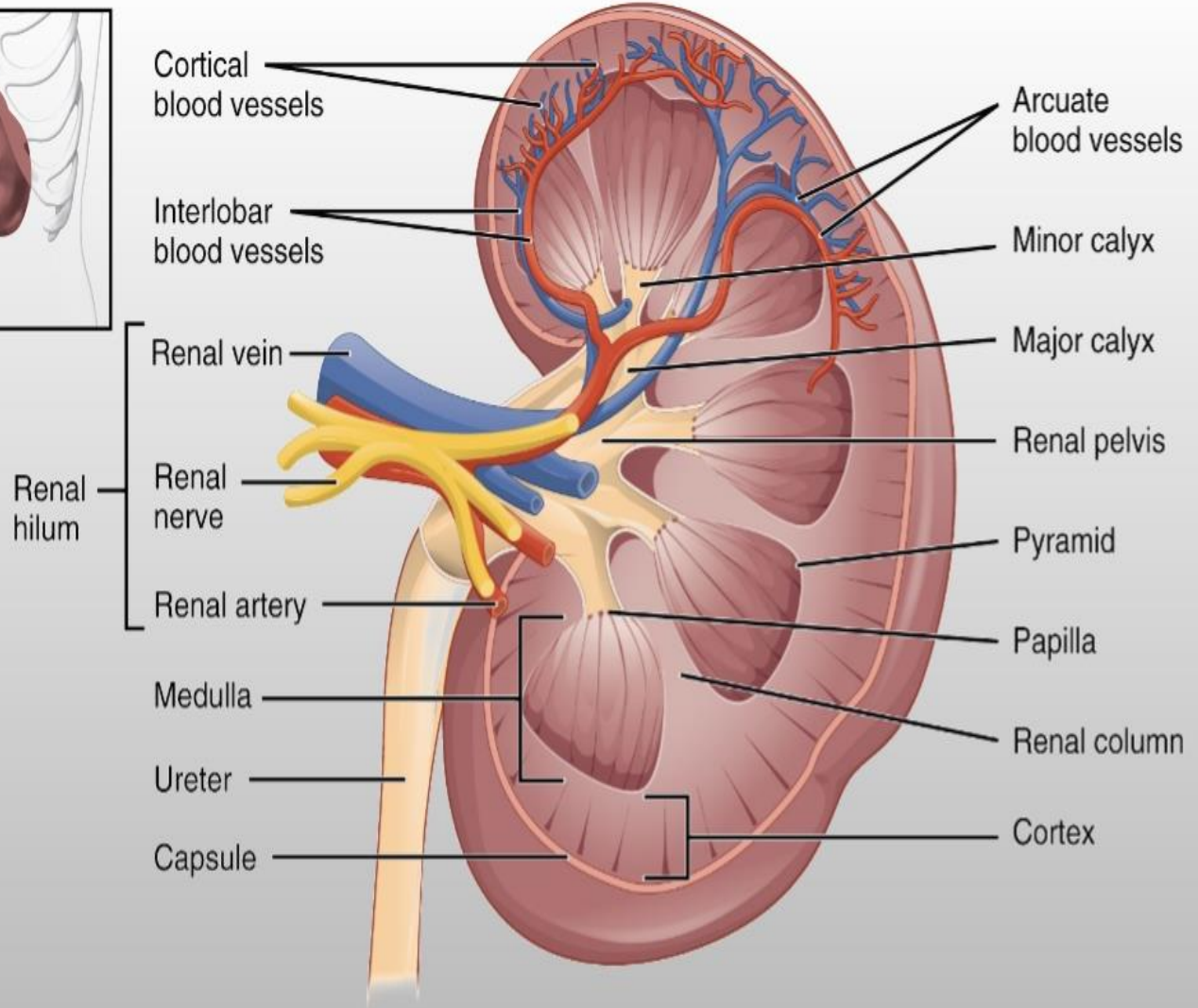
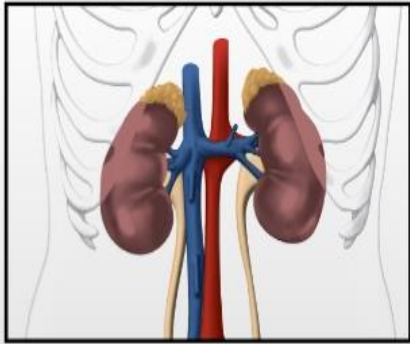
The urinary system is split into the upper and lower urinary tract. The former consists of the kidneys and ureters, the latter of the bladder and urethra.

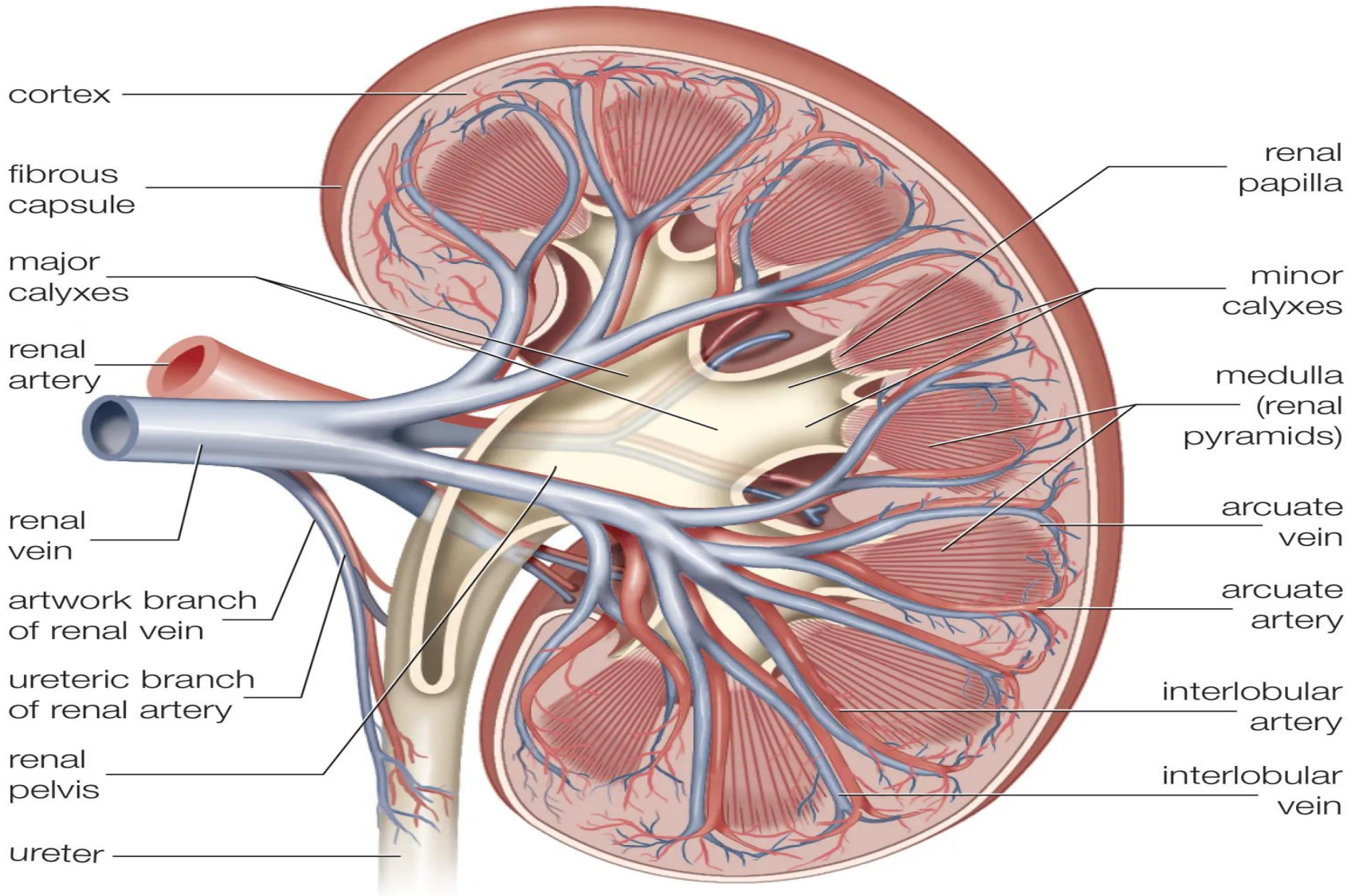
Urinary System Anatomy

- Kidneys:
 - The kidneys are a pair of bean-shaped organs found along the posterior wall of the abdominal cavity. The left kidney is located slightly higher than the right kidney because the right side of the liver is much larger than the left side. The kidneys, unlike the other organs of the abdominal cavity, are located posterior to the peritoneum and touch the muscles of the back. The kidneys are surrounded by a layer of adipose tissue that holds them in place and protects them from physical damage. The kidneys filter metabolic wastes, excess ions, and chemicals from the blood to form urine.
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Structure

- At the concave medial margin of the kidney is a vertical cleft, the renal hilum, where the renal artery enters and renal vein and renal pelvis leave. The renal hilum is the entrance to a space within the kidney, the renal sinus, which is occupied by the renal pelvis, calices, vessels, and nerves and a variable amount of fat.
 - Each kidney has anterior and posterior surfaces, medial and lateral margins, and superior and inferior poles. The renal pelvis is the flattened funnel-shaped expansion of the superior end of the ureter. The renal pelvis receives two or three major calices, each of which divides into two or three minor calices.
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cortex

fibrous capsule

major calyces

renal artery

renal vein

artwork branch of renal vein

ureteric branch of renal artery

renal pelvis

ureter

renal papilla

minor calyces

medulla (renal pyramids)

arcuate vein

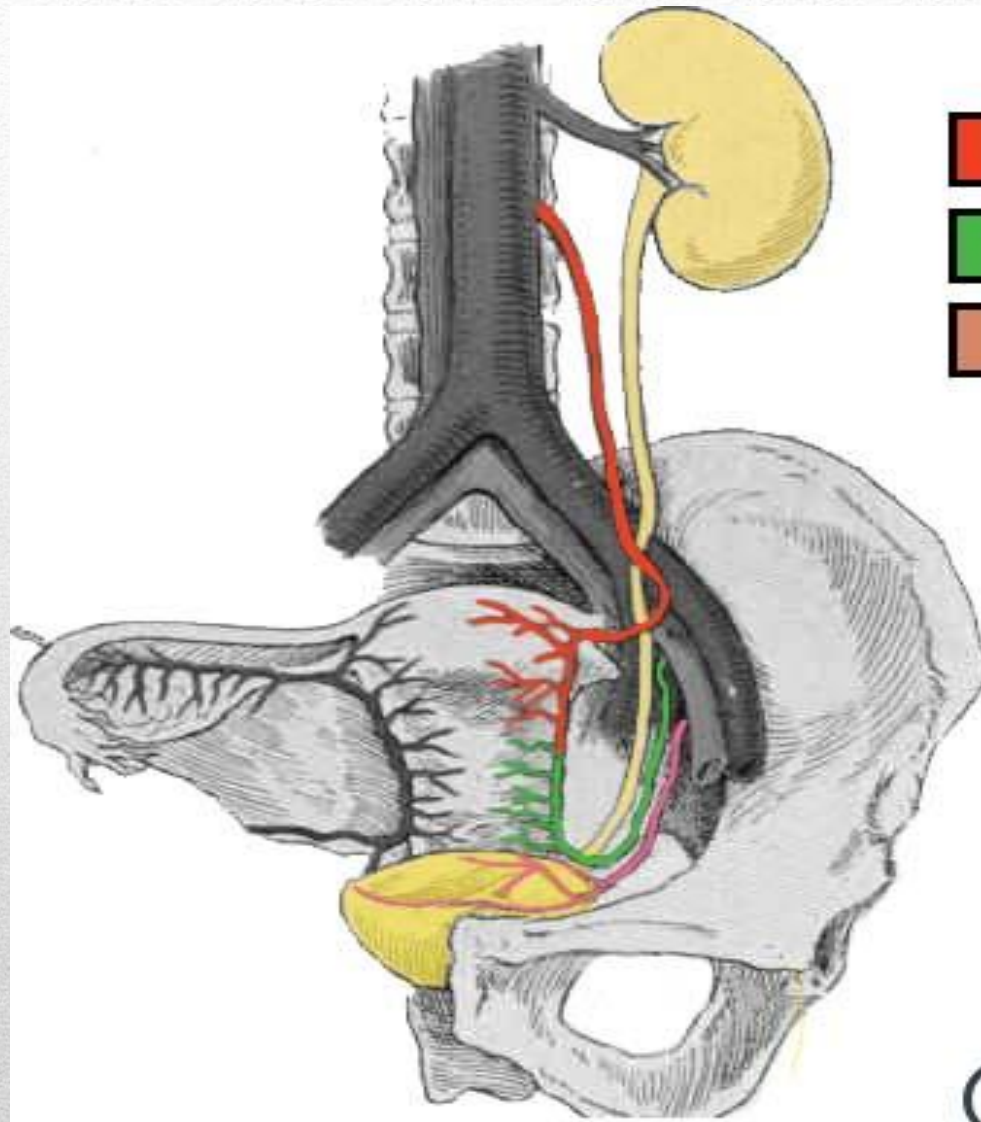
arcuate artery

interlobular artery

interlobular vein

Ureters

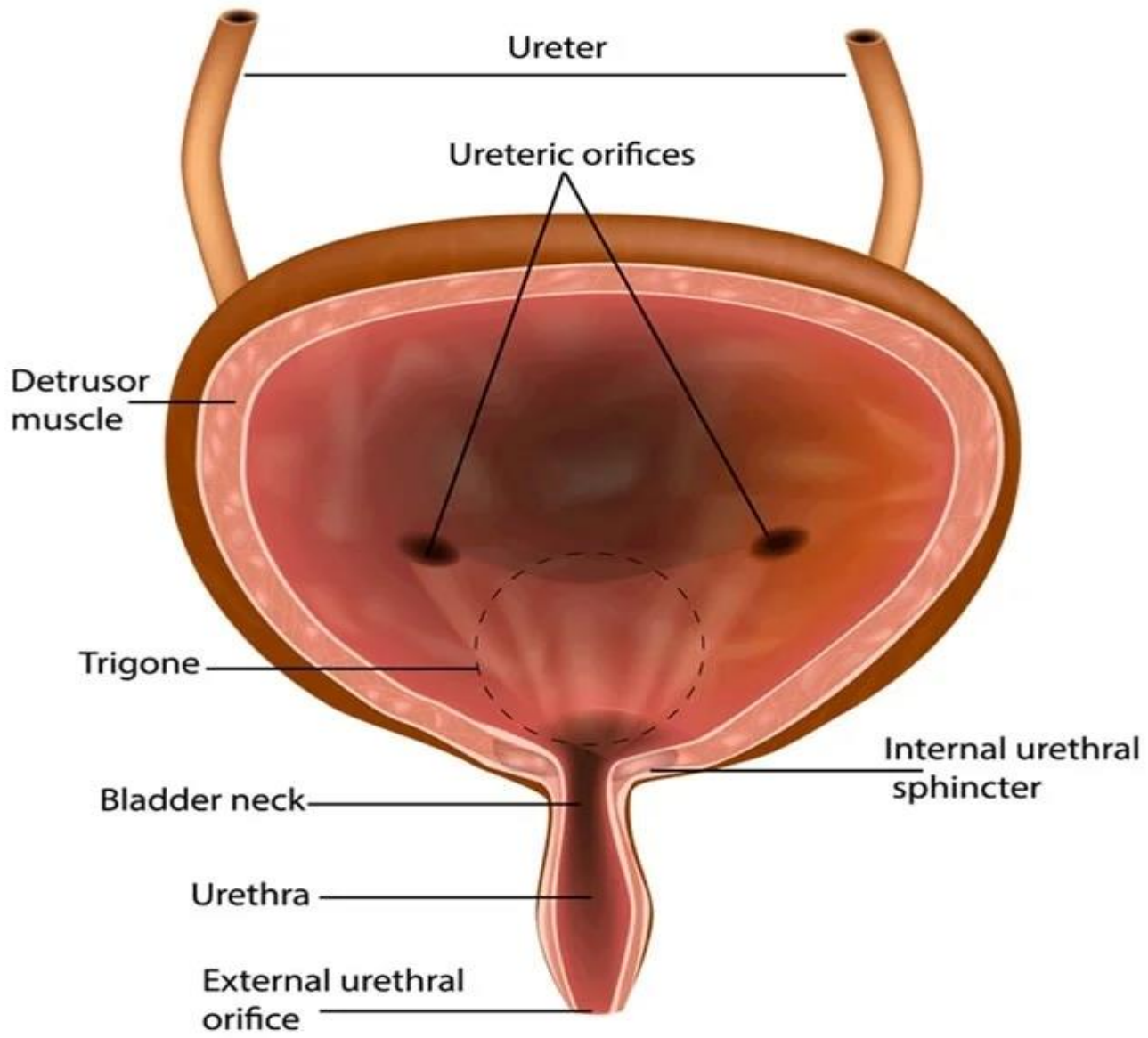
- The ureters are a pair of tubes that carry urine from the kidneys to the urinary bladder. The ureters are about 25 – 30 cm in length and run on the left and right sides of the body parallel to the vertebral column. Gravity and peristalsis of smooth muscle tissue in the walls of the ureters move urine toward the urinary bladder. The ends of the ureters extend slightly into the urinary bladder and are sealed at the point of entry to the bladder by the ureterovesical valves. These valves prevent urine from flowing back towards the kidneys
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-  Ovarian artery
-  Uterine artery
-  Sup. vesical artery

Urinary Bladder

- The urinary bladder is a sac-like hollow organ used for the storage of urine. The urinary bladder is located along the body's midline at the inferior end of the pelvis. Urine entering the urinary bladder from the ureters slowly fills the hollow space of the bladder and stretches its elastic walls. The walls of the bladder allow it to stretch to hold anywhere from 600 to 800 milliliters of urine.
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Urethra

- The urethra is the tube through which urine passes from the bladder to the exterior of the body. The female urethra is around 4cm long and ends inferior to the clitoris and superior to the vaginal opening. In males, the urethra is around 20 cm long and ends at the tip of the penis. The urethra is also an organ of the male reproductive system as it carries sperm out of the body through the penis.
 - The flow of urine through the urethra is controlled by the internal and external urethral sphincter muscles. The internal urethral sphincter is made of smooth muscle and opens involuntarily when the bladder reaches a certain set level of distention. The opening of the internal sphincter results in the sensation of needing to urinate. The external urethral sphincter is made of skeletal muscle and may be opened to allow urine to pass through the urethra or may be held closed to delay urination.
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