



# **SNS COLLEGE OF NURSING**



**SARAVANAMPATTI, COIMBATORE-35**

**DEPARTMENT OF NURSING**

**COURSE NAME : BSC (NURSING) I YEAR**

**SUBJECT : APPLIED ANATOMY**

**&PHYSIOLOGY**

**UNIT IV: RENAL SYSTEM**

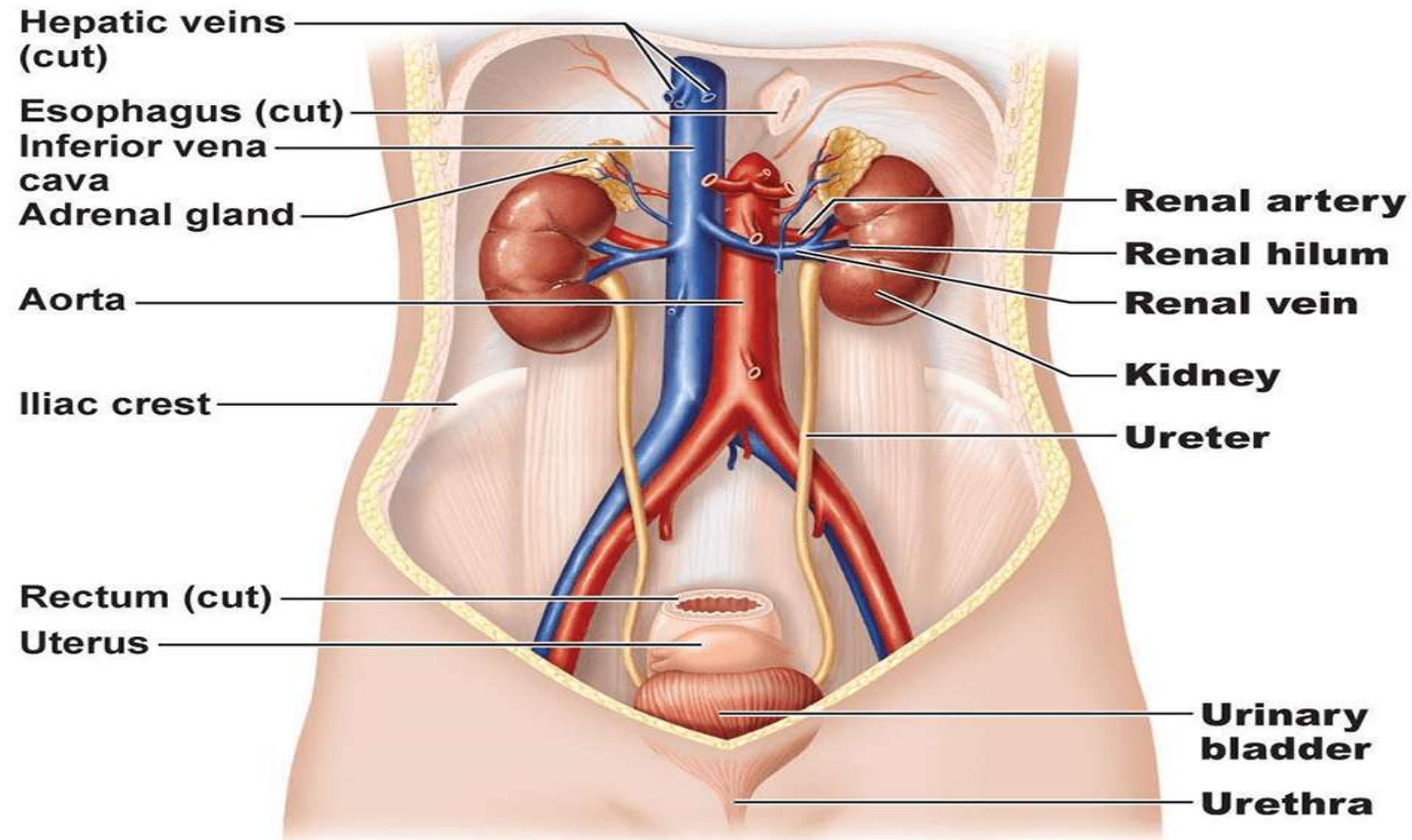
**TOPIC :**



# INTRODUCTION

- The urinary system consists of two kidneys, two ureters, a urinary bladder, and a urethra.
- The kidneys alone perform the functions just described and manufacture urine in the process.
- The other organs of the urinary system provide temporary storage reservoirs for urine or serve as transportation channels to carry it from one body region to another..

# URINARY SYSTEM





# Functions of the Urinary System



- Filter.
- Waste processing.
- Elimination.
- Regulation.
- Other regulatory functions
- Conversion.



# STRUCTURE OF KIDNEY



- Location. - superior lumbar region;
- Positioning- the right kidney is positioned slightly lower than the left.
- Size-12 cm (5 inches) long, 6 cm (2.5 inches) wide, and 3 cm (1 inch) thick
- Adrenal gland
- Fibrous capsule-a glistening appearance.
- Perirenal fat capsule



# STRUCTURE OF KIDNEY



- **Renal fascia.** -the **outermost** capsule,
- **Renal cortex.**-The **outer region**,
- **Renal medulla** -a darker, reddish-brown area,
- **Renal pyramids.**-triangular regions with a striped appearance
- **Renal columns** -pyramids are separated by extensions of cortex-like tissue
- **Renal pelvis** -Medial to the hilum is a flat, basin like cavity

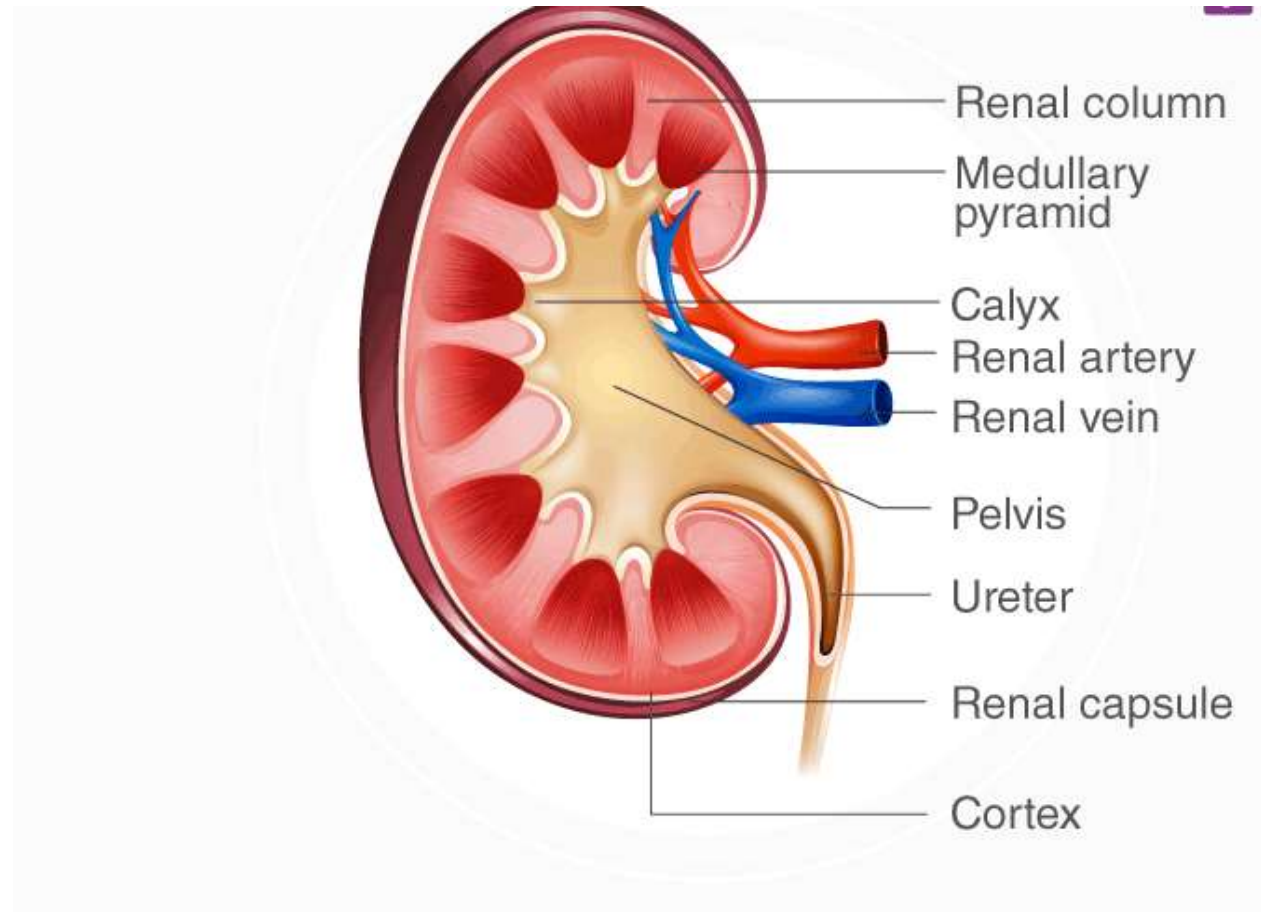


# STRUCTURE OF KIDNEY



- **Calyces-** form cup-shaped areas that enclose the tips of the pyramid and collect urine
- **Renal artery - segmental arteries-**each segmental artery gives off several branches called **interlobar arteries**.
- **Arcuate arteries.** -cortex-medulla junction, interlobar arteries give off arcuate arteries,
- **Cortical radiate arteries.-**Small cortical radiate arteries then branch off the arcuate arteries

# STRUCTURE OF KIDNEY





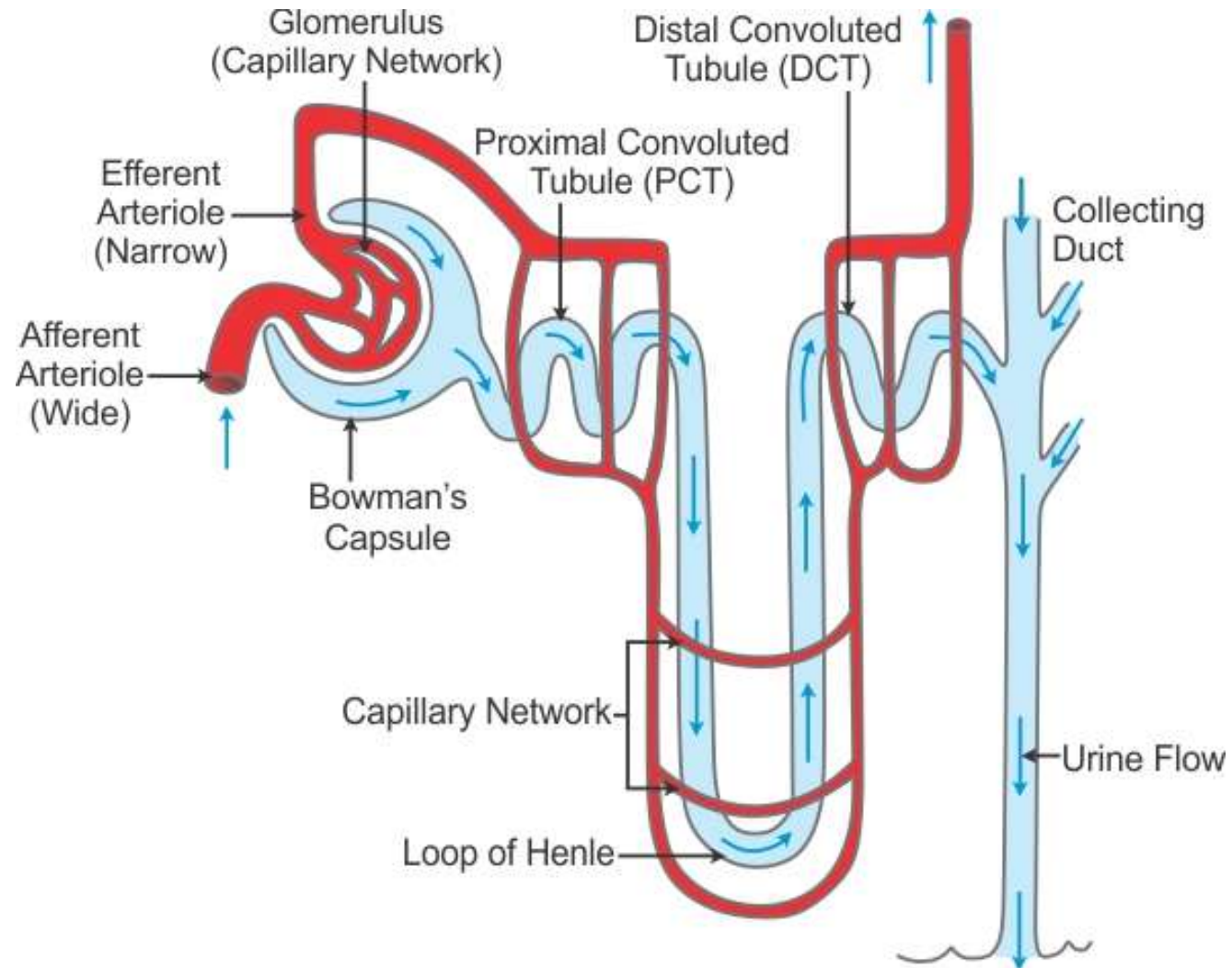


# NEPHRONS



- Nephrons are the structural and functional units of the kidneys.
- **Nephrons**- over a million tiny structures & is responsible for forming urine.
- **Glomerulus** -knot of capillaries.
- **Renal Tubule**
- **Bowman's capsule.** The closed end of the renal tubule is enlarged and cup-shaped and completely surrounds the glomerulus, and it is called the **glomerular** or Bowman's capsule.
- **Podocytes.** The inner layer of the capsule is made up of highly modified **octopus-like** cells called podocytes.

# STRUCTURE OF NEPHRON





# NEPHRONS



- **Foot processes.** intertwine with one another and cling to the glomerulus.
- **Collecting duct.** A collecting tubule called the collecting duct, which receives urine from many nephrons.
- **Proximal convoluted tubule.** The part of the tubule that is **near** to the glomerular capsule.
- **Loop of Henle.** The loop of Henle is the **hairpin loop** following the proximal convoluted tubule.

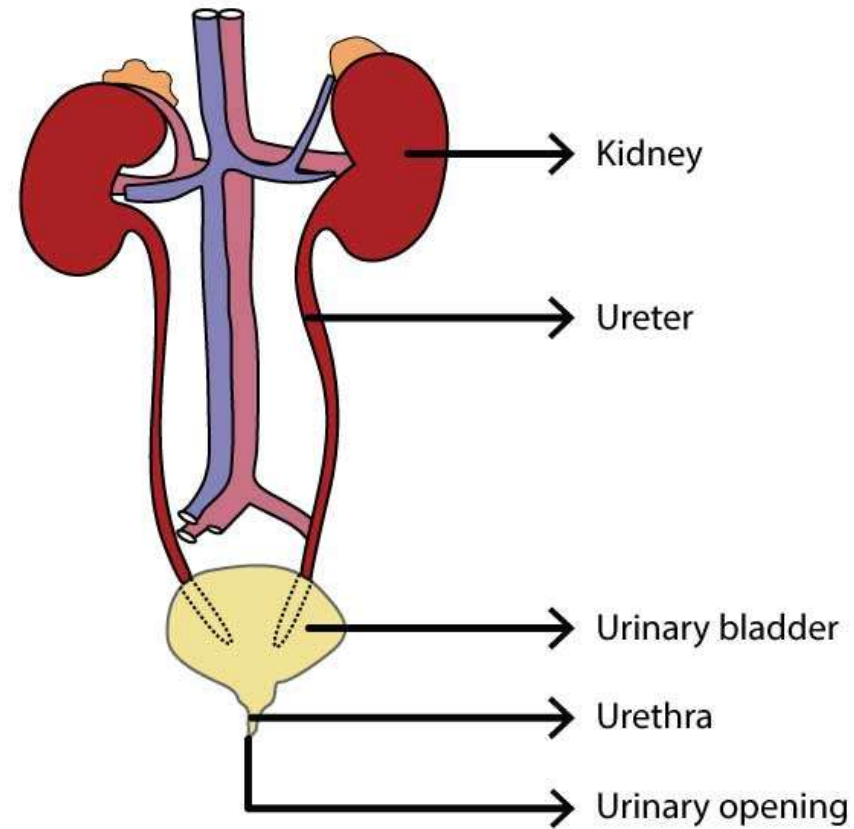


# NEPHRONS



- **Distal convoluted tubule.**
- **Cortical nephrons.**
- **Juxtamedullary nephrons.**
- **Afferent arteriole.** The afferent arteriole, which arises from a cortical radiate artery, is the “**feeder vessel**”.
- **Efferent arteriole.** The efferent arteriole receives blood that has passed through the glomerulus.
- **Peritubular capillaries.** They arise from the efferent arteriole that drains the glomerulus.

# STRUCTURE OF URETER





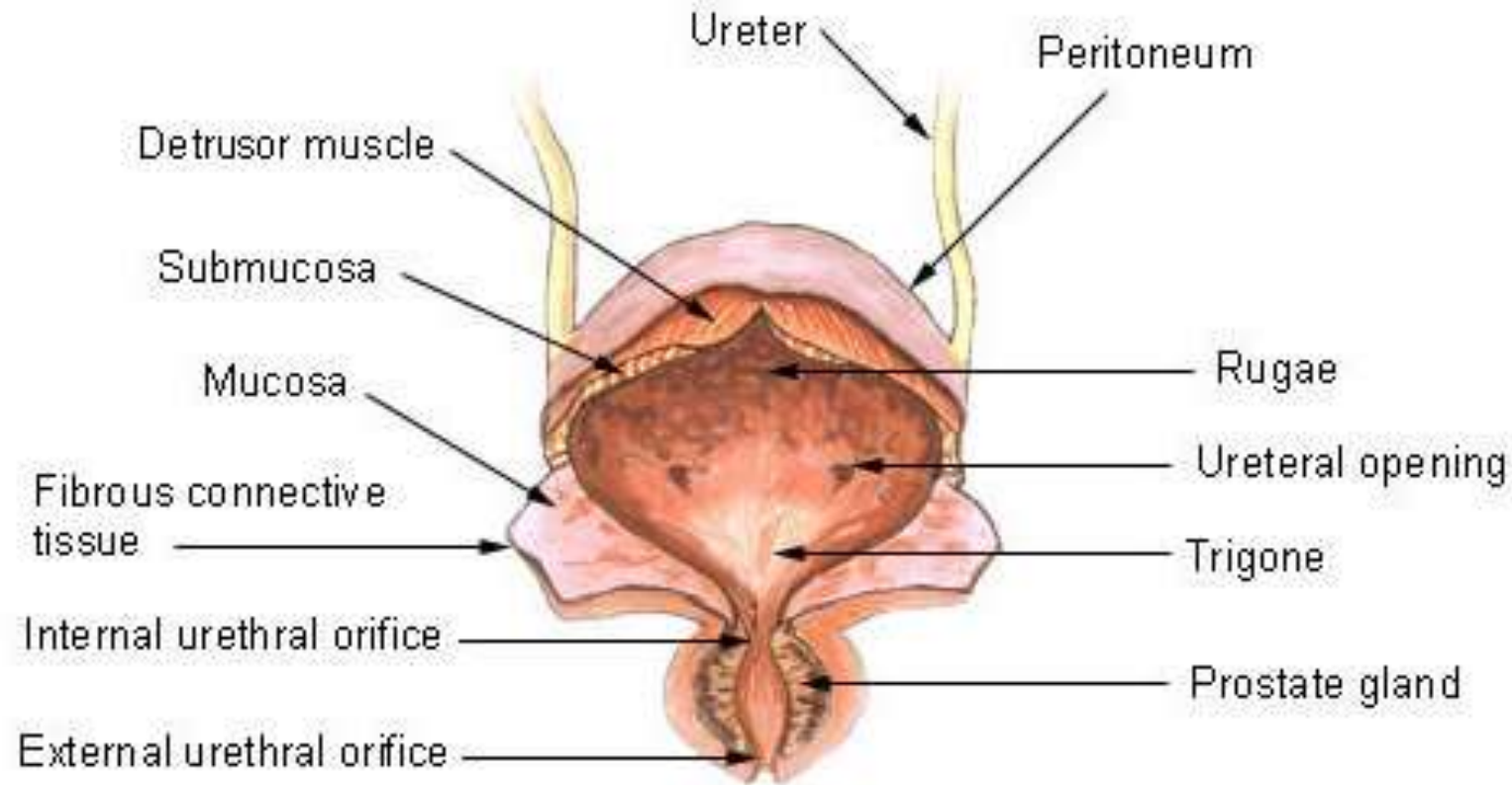
# URETERS



- **Size.** The ureters are two slender tubes each **25 to 30 cm** (10 to 12 inches) long and **6 mm** (1/4 inch) in diameter.
- **Location.** runs behind the peritoneum from the renal hilum to the posterior aspect of the bladder
- **Function**
  - The ureters are passageways that carry urine from the kidneys to the bladder
  - It propel urine into the bladder by peristalsis
  - Prevented from flowing back by small valve-like folds of bladder mucosa

# STRUCTURE OF URINARY BLADDER

## Urinary Bladder





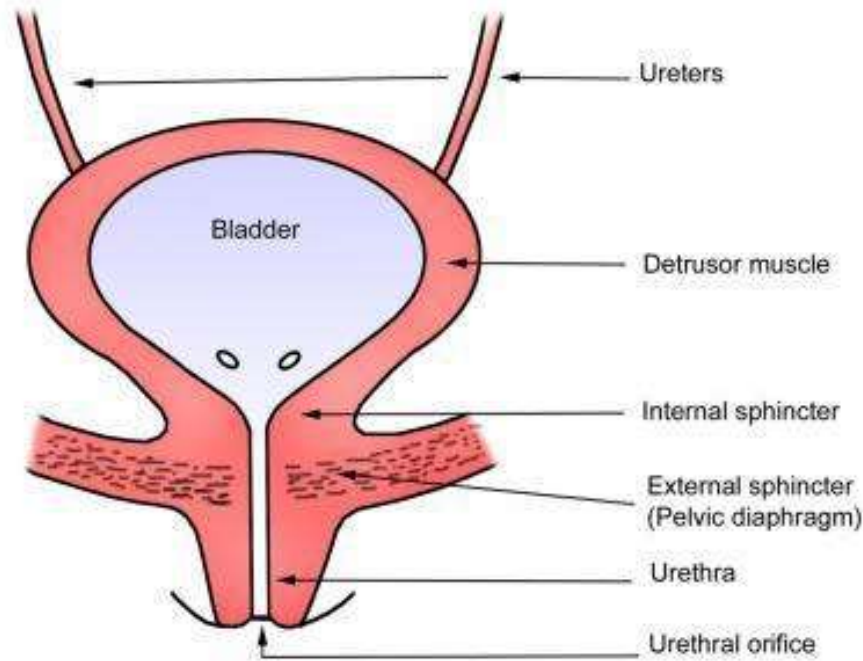
# Urinary Bladder



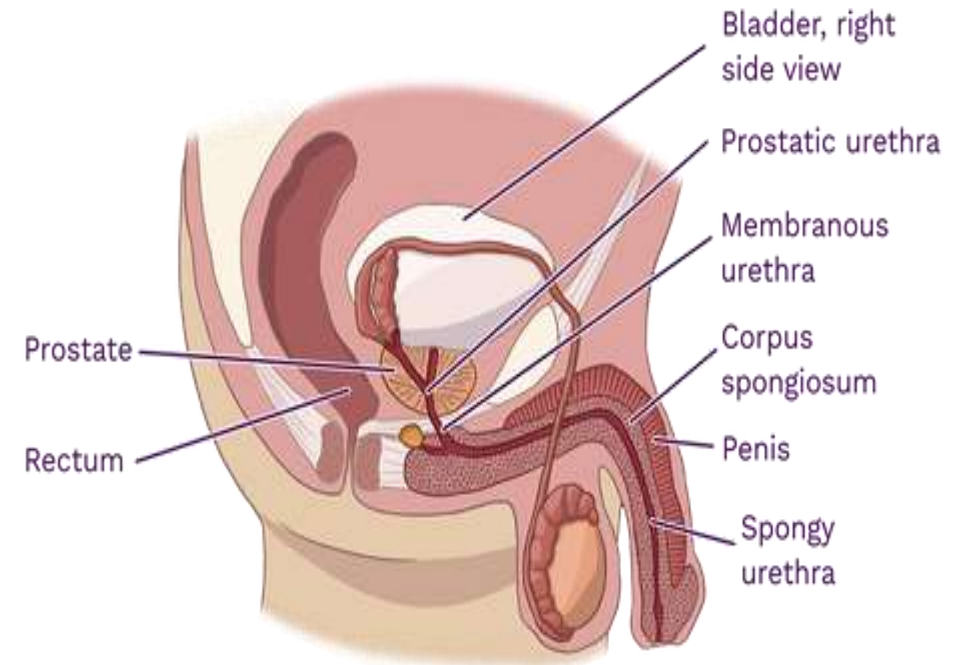
- **Location.** retroperitoneally in the pelvis & posterior to the symphysis pubis.
- **Function.** - urine storage.
- **Trigone-** The smooth triangular region of the bladder base outlined by these three openings is called the trigone, where infections tend to persist.
- **Detrusor muscles-** The bladder wall contains three layers of smooth muscle, collectively called the detrusor muscle, and its mucosa is a special type of epithelium, **transitional epithelium.**



# STRUCTURE OF URETHRA



**FEMALE**



**MALE**



# URETHRA



- **Internal urethral sphincter.** At the bladder-urethral junction an **involuntary** sphincter that keeps the urethra closed
- **External urethral sphincter.** A second sphincter, the external urethral sphincter, is **voluntarily** controlled.
- **Female urethra.** The female urethra is about **3 to 4 cm** (1 1/2 inches) long, and its external orifice, or opening, lies anteriorly to the vaginal opening.
- **Male urethra.** In me, the urethra is approximately **20 cm** (8 inches) long and has three named regions: the **prostatic, membranous, and spongy (penile)** urethrae; it opens at the tip of the penis after traveling down its length.
-



# CONCLUSION



- The **urinary system**, also known as the **urinary tract** or **renal system**, consists of the kidney, ureters, bladder, and the [urethra](#).
- The urine is then passed through the ureters to the bladder, where it is stored.
- During urination, the urine is passed from the bladder through the urethra to the outside of the body.
- 800–2,000 milliliters (mL) of urine are normally produced every day in a healthy human.

