

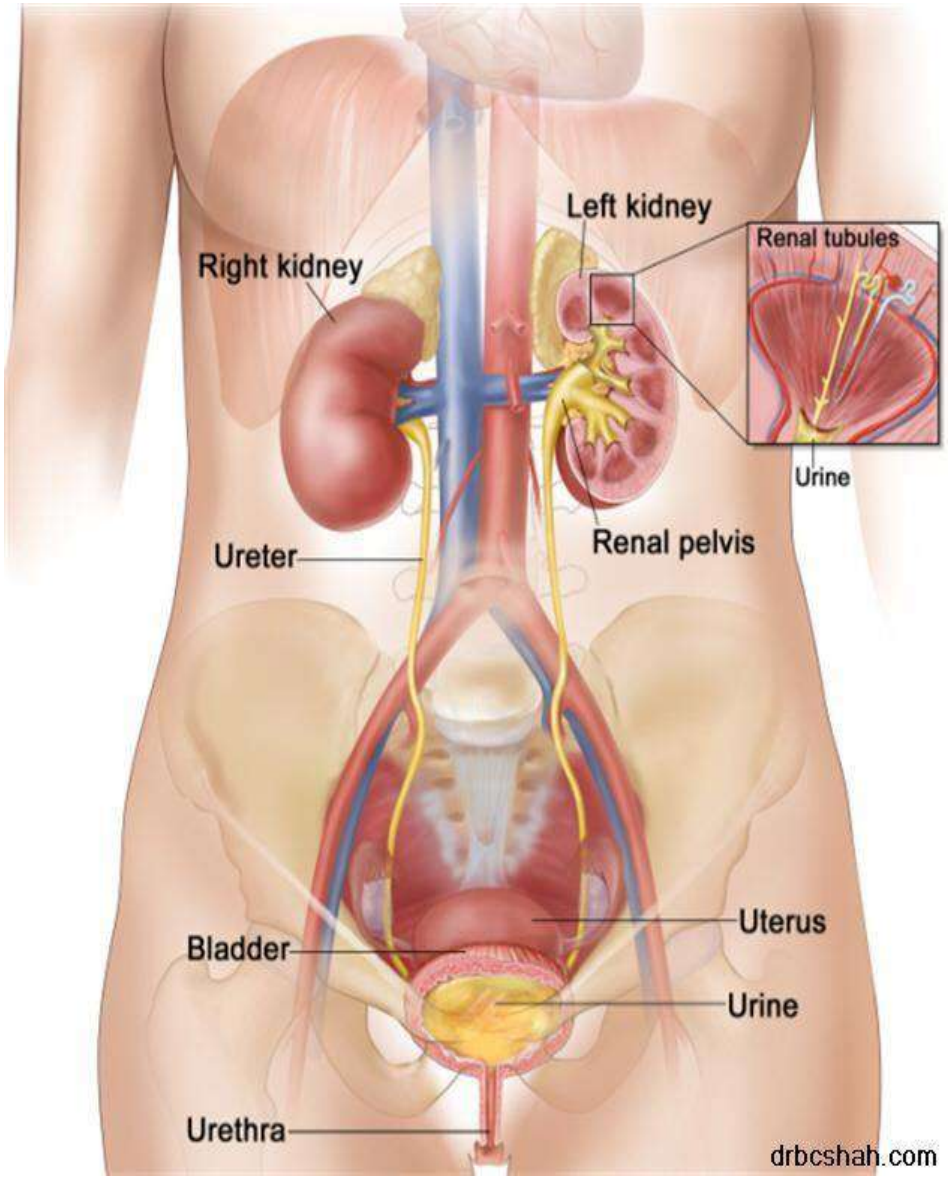
# Urinary system

Learning objectives

- The structure and the function of the urinary system
- The composition of urine
- Pathology of the urinary system

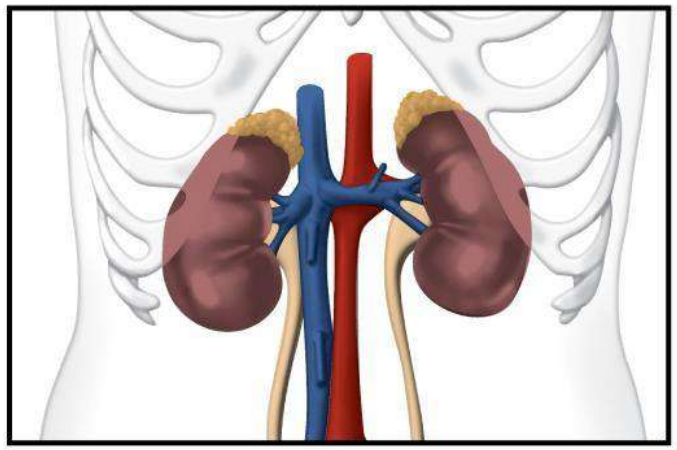
- **Functions of the urinary system**
  - To filter the blood and to remove the waste product
  - To regulate of the blood pressure
  - To regulate of blood pH

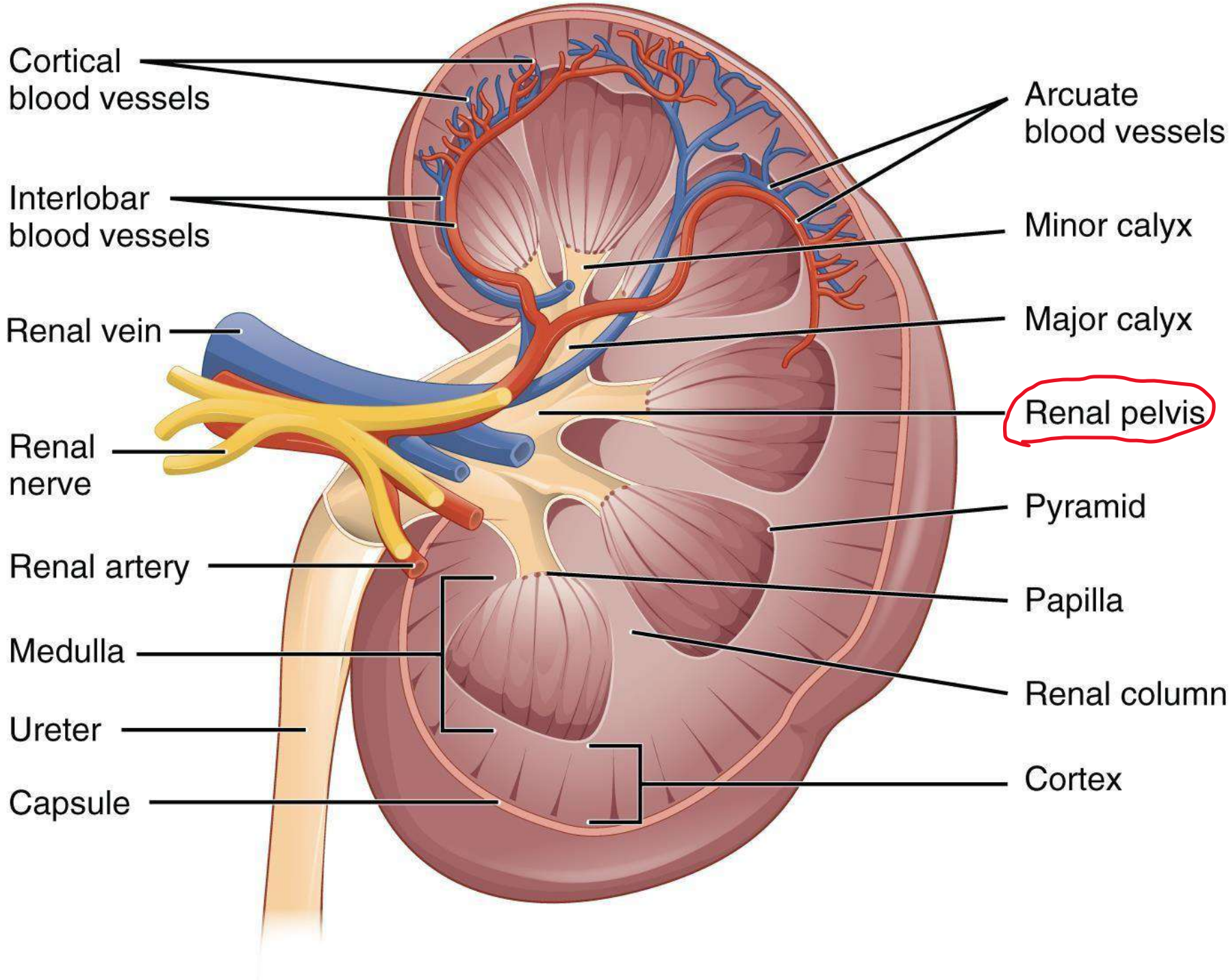
- **Structure:**
  - Kidney
  - Renal pelvis
  - Ureter
  - Urinary bladder
  - Urethra



# Kidney/ Ren

- Bean shaped organ, reddish colour
- 11 cm long
- Located at the posterior wall of the abdomen, either side of the spine
- Functional unit: nephron
- Two main parts:
  - Renal cortex
  - Renal medulla ( renal pelvis, hilium)
- Above each kidney sits: adrenal (suprarenal) gland




Cortical blood vessels
Interlobar blood vessels
Renal vein
Renal hilum
Renal nerve
Renal artery
Medulla
Ureter
Capsule
Arcuate blood vessels
Minor calyx
Major calyx
Renal pelvis
Pyramid
Papilla
Renal column
Cortex

# Nephron

- Nephron is the functional unit of the kidney
  - 1,000,000 nephrons in each kidney
  - 1300 ml of blood enters the kidneys every minute
  - 1299 ml of blood leaves the kidneys
  - 1 ml leaves as urine
- Structure:
- Renal corpuscle
  - Capillaries called glomerulus (water and other substanses pass to the capsula)
  - Bowman capsule (collection point for the waste product)
- Renal tubule
  - Proximal convoluted tubule (PCT)
  - Loop of Henle
  - Distal convoluted tubule (DCT)

# Functions

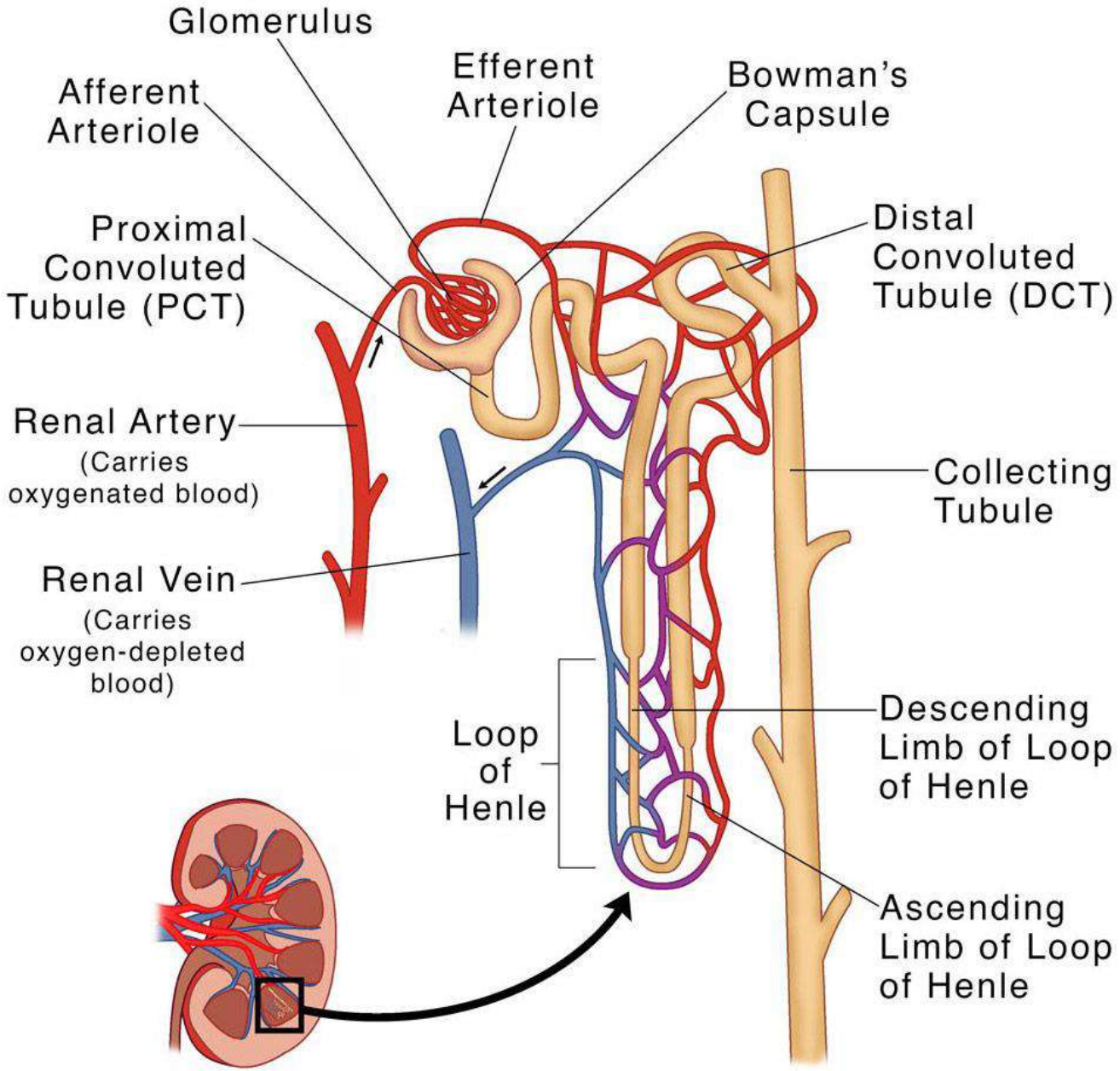
Three stages:

1. Filtration in Bowman capsula

2. Re-absorption

3. Collection in pelvic calyces

( calyses: cuplike extensions within the kedney in wich urine collects before it flows on into the ureter)



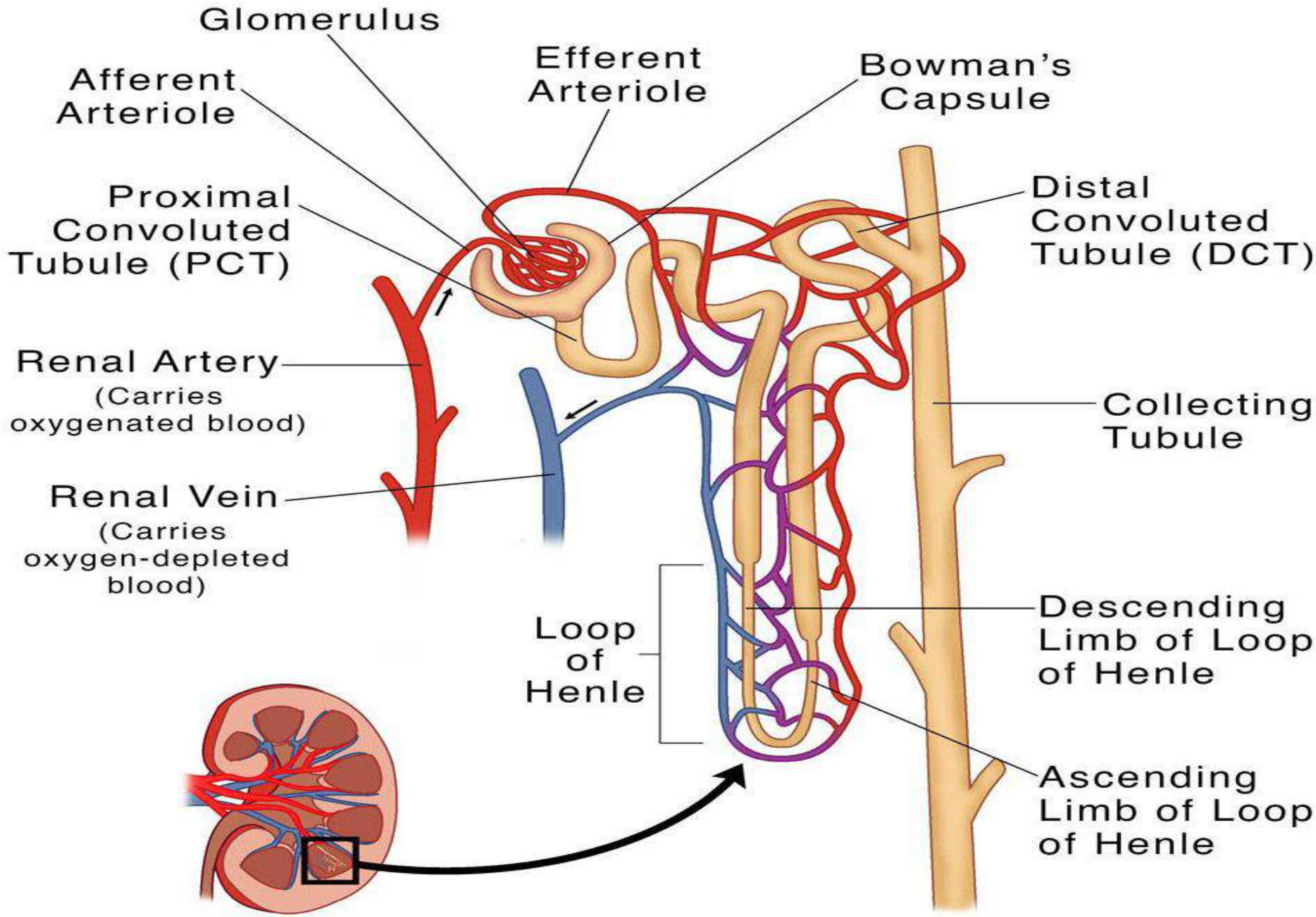
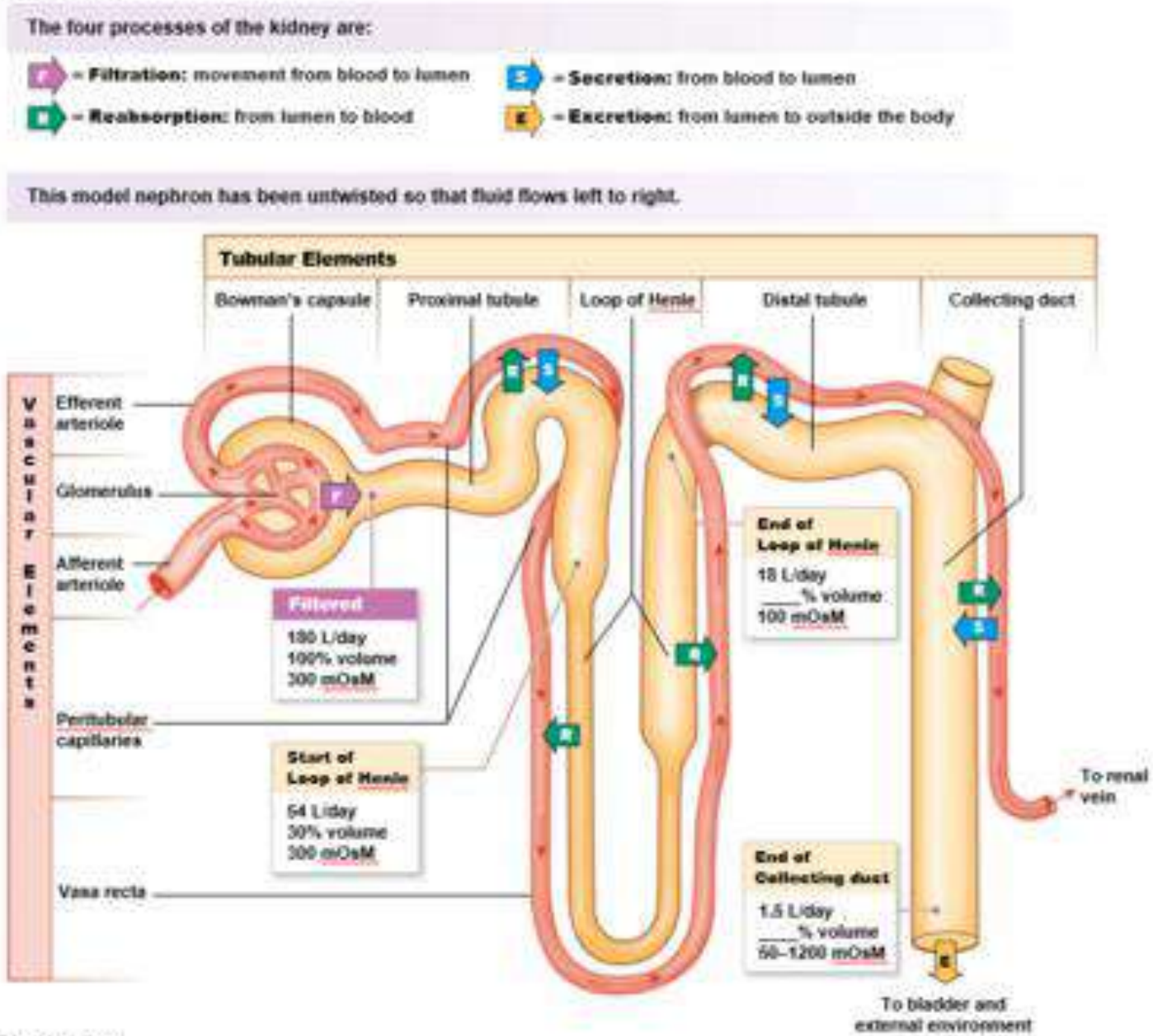

Glomerulus
Afferent Arteriole
Efferent Arteriole
Bowman's Capsule
Proximal Convoluted Tubule (PCT)
Distal Convoluted Tubule (DCT)
Renal Artery
(Carries oxygenated blood)
Collecting Tubule
Renal Vein
(Carries oxygen-depleted blood)
Loop of Henle
Descending Limb of Loop of Henle
Ascending Limb of Loop of Henle

Figure 19.2 Nephron Function

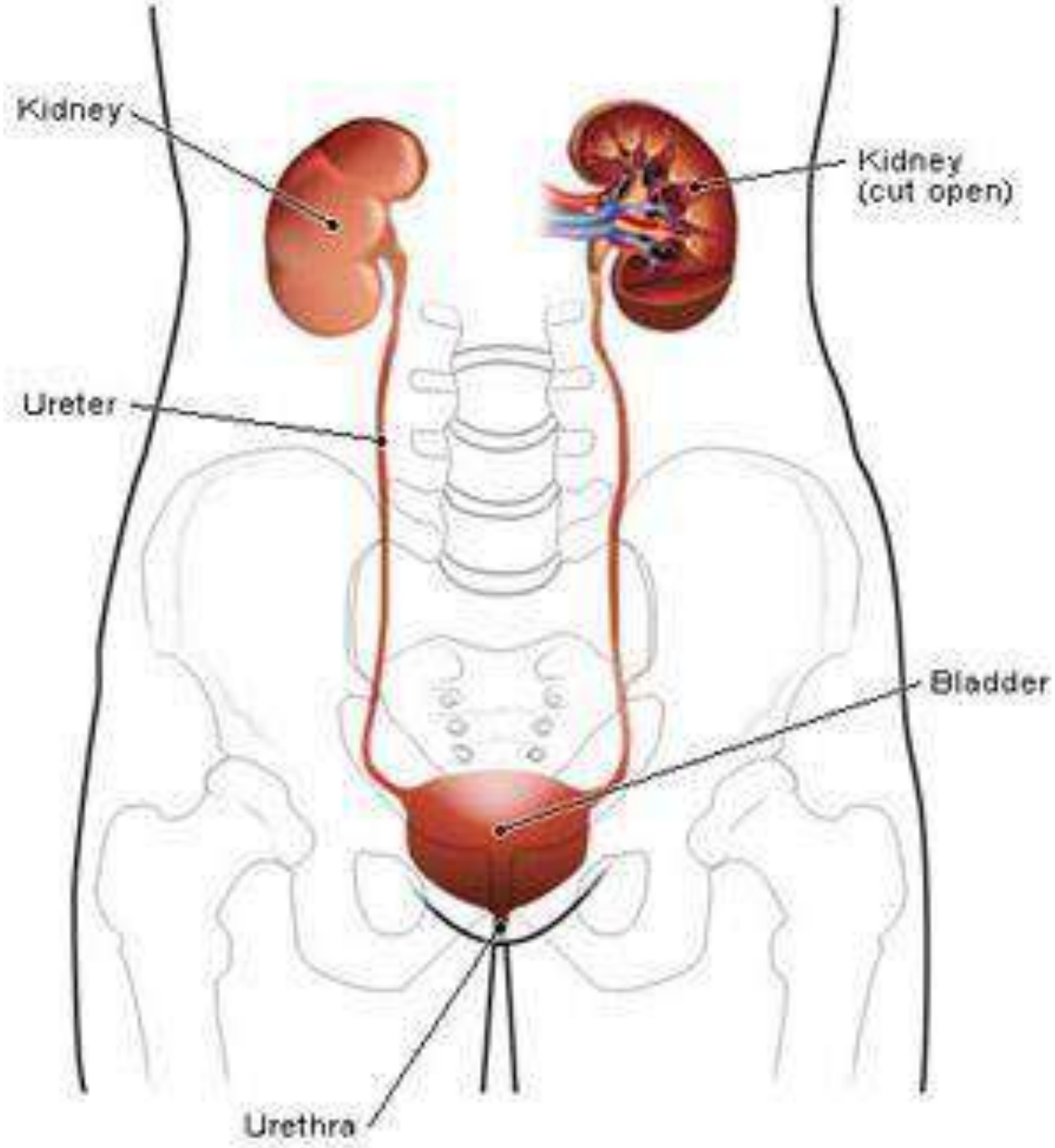





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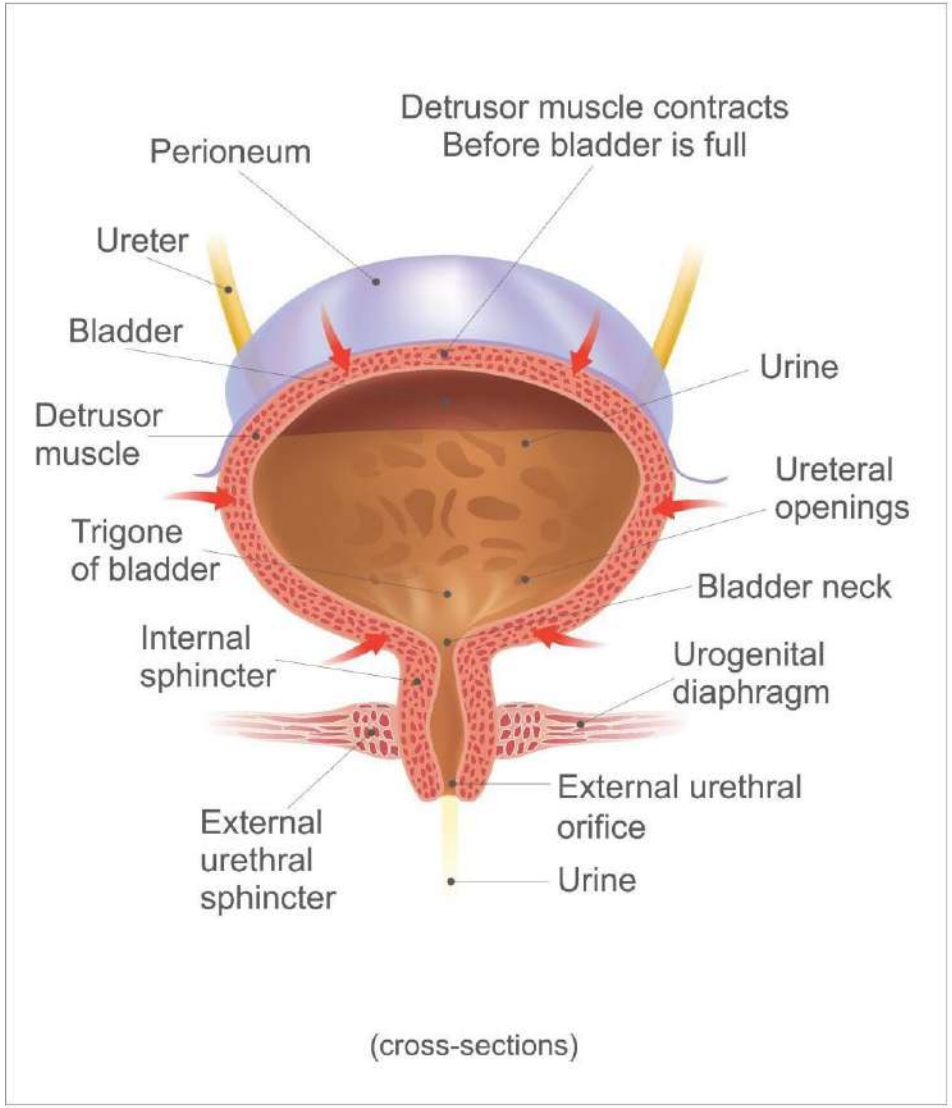
# Ureter

- Ureter:
  - 23-30 cm long,
  - 3-4 mm diameters tube
- Function:
  - Carry urine from kidney to the bladder via mechanical contraction
  - Stratified transitional epithelium tissue



# Bladder

- Hollow muscular organ, storing the urine
- Located behind the symphysis
- When 300-350ml urine is collected it stimulates the bladder's wall for  contraction
- Internal sphincter and bladder's wall opposite action
- Stratified transitional epithelium tissue



# Urethra

Narrow tube from the bladder to the outside of the body

External sphincter-voluntary controlled

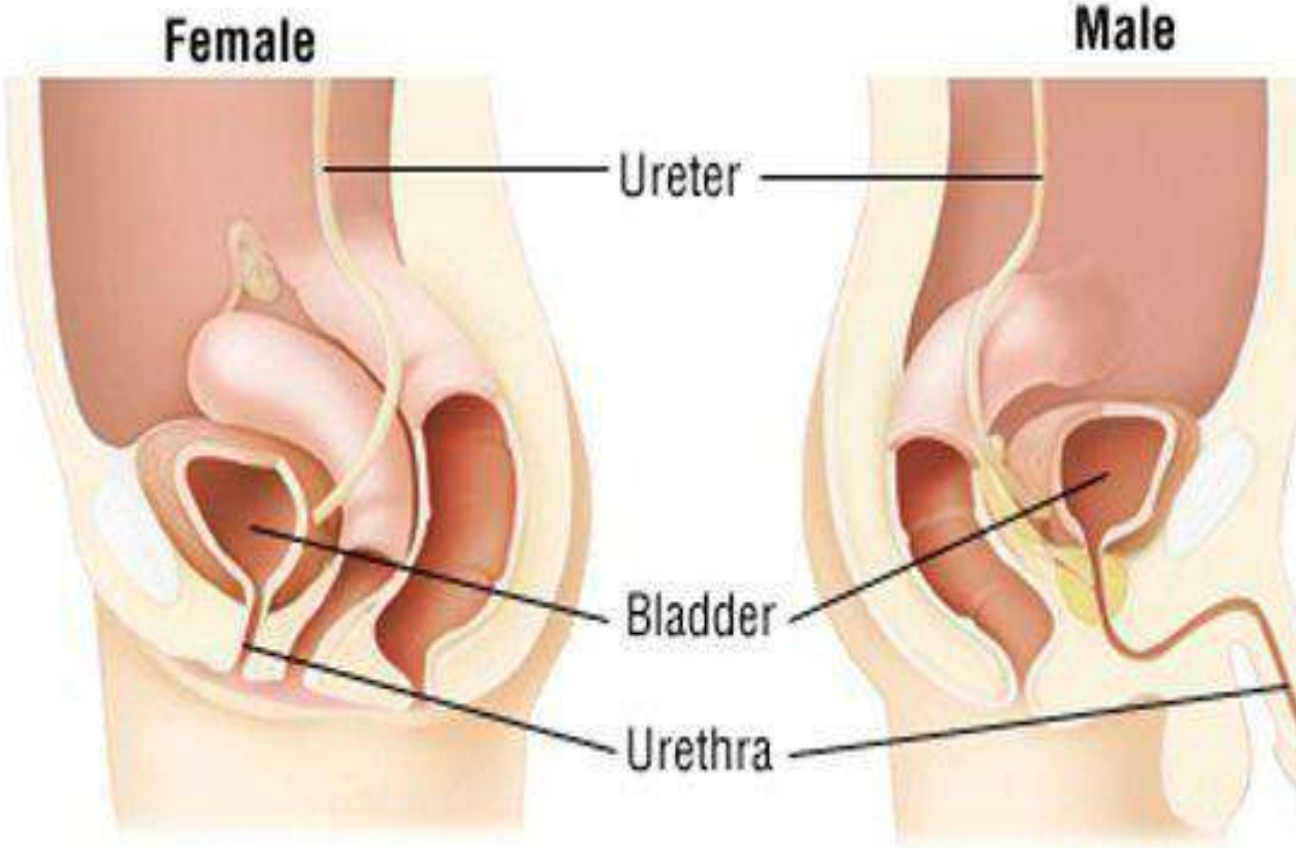
Take the urine from inside the body

Hystology:

columnar, transitional and squamous epithelium tissue

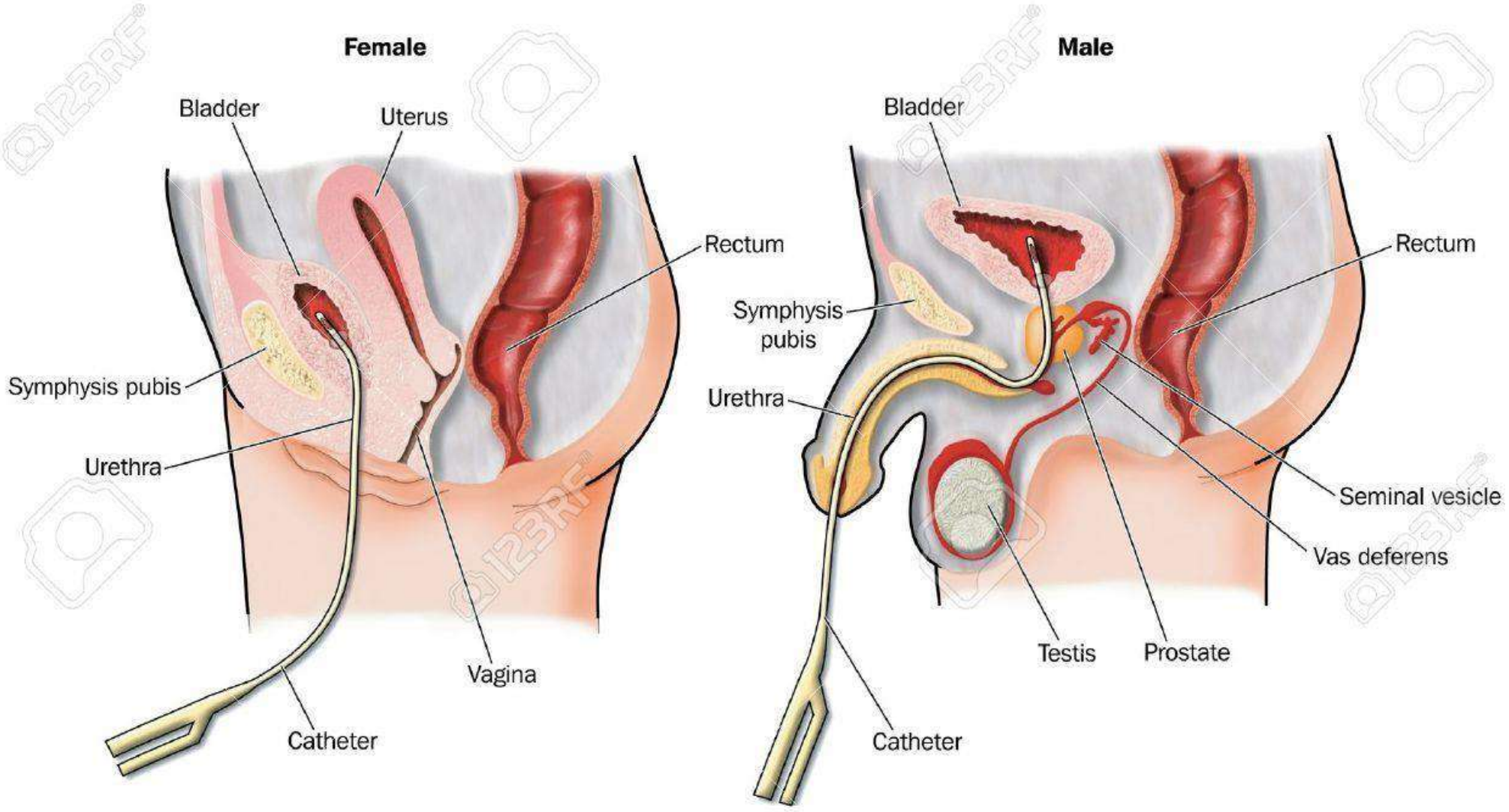
Females: 3-4 cm long

Male: 20 cm long



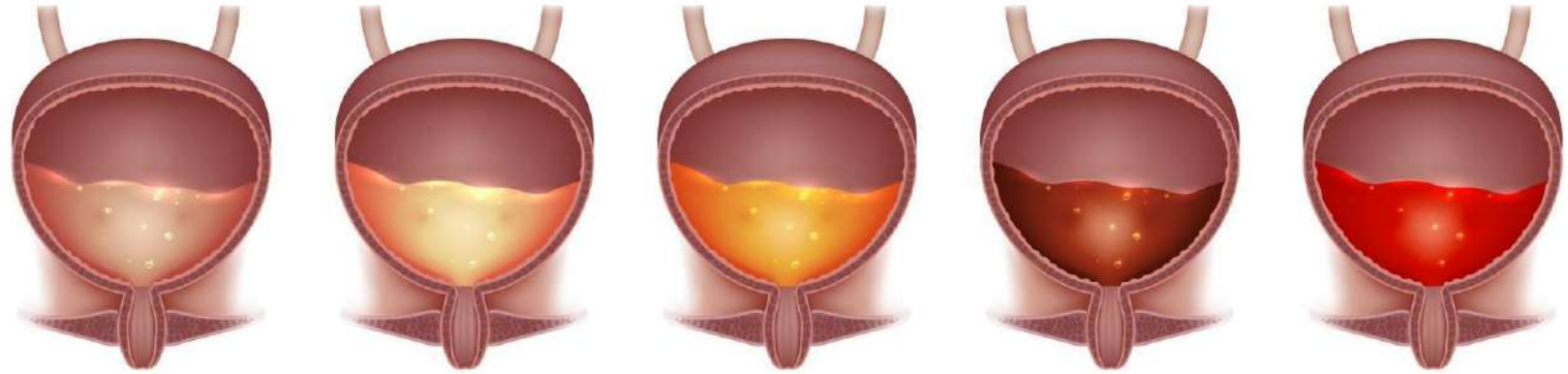

Compisition of urine:

- 96% water
- 2% urea
- 2% other substanses (ammonia, sodium,potassium, phosphates, chlorid, sulphates)


Female
Bladder
Uterus
Rectum
Symphysis pubis
Urethra
Vagina
Catheter
Male
Bladder
Rectum
Symphysis pubis
Urethra
Seminal vesicle
Vas deferens
Testis
Prostate
Catheter

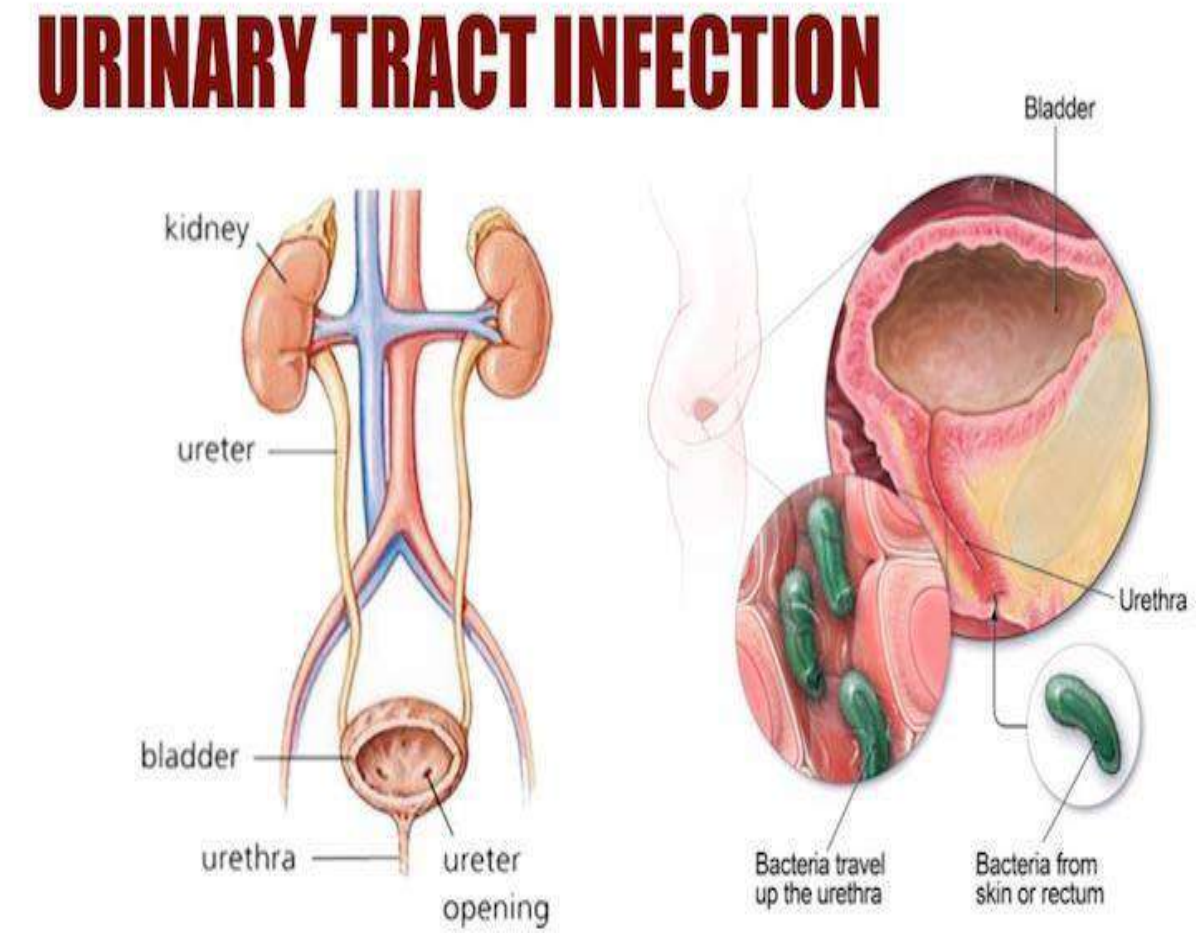


# URINE COLOR






# Pathology of urinary system




# Symptoms:

- Strong, pesistant urge to urinate
- Burning sensation when urinating
- Passing frequent, small amount of urine
- Urine that appears cloudy, red, cola coloured
- Strong smell of urine

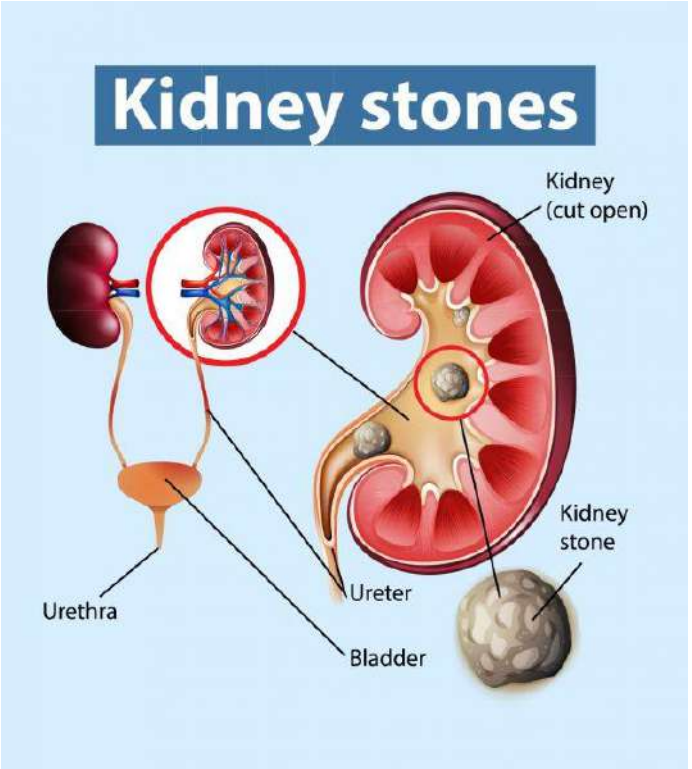
# Cystitis:

- Inflamation of the bladder
- Most of the time bacterial infection
- Burning sensation when urinating
- Passing frequent small amount of urine
- Blood in the urine
- Treatment: antibiotic



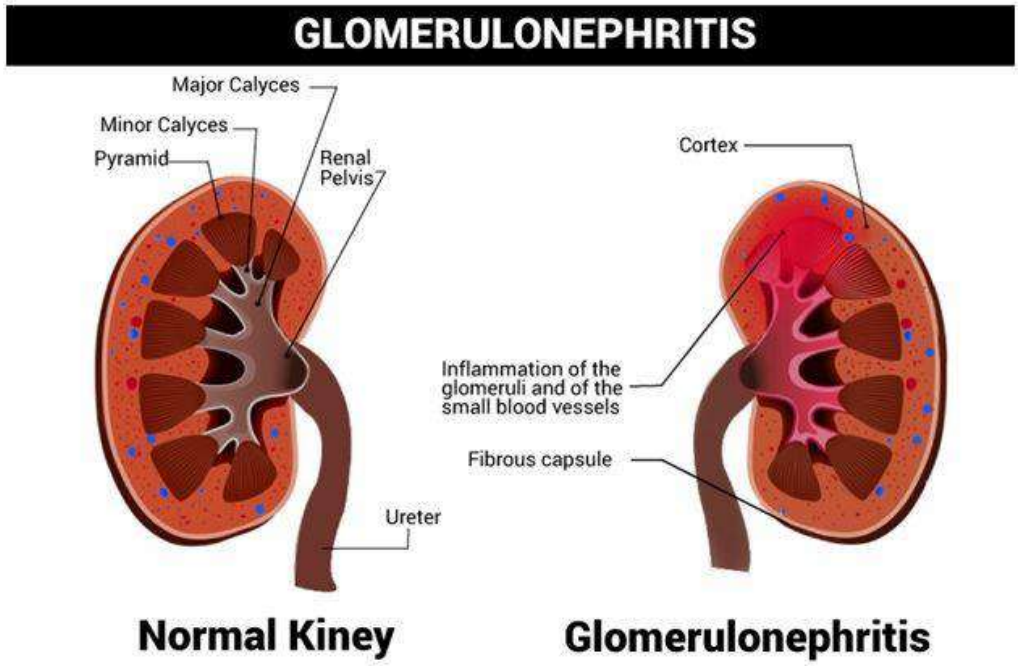

# Kidney stones:

- Hard deposits made of minerals and salts that form inside your kidneys
- Severe pain in the side and back  which can radiate to the lower abdomen
- Treatment:
  - Small stones won’t require invasive treatment
  - Large stone can be broken up by sound waves or removed surgecally



# Nephritis:

- Inflamation of the kidney
- Pink or cola-colored urine
- Foamy urine due to excess protein in urine
- Fluid retension ( edema)
- Causes: bacterial, virus or refer to another inflamatory disorder
- Prompt treatment is essentiol to avoid kidney failure
- Treatment depend on the cause




# Diabetes insipudis:

- Uncommon disorder that causes an inbalance of fluid in the body
- Impaired hormon (ADH) production by the pitutary gland
- Produces large amont of urine ( toxins become concentrated)
- Makes you thirsty all the time
- Need to get up to urinate during night

