

physiology  
lecture (10)  
part (1)

urinary system  
consists from

- two kidneys
- two ureters
- one urinary bladder
- one urethra

urinary system  
functions (most  
of them by the  
kidneys)

- Regulation of blood glucose level  
(amino acid glutamine in gluconeogenesis)
- altering blood composition  
(blood levels of several ions)
- pH(excrete a variable amount of hydrogen ions  
into the urine and conserve bicarbonate ions)
- volume, and pressure  
(eliminating water)(enzyme renin)
- maintaining blood osmolarity  
(loss of water and loss of solutes)  
(300mOsm/liter)
- excreting wastes and foreign substances
- producing hormones  
(Calcitriol, the active form of vitamin D)  
(erythropoietin, red blood cells)

**Nephrology** : the scientific study of the anatomy, physiology, and pathology of the kidneys .

**urology** :branch of medicine that deals with the male and female urinary systems and the male reproductive system

**urologist** : physician who specializes in this branch of medicine

kidneys filtered

→ The remaining water and solutes constitute urine → passes through the ureters → stored in the urinary bladder

return most of the water and solutes to the bloodstream

The remaining water and solutes constitute urine → passes through the ureters

d → passes through the ureters

stored in the urinary bladder

excreted from the body through the urethra

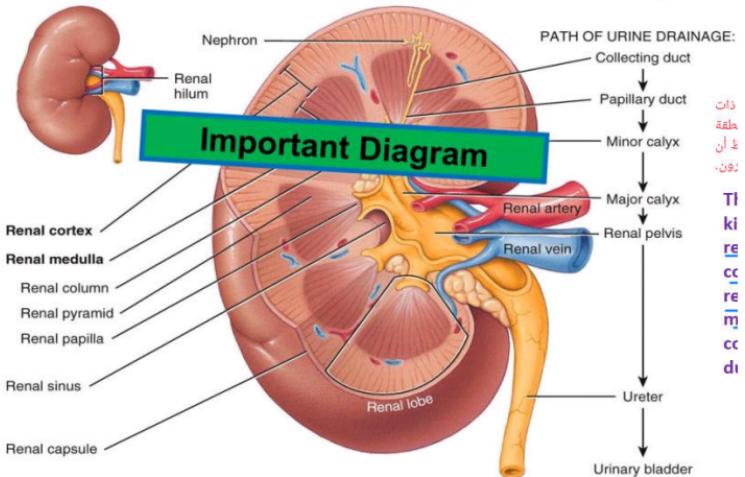
two regions  
of the kidney

superficial, light red region  $\rightarrow$  renal cortex

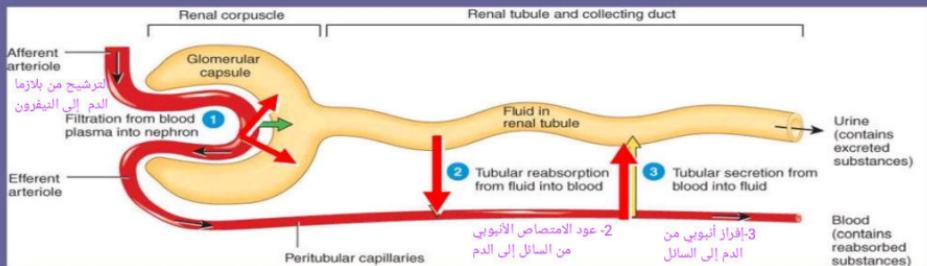
deep, dark red region  $\rightarrow$  renal medulla

collecting duct and papillary duct are not part of a nephron

### Figure 26.3 Internal Anatomy of the Kidneys



# Overview of Renal Physiology



- Glomerular filtration of plasma
- Tubular reabsorption
- Tubular secretion

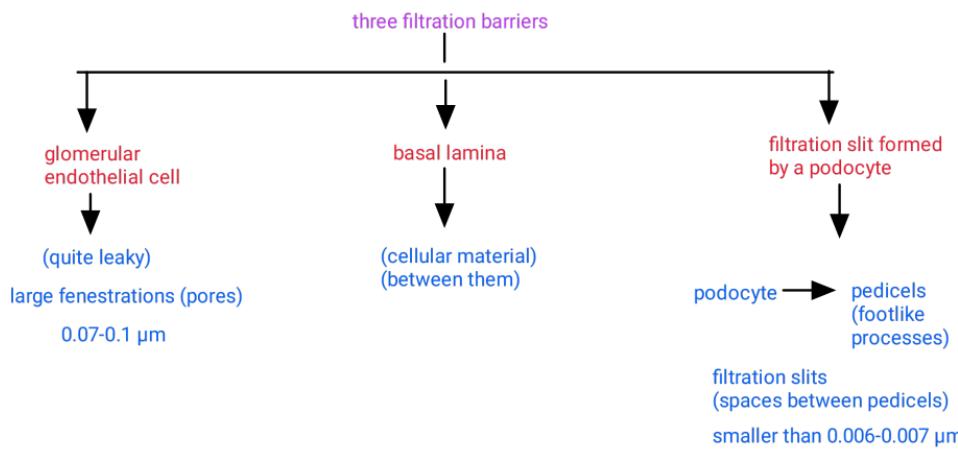
Glomerular filtration occurs in the renal corpuscle. Tubular reabsorption and tubular secretion occur all along the renal tubule and collecting duct.

glomerular filtrate: The fluid that enters the capsular space .

filtration fraction : The fraction of blood plasma in the afferent arterioles of the kidneys that becomes glomerular filtrate

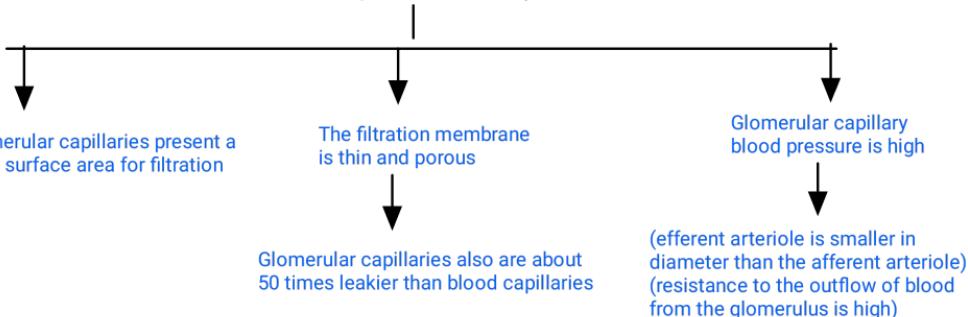
daily volume of glomerular filtrate  
 150L in females  
 180L in males

the filtration membrane (leaky barrier):  
 glomerular capillaries + podocytes



including water, glucose, vitamins, amino acids, very small plasma proteins, ammonia, urea, and ions.

the volume of fluid filtered by the renal corpuscle is much larger than in other blood capillaries of the body for three reasons



#### Glomerular filtration :

