SNS COLLEGE OF PHYSIOTHERAPY

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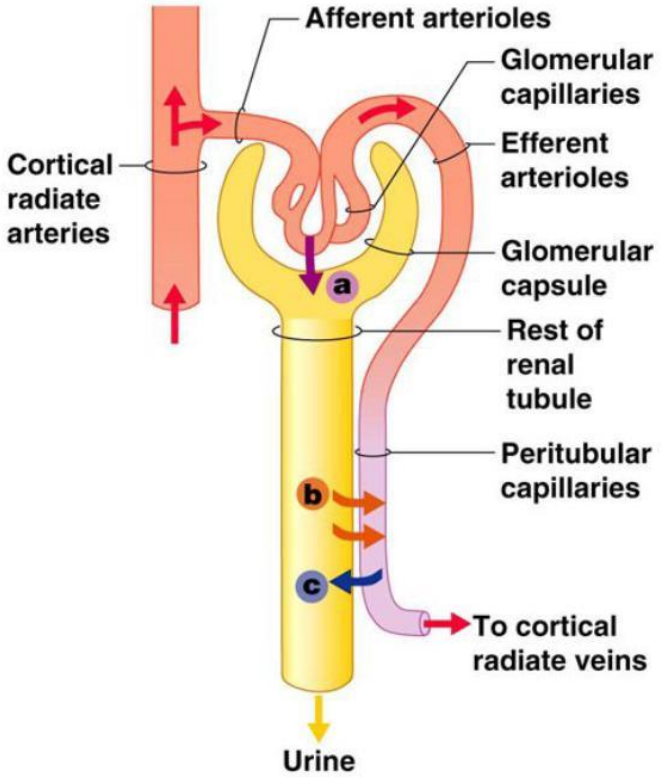
COURSE NAME: PHYSIOLOGY

SUBJECT CODE: 6281

TOPIC: FORMATION OF URIN AND MICTURITION

Introduction

- Kidneys are the main organs of the excretory system.
- They remove metabolic waste products from the blood.
- Help in maintaining water balance and electrolyte balance.
- Regulate acid–base balance of the body.
- Urine formation occurs in microscopic units called nephrons.



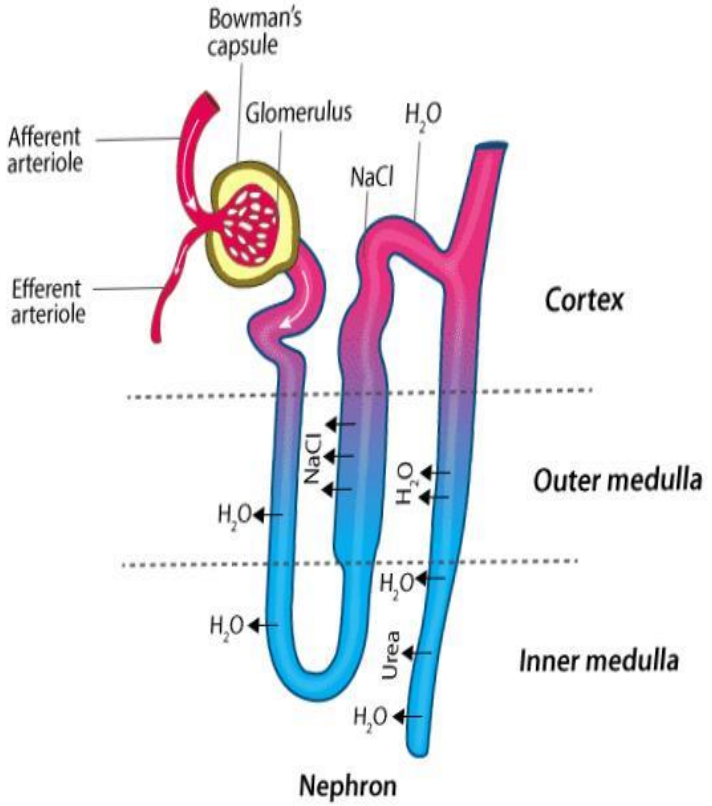
Nephron

- Nephron – Functional Unit of Kidney.
- Each kidney contains about 1 million nephrons.
- Nephron has two main parts:

  1.Glomerulus Renal,

  2.Tubule Renal tubule consists of;

- Proximal Convoluted Tubule (PCT)Loop of He
- Distal Convoluted Tubule (DCT)Collecting duc..



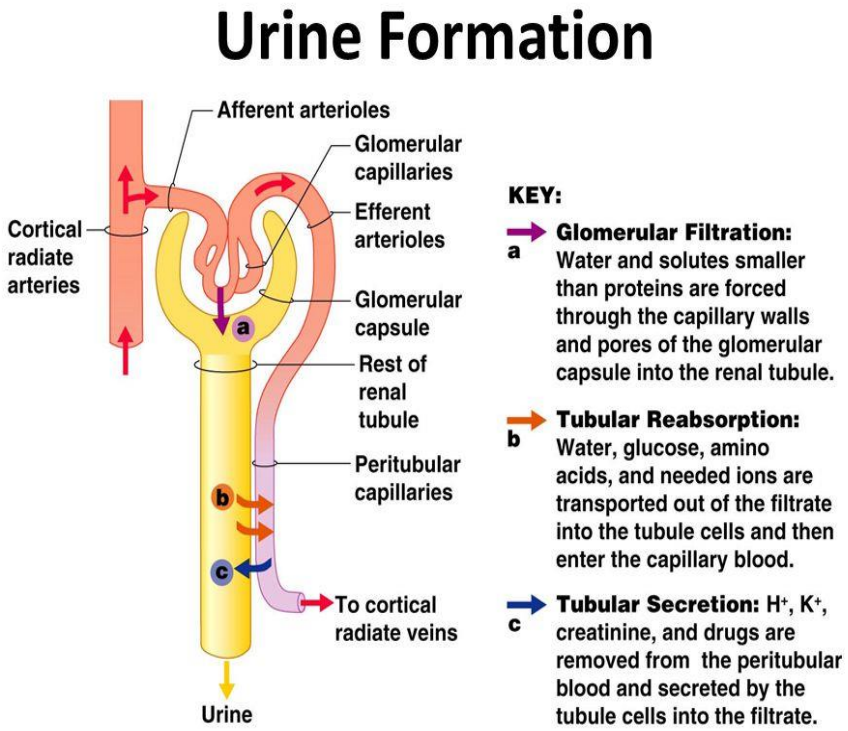
Formation of urine

- Urine formation occurs in three major steps:

  1. Glomerular Filtration
  2. Tubular Reabsorption
  3. Tubular Secretion

- These processes occur continuously in the kidneys.

- They help in removal of wastes and conservation of useful substances.

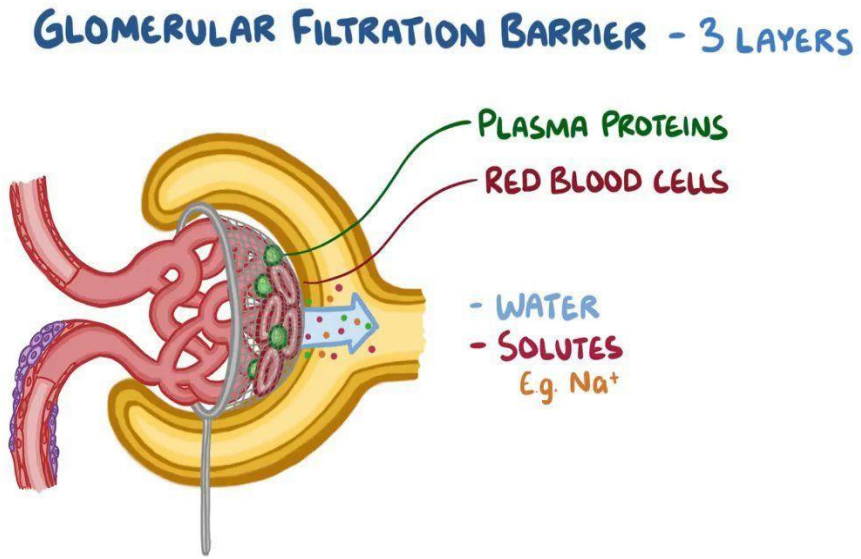


Glomerular Filtration

- First step of urine formation.
- Occurs in the glomerulus.
- High blood pressure forces blood plasma into Bowman's capsule.
- The fluid formed is called glomerular filtrate.
- Filtrate contains:

Water
Glucose
Amino acids
Salts
Urea

- Blood cells and plasma proteins are not filtered.



Tubular Reabsorption

- Useful substances are reabsorbed back into the blood.
- Mainly occurs in the Proximal Convoluted Tubule (PCT).
- Substances reabsorbed:
  - Glucose (completely)
  - Amino acids
  - Water
  - Sodium and chloride ions.
- Reabsorption occurs by:
  - Active transport,
  - Passive transport.

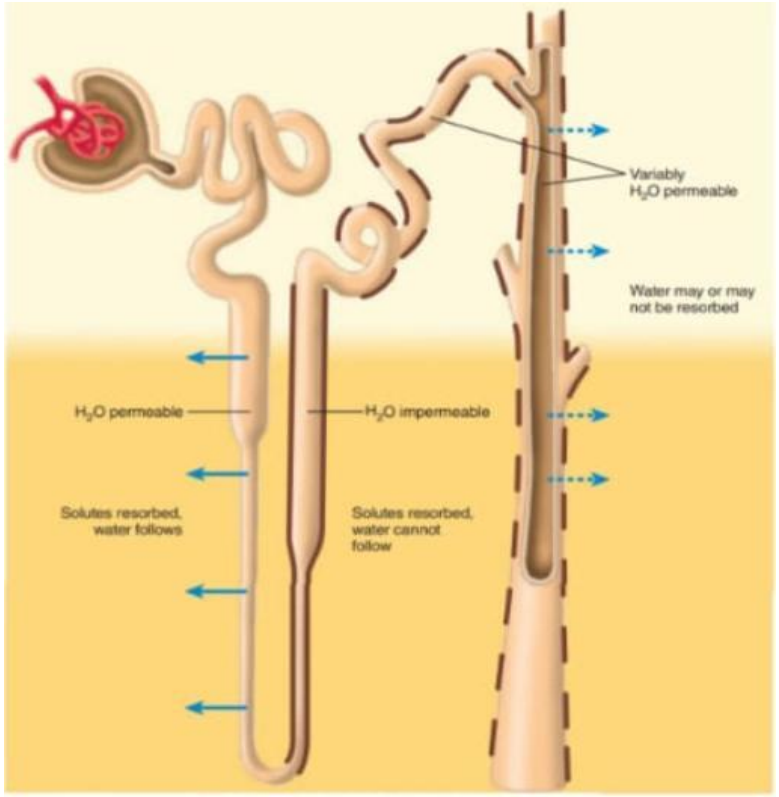
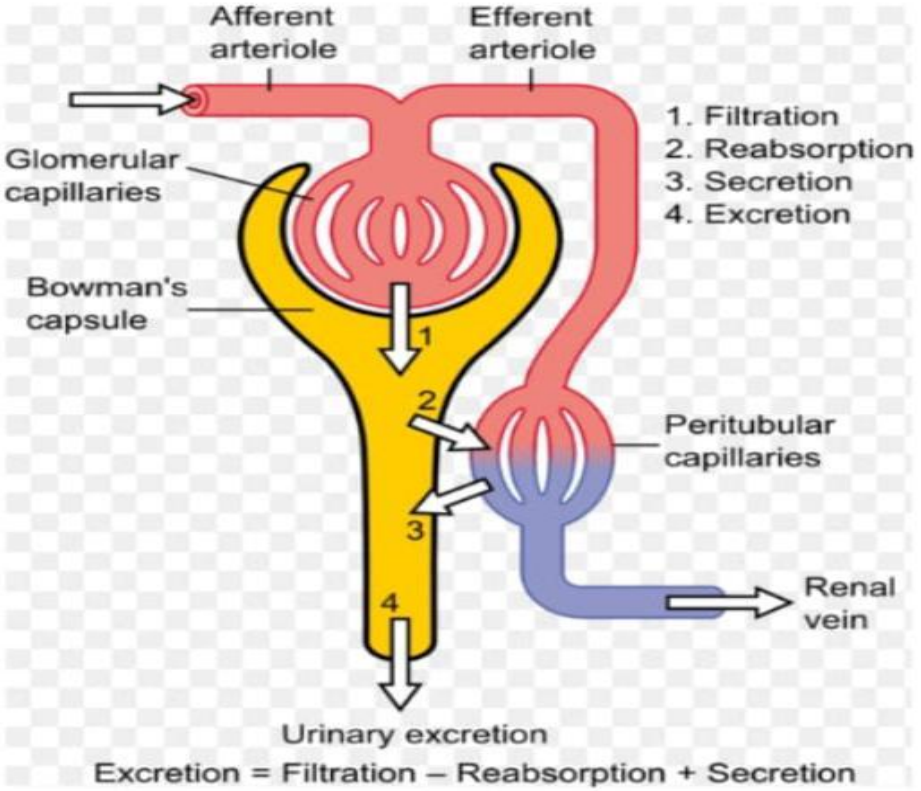


FIGURE 22-8 Tubular reabsorption of water.

Tubular Secretion

- Transfer of substances from blood into the renal tubule.
- Mainly occurs in DCT and collecting duct.
- Substances secreted:
  - Hydrogen ions
  - Potassium ions
  - Ammonia
  - Drugs and toxins.
- Helps in maintaining:
  - Acid–base balance
  - Ionic balance of blood.



Composition of urine

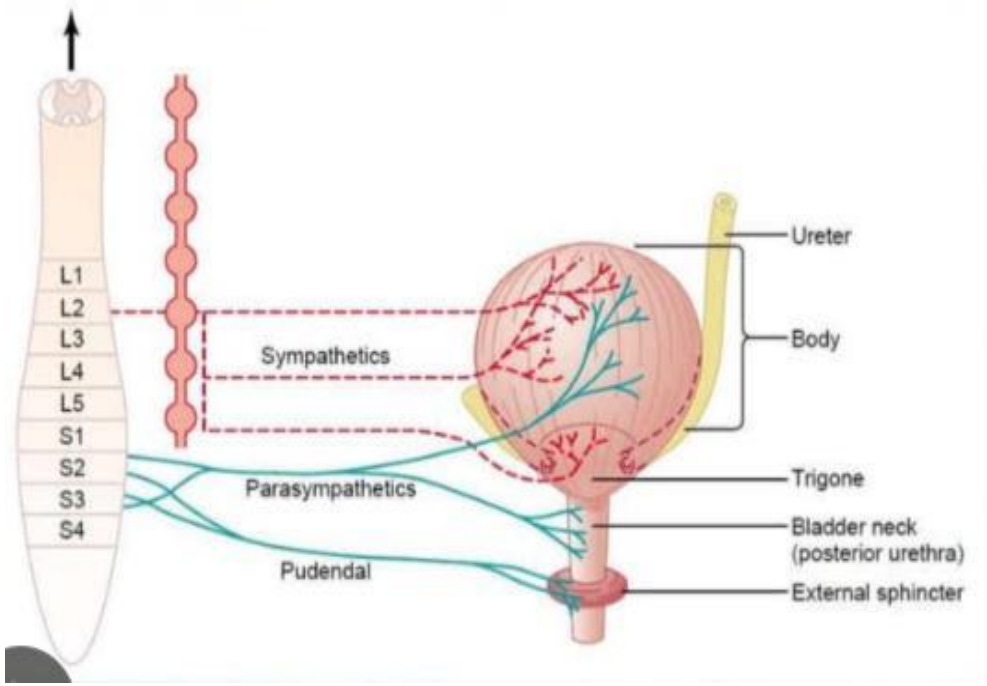
- Urine consists of:
  - 95% water
  - 5% dissolved substances
- Dissolved substances include:
  - Urea
  - Uric acid
  - Creatinine
  - Excess salts
- Normal urine color is pale yellow.

Composition of Normal Urine

Constituents	Amount present
Water	95%
Urea	9.3 to 23.3 gram/liter
Chloride	1.87 to 8.4 gram/liter
Sodium	1.17 to 4.39 gram/liter
Potassium	0.750 to 2.61 gram/liter
Creatinine	0.670 to 2.15 gram/liter
Sulfur	0.163 to 1.80 gram/liter

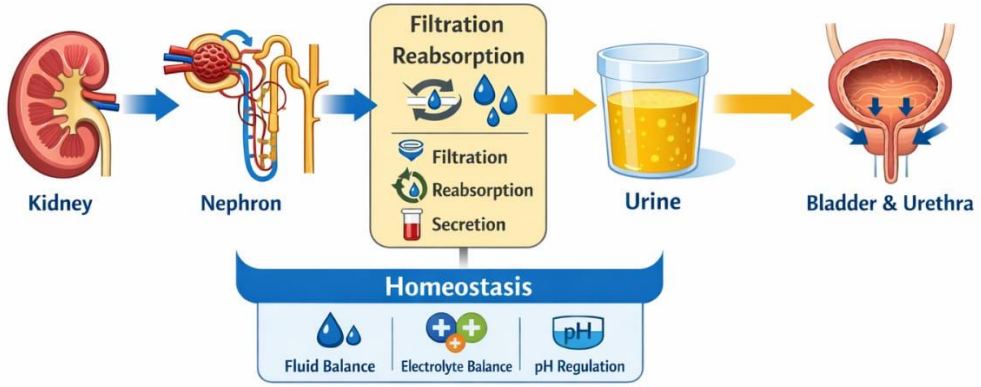
Micturition

- Micturition is the process of expelling urine from the urinary bladder.
- Urine is temporarily stored in the bladder.
- Stretch receptors in bladder wall get stimulated.
- This initiates the micturition reflex.
- Involves contraction of bladder muscles and relaxation of sphincters.
- Voluntary control in adults; involuntary in infants.



Summary

- Urine formation includes filtration, reabsorption, and secretion.
- Nephrons play a key role in kidney function.
- Micturition helps eliminate urine from the body.
- These processes are essential for maintaining homeostasis.



Thank you