

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

PHYSIOLOGY **PRESENTATION**

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TOPIC NAME :

NEPHRON

INTRODUCTION TO NEPHRON

DEFINATION :

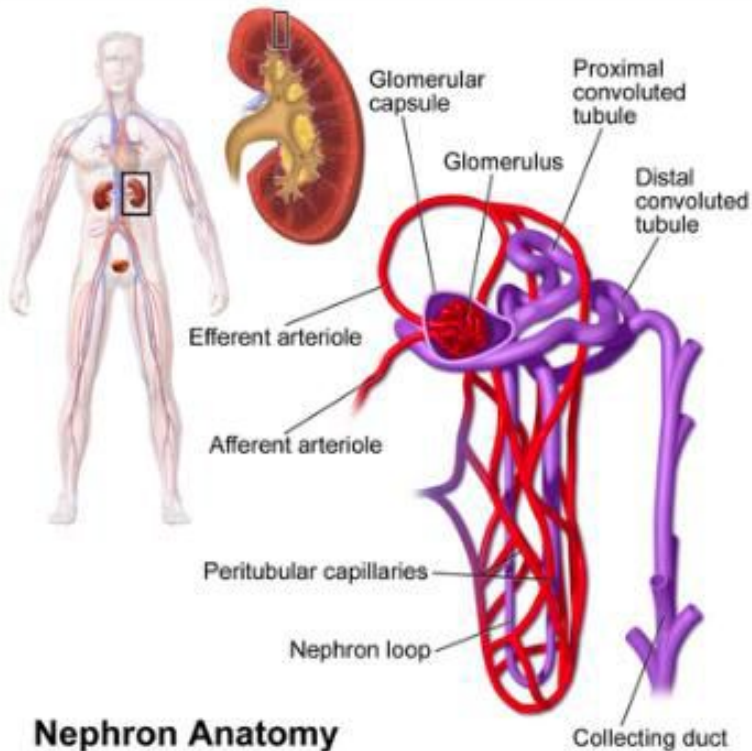
A nephron is the basic structural and functional unit of the kidney. The word nephron is derived from the Greek word – nephros, meaning kidney. There are about millions of nephrons in each human kidney.

- The nephron's primary function is to filter blood, remove waste products, and maintain the body's fluid balance.

KEY COMPONENTS

1. Renal Corpuscle:

- Glomerulus: A network of blood capillaries.
- Bowman's Capsule: Collects the filtered fluid.

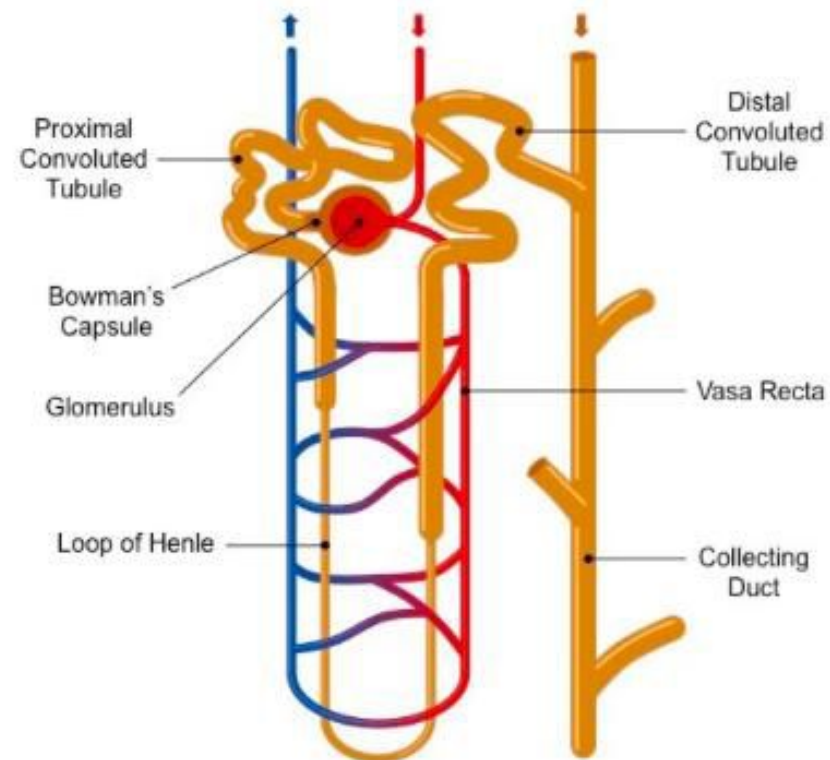


Nephron Anatomy

STRUCTURE OF NEPHRON

OVERVIEW ABOUT NEPHRON COMPONENTS

- **Glomerulus**
- **Bowman's capsule**
- **Proximal convoluted tubule**
 - **Loop of Henle**
- **Distal convoluted tubule**
 - **Collecting duct**



BOWMAN CAPSULE

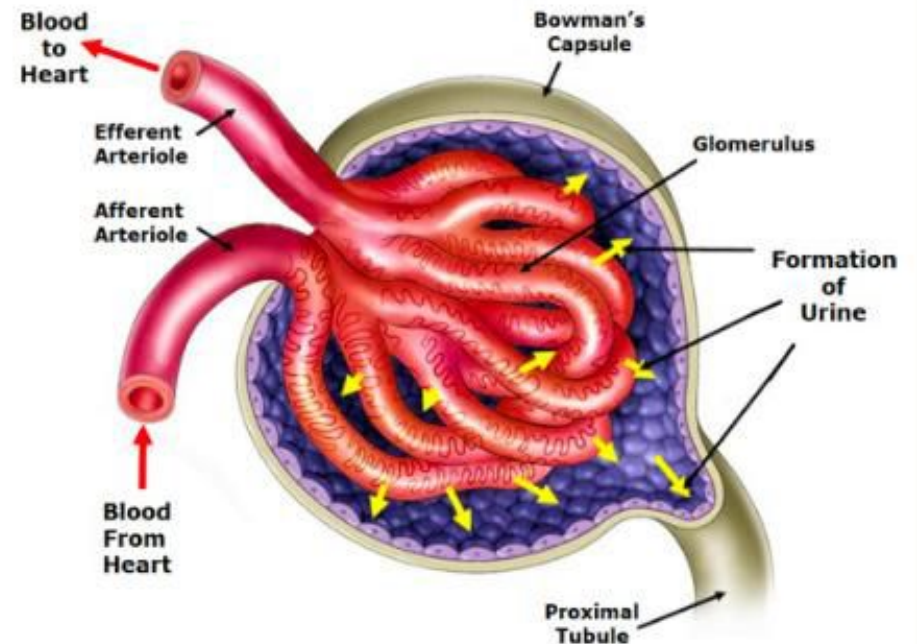
The Bowman's capsule (also called the glomerular capsule), is the beginning of a nephron.

GLOMERULUS

A network of capillaries inside the Bowman's capsule
Blood filtration occurs here

PROXIMAL CONVOLUTED TUBE

First segment of the tubule
Reabsorption of water, ions, glucose, and amino acids



LOOP OF HENLE

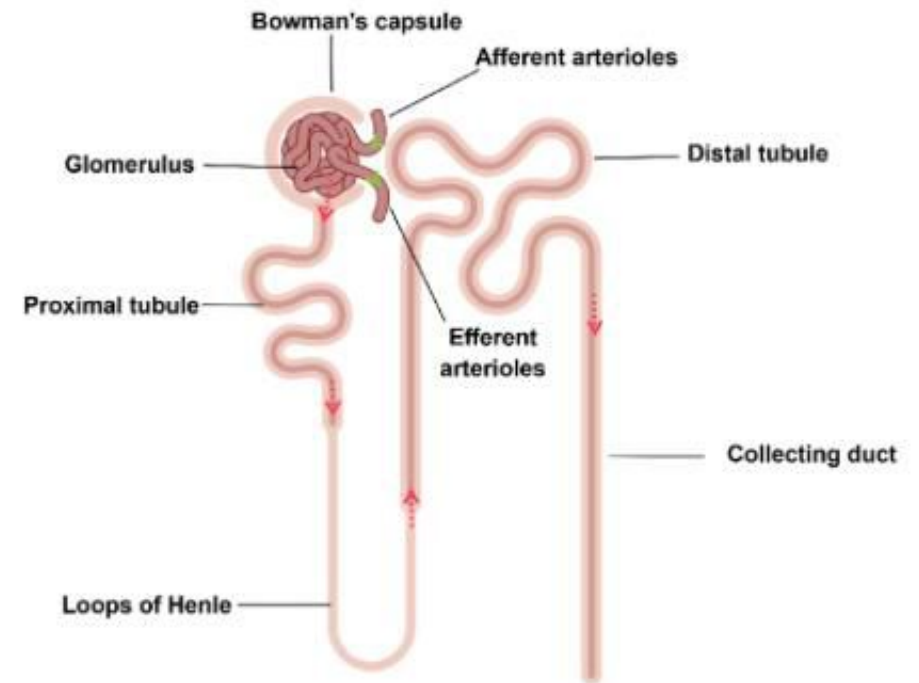
Consists of descending and ascending limbs

DISTAL CONVULATED TUBULE

Further reabsorption and secretion of ions
Helps maintain electrolyte balance

COLLECTING DUCT

Collects urine from multiple nephrons
Final reabsorption of water and ions
before excretion



FUNCTIONS OF NEPHRON

The following functions of nephron;

1. Filtration
2. Reabsorption
3. Secretion
4. Urine Concentration
5. Excretion

Purpose:

Maintains homeostasis (fluid balance,
electrolyte levels, waste removal)

Filtration in the Glomerulus

• *Location:*

Glomerulus (inside Bowman's Capsule)

• *Process:*

- > Blood enters through the afferent arteriole and passes through the glomerular capillaries.
 - > Small molecules (water, glucose, salts, urea) pass into Bowman's capsule.
 - > Larger molecules (proteins, blood cells) are retained in the blood.

Reabsorption in the Proximal Convolute Tubule (PCT)

LOCATION:

Proximal Convolute Tubule (PCT)

PROCESS:

Majority of water, glucose, amino acids, and electrolytes (Na⁺, K⁺, Cl⁻) are reabsorbed back into the bloodstream.

- Key for maintaining energy and fluid balance.
- Result: Most filtered substances are reclaimed.

Secretion and Further Reabsorption in the DCT and Loop of Henle

location:

collecting duct

Process:

- Reabsorbs water based on ADH (antidiuretic hormone) levels, concentrating urine.
- Excretion: Remaining filtrate (urine) is collected and excreted via the renal pelvis, ureter, and bladder.
- Result: Final product is concentrated urine, with excess waste and water excreted from the body.

Urine Concentration & Excretion in **Collecting Duct**

Location:

Loop of Henle, Distal Convoluted Tubule (DCT)

Process:

- **Loop of Henle: Establishes osmotic gradient in the kidney for water reabsorption.**
 - **DCT: Fine-tunes ion balance (Na^+ , K^+ , H^+).**
- **Secretion: Waste products (e.g., hydrogen ions, potassium, urea) are secreted from the blood into the filtrate.**

Conclusion

The Nephron's Role in Homeostasis

- **The nephron is essential for maintaining the body's fluid, electrolyte, and waste balance.**
- **Through filtration, reabsorption, secretion, and urine concentration, it ensures proper excretion of waste while retaining vital substances.**
- **Proper nephron function is crucial for overall kidney health and systemic homeostasis.**

Thank you very much!

CREATED BY FIZA JAMIL