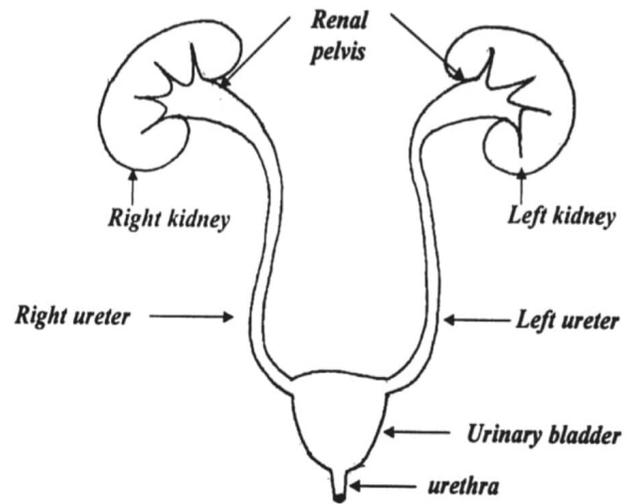


the topic of this lecture :

an overview on the renal system .

components of the urinary system :

1. two kidneys.
2. two ureters .
3. one bladder .
4. one urethra .



the location of the kidneys :

abdominal region (posterior abdominal cavity)

kidney is paired organ

- kidney receive blood from the renal artery → directly from the aorta.
- * renal artery is direct branch from aorta*
- blood exits kidneys through the renal vein → inferior vena cava

urine is formed in the kidneys → ureters → bladder → urethra → excretion

* If we look **a section of the kidney** we will see:

- 1) cortex (قشرة)
- 2) medulla (نخاع) → it has something called renal pyramids , urine exist the kidney through the apex of these pyramids to **pelvi uteric calyces**

function and structural unit of the kidney → **nephron**

* structure of the nephron

1) glomerulus → group of capillaries

2) bowman capsule

* cup shaped structure that has two wall :

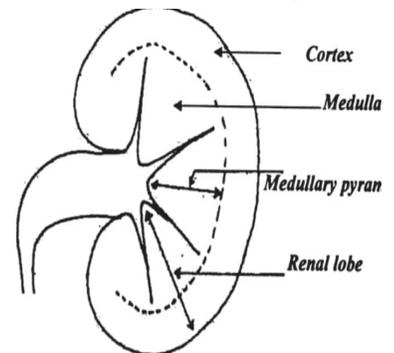
inner wall covering the glomerulus and the outer wall

* type of the cell in it → simple squamous epithelium

3) proximal convoluted tubule

* length → 15 mm

* type of cell → simple long cuboidal



* it has **microvilli** on its outer surface which increase the surface area to increase absorption.

note microvilli : finger like projection (brush like sheet)

* at the **basal border** it has multiple **mitochondria** → production of **ATP** active transport for molecules

4) loop of the Henle

* **U** shaped

* **2-14** mm

* it has a thin descending part (type of the cell in it is → flat epithelium)

* it has a thick ascending part (the base of it is thin with flat cell) , the thick part has cuboidal cell

classification of the nephron based on location (depth) :

1) cortical nephron :

- its entire structure is in the cortex except for the loop of HENLE (too short (that penetrates only a short distance in the outer medulla .

- it makes about 85% from the entire percentage of nephron in the kidney.

- its function is :

a) urine formation

b) blood filtration

2) medullary nephron

- the loop of **Henle** is in the medulla .

- it makes 10 %

- its function is to :

a) concentrate urine .

b) form urine .

5) distal convoluted tubule :

* length 5mm

* type of cell : low cuboidal → to adapt to its function (reabsorption process gets lower by moving forward through the nephron , so we don't need long cuboidal epithelium anymore .

*its epithelium is lower than that in the proximal tubules and has fewer microvilli

It has two part

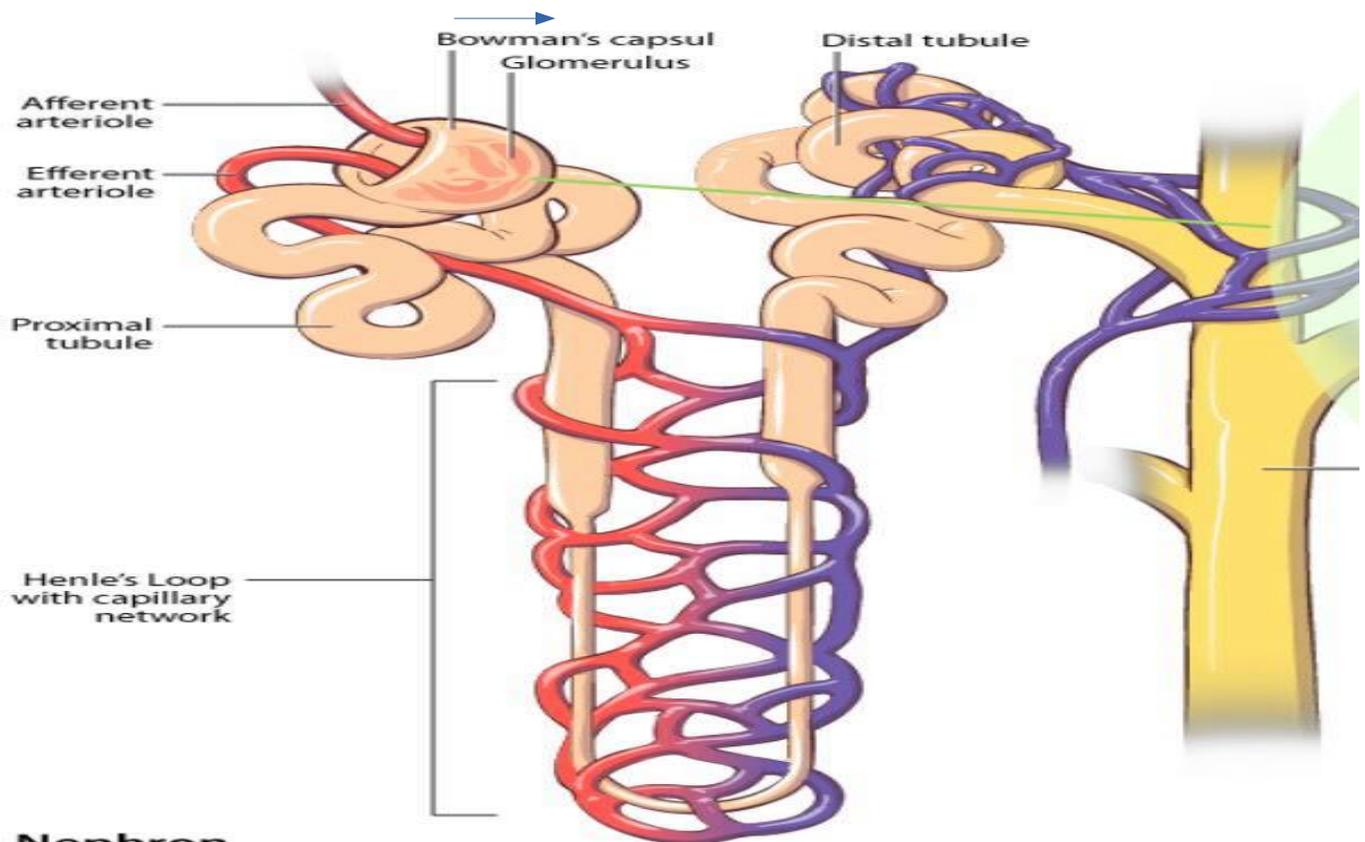
- 1) first half → similar to the one before it (thick part of loop of henle) in structure and function
 - ↳ it 's called → diluting segment of distal tubule.
- 2) second half → similar to one after it
 - ↳ it's called → late distal tubule

6) collecting duct

- length → 20 mm
- function → collecting urine

#this part needs a bit imagination #

The loop of the **Henle** isn't actually (**U** shaped)
it's twisted in a way that the distal convoluted tubule is close to **bowman's capsule**. / loop of henle (مش نازل مفرد کده)



Nephron

Basic functional and structural unit of the kidney

** the point where the afferent and efferent arterioles meet with a part of distal convoluted tubule is called **juxta glomerular apparatus.**

- we also have cell called Juxta glomerular cell (**Jg cells**)
- it controls and measures the osmolarity of urine

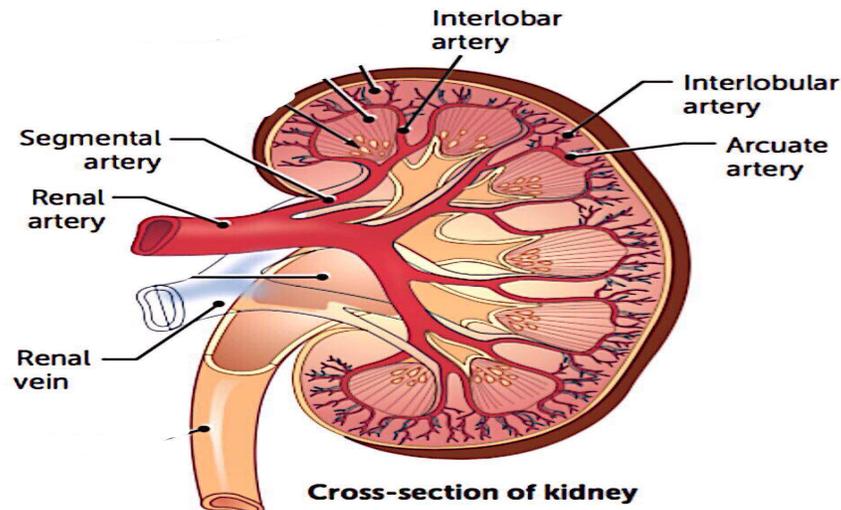
#IF the osmolarity is really high → concentrated urine.

IF the osmolarity is really low → diluted urine.

There will be modification , so the (**J G A**) will control urine concentration based on the needs of the body

Blood supply of the kidney

renal artery → segmental artery → inter lobar artery → inter lobular artery → arcuate arterie → afferent and efferent arterioles → glomerular capillaries



afferent arteriole → glomerular capillaries → efferent arteriole → peri tubular capillaries → efferent venioles .

- glomerular capillaries → toward the aterial end
- peri tubular capillaries → toward the veniole end

**25% of cardiac output go to the kidney to be filtered

* **pressure** of the blood in the **artery** is greater than that in the **vein** .

* arteriole $\xrightarrow[\text{BLOOD}]{\text{Pump}}$ capillary $\xrightarrow[\text{BLOOD}]{\text{Pump}}$ arteriole.

* the **pressure** is still **high** (high pressure capillary bed) → gives a **big push** for the filtration process to happen .

when we want **re-absorption** process to happen correctly → (low pressure capillary bed → it makes the process of reabsorbing the filtrate easier ,(a little amount of **ATP** is needed) .

vasa recta → it's the peri tubular capillary in the medullary section (nephron).

#It has really low blood pressure which helps in urine concentration .

#**urine concentration needs concentration #** → the blood movement and pressure should be low.

إنّ ما تحصل عليه من دون جهد أو ثمن ليس له قيمة

* كان معكم زملائكم :
مشرف : لينا محمود
مُتَبَيِّض: سُلّاف معاينة
مدقق : فراس أحمد
حوسبة : أحمد معاينة