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Question:

How the urine is formed?  
Discuss the role of kidney in excretion.

Outline:

- ① Urine Formation
- ② Structure of kidney
- ③ Working of kidney & Nephron

i) Urine Formation:-

The nephrons process the blood and form urine by three steps.

(a) Ultra-filtration:

The plasma and all the constituents of plasma pass through the Bowman's capsule except proteins.

(b) Reabsorption:-

About 99% of the filtrate is reabsorbed by the renal tubules.



(c) Secretion:-

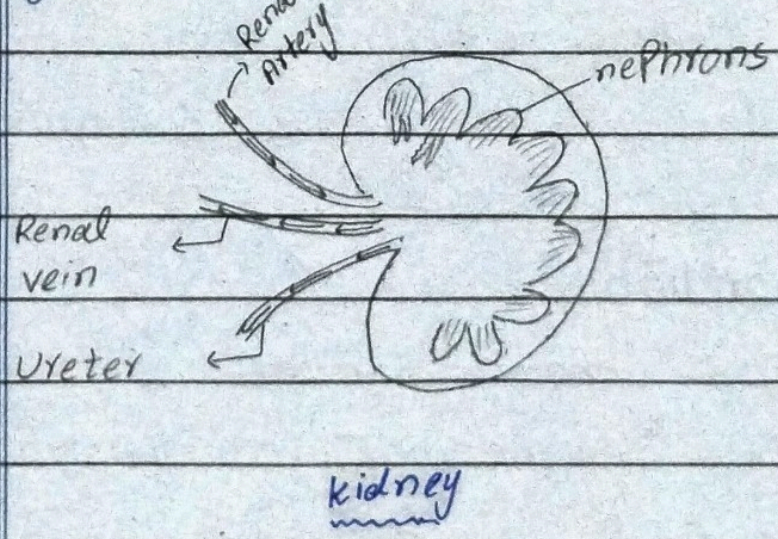
The tubular cells secrete some ions like  $H^+$ ,  $K^+$  etc and these ions combine with the urine.

Urine is 95% water and 5% waste products.

(iii) Structure of kidney:-

Kidney is a dark ~~grey~~ bean-shaped organ. It is protected by two ribs. Its outer surface is convex and inner surface is concave.

Our kidneys are un-symmetrical. It means that the left kidney is slightly higher than the right one.





• Components of Kidney:-

(i) Renal Artery:-

Through renal artery blood enters into the kidney for filtration.

(ii) Ureters:-

These tubes take away the urine from kidney.

(iii) Urinary bladder:-

The urine removed from the kidney and bladder acts as a storage for urine. It can store "400-500ml" of urine.

(iv) Nephron:-

Nephron is the functional unit of kidney. There are 1 million nephrons in each kidney.

Working of Nephron/Role of kidney in excretion:-

Nephron is the functional unit of kidney. It has following components:



(i) **Afferent Arteriole:-**

Blood enters into the nephron through afferent arteriole.

(ii) **Glomerulus & Bowman's capsule:-**

Beneath the afferent arteriole, there is a glomerulus. It has a network of capillaries. And there is a membrane b/w glomerulus and bowman's capsule. It is a mesh like structure that allow the small particles to pass through the glomerulus, but doesn't allow the large molecules such as proteins and plasma. It also doesn't allow some essential molecules to pass through it.

The other four regions are;

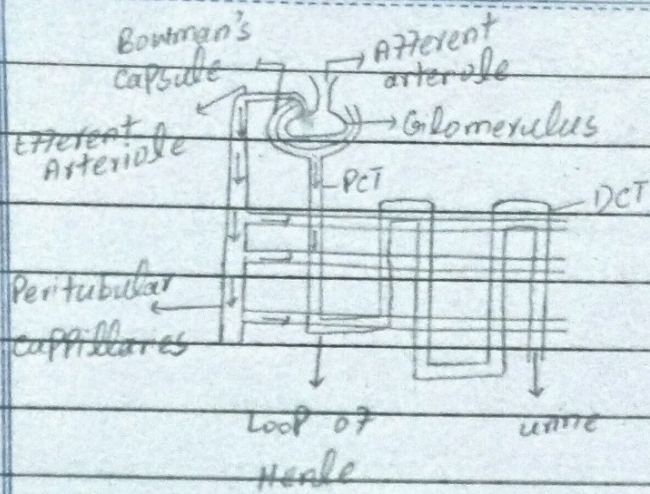
(iii) **Proximal convoluted tubule**

(iv) **Loop of Henle**

(v) **Distal convoluted tubule**

(vi) **Efferent Arteriole.**





### Nephron

The filtrate from Bowman's capsule moves towards PCT and then it moves to the loop of Henle. Loop of Henle concentrate the salts which are added into the urine. Then the filtrate moves towards the DCT and then to the collecting duct.

#### Efferent Arteriole:-

The blood that is filtered moves out of the glomerulus with the help





of the efferent arteriole. Then it moves to the Peri-tubular capillaries. And this is the point where the essential nutrients are ions are ~~removed~~ <sup>reabsorbed</sup> into the blood. The urine moves towards the ureter and urinary bladder and then it is removed out by urethra.

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