

Level: IGCSE

Board: Edexcel

Subject: Excretion- Humans

Syllabus Reference:

2.71 know the excretory products of the lungs, kidneys and skin (organs of excretion)

2.72B understand how the kidney carries out its roles of excretion and osmoregulation

2.73B describe the structure of the urinary system, including the kidneys, ureters, bladder and urethra

2.74B describe the structure of a nephron, including the Bowman's capsule and glomerulus, convoluted tubules, loop of Henle and collecting duct

2.75B describe ultrafiltration in the Bowman's capsule and the composition of the glomerular filtrate

2.76B understand how water is reabsorbed into the blood from the collecting duct

2.77B understand why selective reabsorption of glucose occurs at the proximal convoluted tubule

2.78B describe the role of ADH in regulating the water content of the blood

2.79B understand that urine contains water, urea and ions

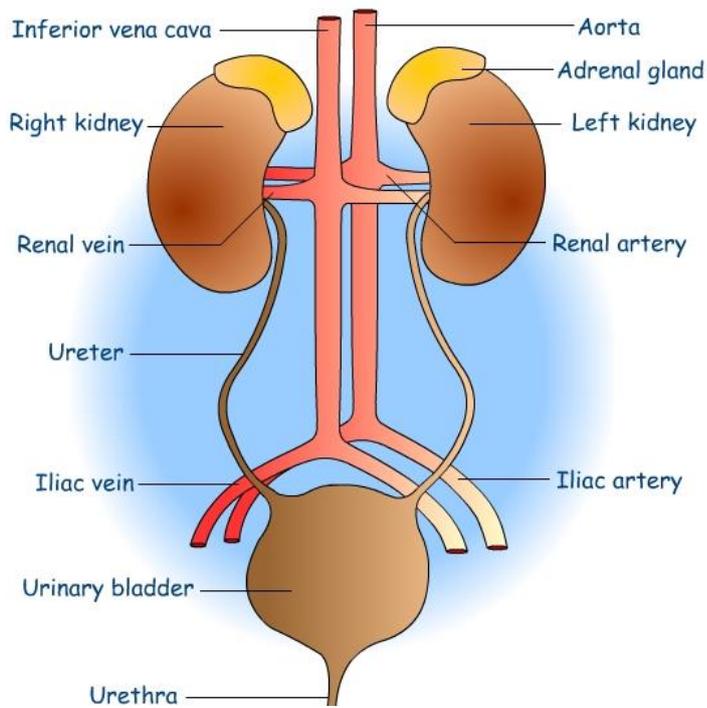
Excretion - the removal of metabolic products from the cells of the body.

- Skin produces sweat consisting of water, salts and urea.
- Kidney produces urine consisting of urea/water/salts.
- Lungs excrete CO_2 .

The **excretory system** consists of the kidneys, bladder, ureter and urethra (note the spelling of these last two).

The associated blood system consists of the renal artery (branching from the aorta) and renal vein (which joins to the vena cava).

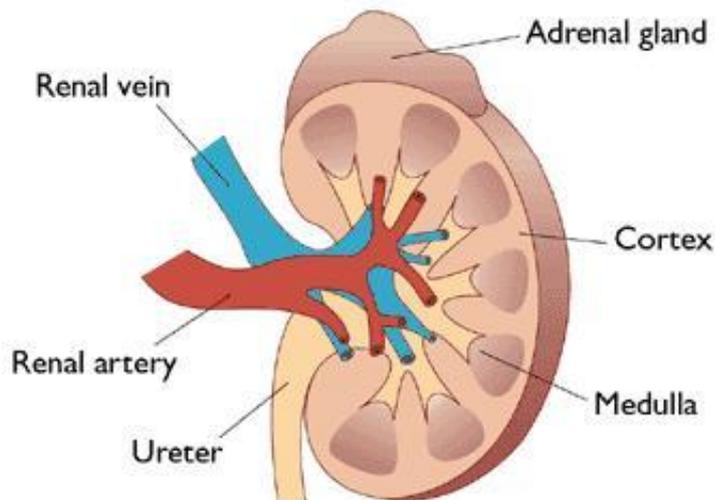
The Human Excretory System



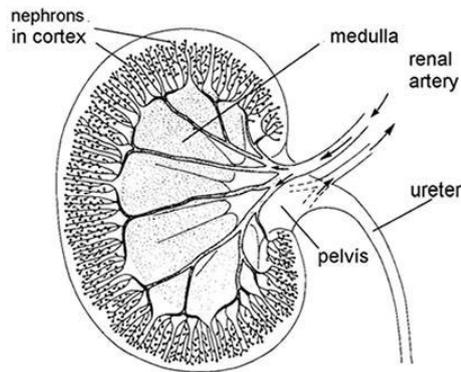
Learn these labels!

and these.....

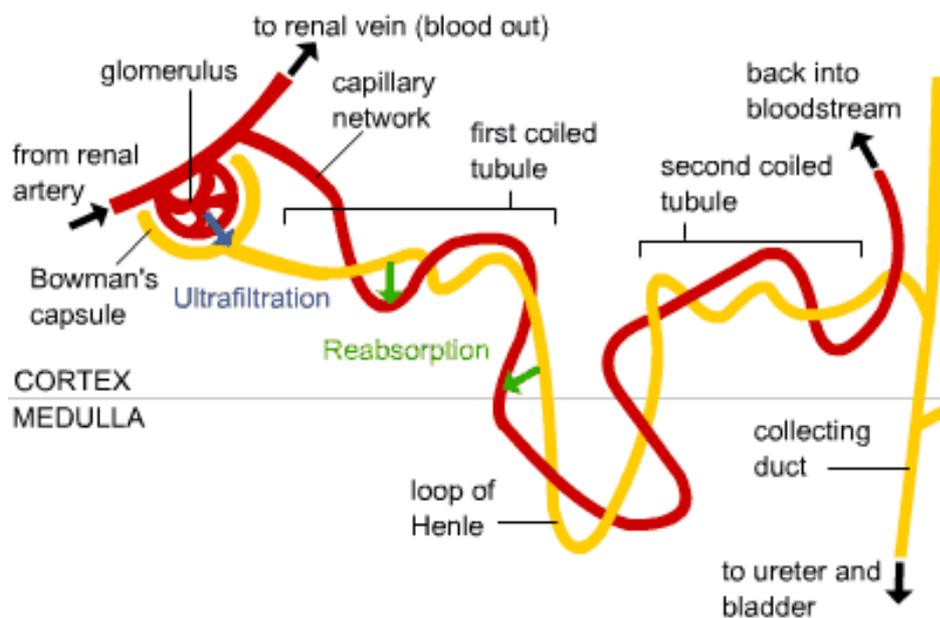
Diagram of Kidney



The kidney showing nephrons- the basic filter units.



A Nephron magnified



The Action of the Kidneys.

The nephron is the basic filter unit of the kidney.

1. The arteriole leading into the **glomerulus** is wider than the one leaving so high pressure builds up and **ultrafiltration** leads to small molecules being forced into the **Bowman's Capsule**.

These small molecules are water, salts, glucose and urea. Molecules such as protein cannot be filtered as they are too large.

2. As filtrate passes into the proximal (first coiled) tubule, 100% of the glucose is reabsorbed by active transport.
3. As the rest of the filtrate travels through, some of the water and salts are reabsorbed according to the body's needs. This is called selective reabsorption. Water is taken back via the loop of Henle and the collecting duct.
4. Finally, the concentrated urine is passed along the collecting duct to the ureter and bladder.

Control of water levels in the body-Osmoregulation

- The hypothalamus in the brain detects the level of water in the blood.
- If the concentration of water is too low, the pituitary gland in the brain secretes Anti-diuretic hormone (ADH).
- This travels through the bloodstream to the kidney where it acts on the cells of the collecting duct to make them more permeable to water.
- More water is reabsorbed from the tubule into the blood and less urine is made.
- The hypothalamus then senses that the blood is at the correct concentration and the pituitary stops secreting ADH.

