

Glomerular Filtration

Occurs in renal corpuscle - blood is forced out of glomerulus and enters glomerular capsule (liquid is now called filtrate).

Afferent arteriole (going IN to renal corpuscle) is wider than efferent arteriole -> increase resistance to blood flow, so higher blood pressure.

Cell membranes of capillary and capsule are differentially permeable - this means filtrate is NOT the same as blood.

Filtrate DOES NOT contain red blood cells, white blood cells or plasma proteins.

Filtrate DOES contain water, salts, amino acids, fatty acids, glucose, urea, uric acid, creatine, toxins and ions.

Filtration process results in 20% of plasma being filtered that flows through. This is because blood is constantly flowing.

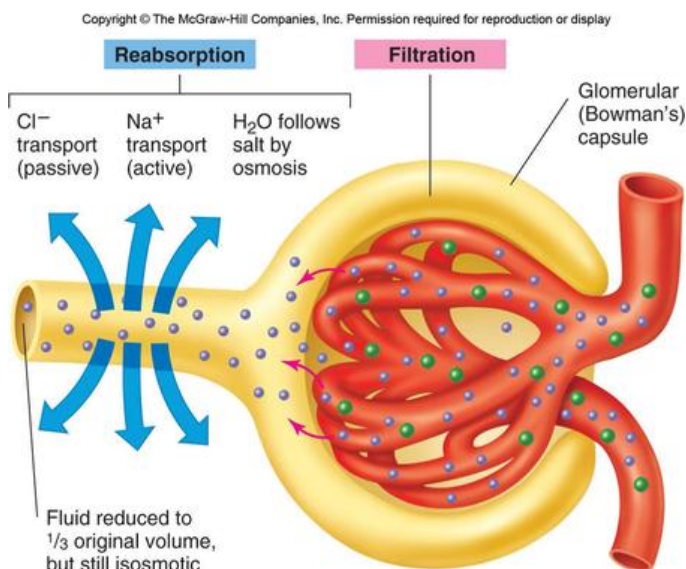
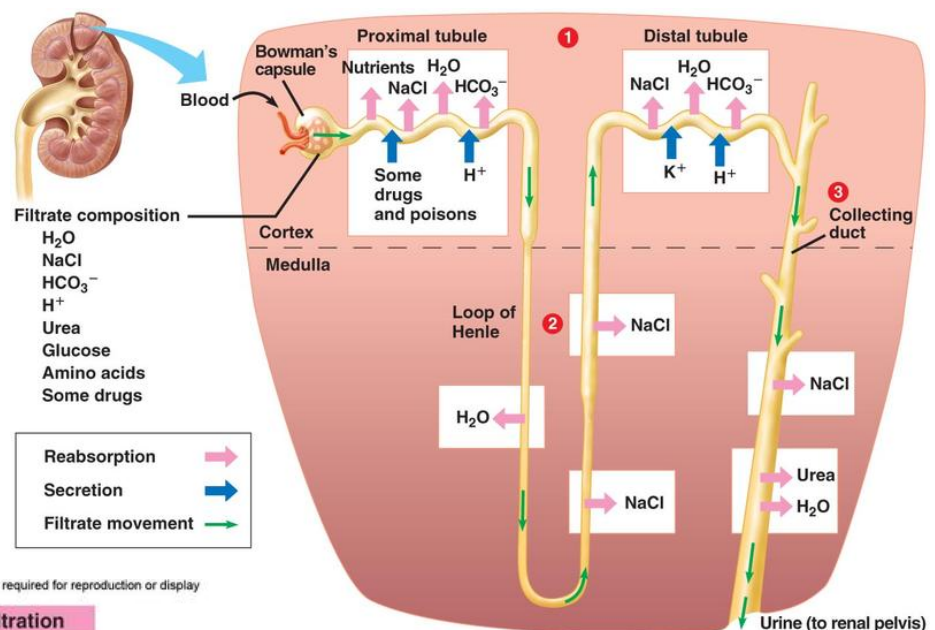
180L of blood per day is filtered, yet only 1% leaves the body as urine. Majority of filtrate is reabsorbed.

Selective Reabsorption

Useful substances are reabsorbed such as water, glucose, amino acids and ions (e.g. potassium, sodium, calcium, chloride and bicarbonate). Some urea is also reabsorbed

Large surface area for reabsorption is required - PCT, DCT and loop of Henle of each nephron, as well as large numbers of nephrons meet this requirement.

Reabsorption of water is under hormonal control and is known as facultative reabsorption. Parts of the nephron can become more or less permable to water.



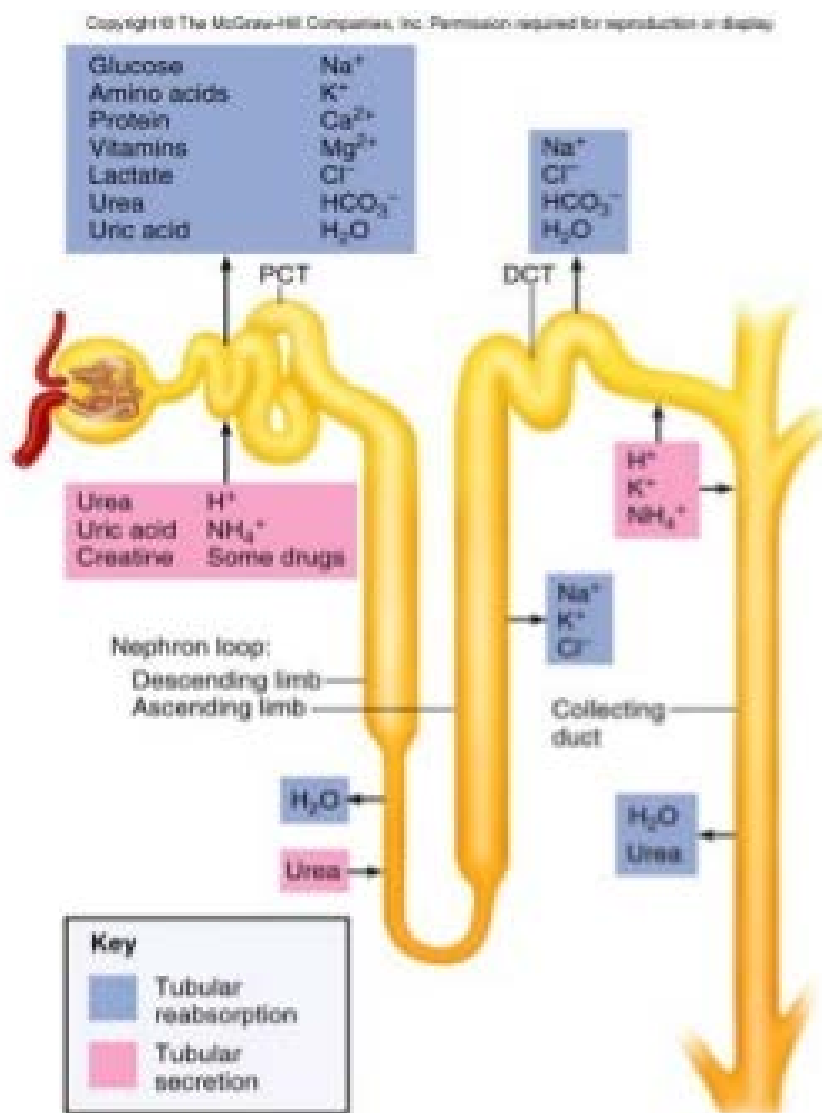
Tubular Secretion

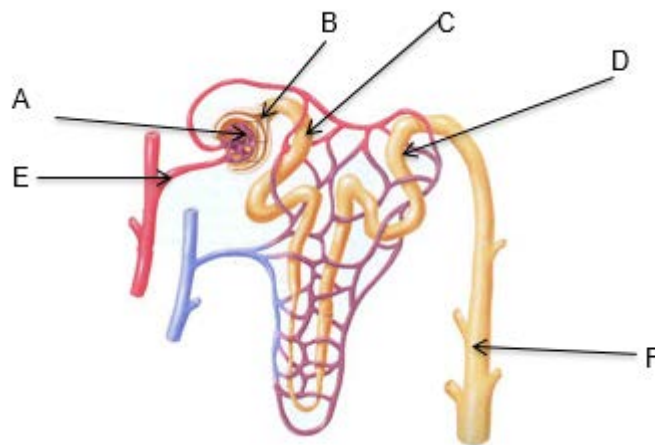
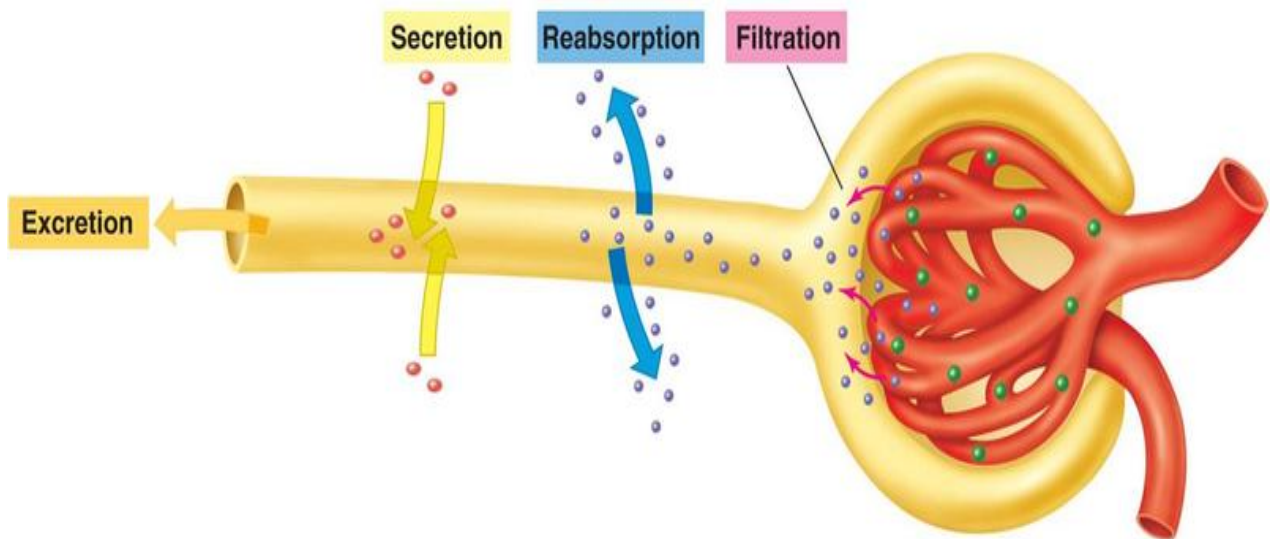
Process of adding substances to filtrate e.g. hydrogen ions, creatine and drugs.

Can be an active or passive process. These can help to control blood pH.

Many foods we consumer lower pH of blood - tubules secrete H^+ ions and NH_4^+ **into nephron** tubules to raise pH of blood. This makes urine slightly acidic.

Substances not reabsorbed train from collecting ducts to renal pelvis -> ureter -> bladder -> urethra -> urine





1. The glomerulus is indicated by label

- a) A
- b) B
- c) E
- d) F

2. The process of tubular secretion mostly occurs from which labelled structure?

- a) A.
- b) C.
- c) D.
- d) F.

3. Which of the following substances would you not expect to find in **structure F**.

- a) urea and creatinine
- b) proteins and glucose
- c) water and toxins
- d) water and ions

4. Which of the following does NOT assist in increasing blood pressure in the glomerulus.

- a) Short renal artery entering the kidney.
- b) Efferent arteriole being narrower than the afferent arteriole.
- c) Ability of arterioles to vasoconstrict.
- d) Afferent arteriole being narrower than the efferent arteriole.

Answers:

A, C, B, D

Structure and function of the nephron

Put the following statements into a table to summarise the relationship between the structure and function of the nephron.

1. Each kidney has over a million nephrons so the total surface area available for reabsorption and secretion is extremely large.
2. Short renal artery taking blood to the kidney means blood is always under high pressure
3. The arteriole leading out of the glomerulus has a smaller diameter than the arteriole leading in. This raises the blood pressure so that more fluid is filtered out of the blood.
4. Muscular walls of afferent and efferent arterioles can constrict to increase blood pressure
5. Coiled capillaries of glomerulus increases surface area for more efficient filtration
6. The glomerular capsule surrounds the glomerulus to collect the fluid filtered out of the blood capillaries.
7. Glomerulus wall and capsule are one cell thick so filtered substances do not have far to travel
8. The renal tubule has two sets of convolutions and a long loop so that each tubule has a large surface area for reabsorption and secretion