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ASSIGNMENT

EXPLAIN URINE FORMATION AND CONCENTRATION

There are three steps of urine formation

Glomerular filtration

Reabsorption

Secretion

1. The glomerulus filters water and other substances from the bloodstream

Each kidney contains over 1 million tiny structures called nephrons. Each nephron has a glomerulus, the site of blood filtration. The glomerulus is a network of capillaries surrounded by a cuplike structure, the glomerular capsule (or Bowman's capsule). As blood flows through the glomerulus, blood pressure pushes water and solutes from the capillaries into the capsule through a filtration membrane. The glomerular filtration begins the urine formation process.

2. The filtration membrane keeps blood cells and large proteins in the bloodstream

Inside the glomerulus, blood pressure pushes fluid from capillaries into the glomerular capsule through a specialized layer of cells. This layer,

the filtration membrane, allows water and small solutes to pass but blocks blood cells and large proteins. Those components remain in the bloodstream. The filtrate flows from the glomerular capsule further into the nephron.

3. Reabsorption moves nutrients and water back into the bloodstream

The glomerulus filters water and small solutes out of the bloodstream. The resulting filtrate contains waste, but also other substances the body needs: essential ions, glucose, amino acids, and smaller proteins. When the filtrate exits the glomerulus, it flows into a duct in the nephron called the renal tubule. As it moves, the needed substances and some water are reabsorbed through the tube wall into adjacent capillaries. This reabsorption of vital nutrients from the filtrate is the second step in urine creation.

4. Waste ions and hydrogen ions secreted from the blood complete the formation of urine

The filtrate absorbed in the glomerulus flows through the renal tubule, where nutrients and water are reabsorbed into capillaries. At the same time, waste ions and hydrogen ions pass from the capillaries into the renal tubule. This process is called secretion. The secreted ions combine with the remaining filtrate and become urine. The urine flows out of the nephron tubule into a collecting duct. It passes out of the kidney through the renal pelvis, into the ureter, and down to the bladder

The loop of henle is critical to the ability of the kidney to concentrate urine. The high concentration of salt in the medullary fluid is believed to be achieved in the loop by a process known as countercurrent exchange multiplication. In the presence of antidiuretic hormone, the medullary collecting ducts become freely permeable to solute and water, thus, the urine becomes concentrated. In the absence of ADH,

the collecting ducts are impermeable to solute and water, and, thus, the fluid in the lumen, from which some solute has been removed, remains less concentrated than plasma, i.e, the urine is dilute.