What Stays, What Leaves

Follow blood materials through a nephron

HAP.14.2 "Describe the processes of filtration and selective reabsorption within the nephrons as it relates to the formation of urine and excretion of excess materials in the blood."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the sentences that explain what filtration moves into the nephron, circle the sentences that explain what selective reabsorption returns to the blood, and number the two processes in the order they occur.

A Drink's Path Through the Kidneys

1. After a student drinks a large bottle of water, blood carries the extra water through the kidneys. Each kidney contains tiny working units called nephrons. Blood enters a knot of capillaries called the glomerulus. Pressure pushes water and small dissolved substances out of this blood and into a surrounding cup, the glomerular capsule. This step is filtration. Glucose, mineral ions, and urea can pass with the water. Blood cells and most proteins are too large to cross the filter and remain in the blood. The liquid that enters the capsule is called filtrate, not urine.

2. Filtrate then flows through a long nephron tubule. Nearby capillaries receive substances that move from the tubule back into the blood. This return is selective reabsorption, not a second round of filtration. In a healthy person, nearly all filtered glucose returns to the blood, along with much of the water and useful mineral ions. The body can adjust how much water and certain ions it reabsorbs according to its needs. After the large drink, less of the filtered water needs to return than when the body is short of water. More water can stay in the tubule.

3. As the fluid moves through the rest of the nephron and collecting duct, what remains becomes urine. It contains water plus wastes such as urea, which comes from the breakdown of proteins. It can also carry excess mineral ions. Urine travels to the bladder and later leaves the body. Following the student's large drink, urine may be more dilute because extra water stays in it. The kidneys do not simply strain blood once and discard everything small. Filtration first moves small materials into the nephron, while selective reabsorption returns needed materials to the blood and leaves excess materials for excretion.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why do blood cells remain in the blood while glucose enters the filtrate, and what happens to glucose afterward in a healthy person?

2. After the large drink, how do filtration and adjusted water reabsorption together affect the student's urine?

3. Trace urea from the blood to its exit from the body. How do filtration and urine formation help remove it?

4. How can mineral ions enter the filtrate but still be conserved or excreted according to the body's needs?

3 YOUR TURN

Your own words

After a long hike with little to drink, a person produces less urine than the student in the passage. In three sentences, explain how filtration and selective reabsorption produce this difference while urea can still leave the body.

ANSWER KEY

What Stays, What Leaves

HIGH SCHOOL · HAP.14.2

PART 1 · READ AND MARK

Underline the sentences that explain what filtration moves into the nephron, circle the sentences that explain what selective reabsorption returns to the blood, and number the two processes in the order they occur. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why do blood cells remain in the blood while glucose enters the filtrate, and what happens to glucose afterward in a healthy person?	**Blood cells are too large to cross the filter, but glucose is small enough to enter the filtrate. Nearly all filtered glucose is then reabsorbed into the blood.**
2	After the large drink, how do filtration and adjusted water reabsorption together affect the student's urine?	**Filtration moves water into the nephron. Less of that water is reabsorbed, so more remains in the urine, making it more dilute.**
3	Trace urea from the blood to its exit from the body. How do filtration and urine formation help remove it?	**Urea passes from the blood into the filtrate. Some remains as the fluid becomes urine, which travels to the bladder and later leaves the body.**
4	How can mineral ions enter the filtrate but still be conserved or excreted according to the body's needs?	**Mineral ions pass into the filtrate during filtration. The nephron can reabsorb useful ions into the blood, while excess ions can remain in the urine.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

During the hike, filtration still moves water and small substances, including urea, from blood into the nephron. Because water is scarce, more of the filtered water returns to the blood by selective reabsorption than after the large drink. Less water remains in the urine, so the hiker produces a smaller volume of more concentrated urine that still carries urea out.

Accept answers that distinguish filtration into the nephron from reabsorption back into the blood. Students should connect water reabsorption to urine volume without claiming that filtration itself selects materials based on whether the body needs them.