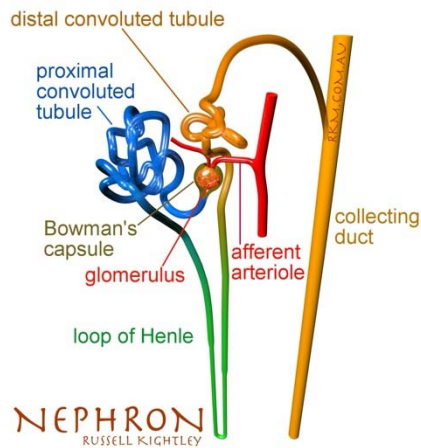


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Nephrons: The Kidney's Filtering Units

Have you ever wondered how your kidneys work their magic to keep your blood clean and your body in balance? The secret lies in tiny structures called nephrons. In this reading passage, we'll dive into the fascinating world of nephrons and explore their crucial role in the kidneys.

Meet the Nephrons

Nephrons are like the superheroes of the kidney world. These microscopic structures, numbering in the millions in each kidney, are responsible for filtering your blood and ensuring that waste products are removed while retaining essential substances.

Anatomy of a Nephron

Each nephron has several key components:

- **Renal Corpuscle:** Imagine the renal corpuscle as the first stop on the nephron's journey. It consists of the glomerulus and the Bowman's capsule. The glomerulus is a tiny, ball-shaped cluster of blood vessels where blood enters the nephron for filtration. It's like the entrance gate to the filtration process.
- **Proximal Convoluted Tubule:** After the blood is filtered in the glomerulus, the filtered liquid enters the proximal convoluted tubule. This twisty section is where the real work begins. Here, the nephron selectively reabsorbs essential substances like water, glucose, and amino acids back into the bloodstream. It's like a treasure hunt, where the nephron keeps the valuable items and lets go of the waste.
- **Loop of Henle:** The filtered liquid continues its journey into the loop of Henle. This U-shaped loop plays a crucial role in concentrating the urine. As the



Name _____

liquid flows through the loop, more water is reabsorbed, making the urine more concentrated.

- **Distal Convoluted Tubule:** In this part of the nephron, any remaining waste products and excess substances are further concentrated and prepared for excretion in the urine.
- **Collecting Duct:** The final stop for the urine is the collecting duct. Several nephrons share a single collecting duct, which combines their urine into one stream. This combined urine is then sent to the renal pelvis and eventually to the bladder for storage until it's time for elimination.

The Nephron's Mission: Filtration and Regulation

The primary mission of nephrons is to filter the blood, removing waste products, excess substances, and toxins. Think of nephrons as the body's quality control inspectors. They ensure that the valuable components, like water and essential nutrients, are reclaimed while the waste is separated and eliminated.

In addition to filtration, nephrons also play a crucial role in regulating the body's internal balance:

- **Water Balance:** Nephrons help maintain the body's water balance. When you're well-hydrated, they reabsorb more water to prevent excessive urine production. In times of dehydration, they produce concentrated urine to conserve water.
- **Electrolyte Balance:** Electrolytes like sodium and potassium are essential for nerve and muscle function. Nephrons regulate the balance of these electrolytes in your body by selectively reabsorbing or excreting them.
- **Acid-Base Balance:** Maintaining the body's pH level is critical for overall health. Nephrons assist in this task by excreting excess hydrogen ions to lower acidity or retaining them to increase alkalinity, thus helping to restore balance.

