**Urinary Formation Process in the Kidneys**

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**Filtration**

Each kidney has about a million nephrons, where urine formation takes place. At any given time, about 20 percent of the blood is going through the kidneys to be filtered so that the body can eliminate waste and maintain hydration, blood pH and proper levels of blood substances.The first part of the process of urine formation occurs in the glomeruli, which are small clumps of blood vessels. The glomeruli act as filters, allowing water, glucose, salt and waste materials to pass through to the Bowman's capsule, which surrounds each glomerulus, but preventing the red blood cells from passing. The fluid in the Bowman's capsule is referred to as the nephric filtrate and resembles blood plasma. It also includes urea, produced from the ammonia which accumulates when the liver processes amino acids and is filtered out by the glomeruli.

## Reabsorption

About 43 gallons of fluid goes through the filtration process, but most is subsequently reabsorbed rather than being eliminated. Reabsorption occurs in the proximal tubules of the nephron, which is the portion beyond the capsule, in the loop of Henle, and in the distal and collecting tubules, which are further along the nephron beyond the loop of Henle.Water, glucose, amino acids, sodium and other nutrients are reabsorbed into the bloodstream in the capillaries surrounding the tubules. Water moves via the process of osmosis: movement of water from an area of higher concentration to one of lower concentration.Usually all the glucose is reabsorbed, but in diabetic individuals, excess glucose remains in the filtrate. Sodium and other ions are reabsorbed incompletely, with a greater proportion remaining in the filtrate when more is consumed in the diet, resulting in higher blood concentrations. Hormones regulate the process of active transport by which ions like sodium and phosphorus are reabsorbed.

## Secretion

Secretion is the final step in the process of urine formation,Some substances move directly from the blood in capillaries around the distal and collecting tubules into those tubules. Secretion of hydrogen ions via this process is part of the body's mechanism for maintaining proper pH, or acid-base balance. More ions are secreted when the blood is acidic, less when it is alkaline.

Potassium ions, calcium ions and ammonia also are secreted at this stage, as are some medications. The kidney is considered a homeostatic organ, one that helps maintain the chemical composition of the blood within strict limits. It does this partly by stepping up secretion of substances such as potassium and calcium when concentrations are high and by increasing reabsorption and reducing secretion when levels are low.The urine created by this process then passes to the central part of the kidney called the pelvis, where it flows into the ureters and then the bladder.

[**Urine**](https://www.wisegeek.com/how-much-urine-does-a-person-produce.htm) [**concentration**](https://www.wisegeek.com/what-is-concentration.htm)

is the collection of waste materials in urine for excretion by the body. The ability to concentrate soluble waste is important to one's overall health, as it allows the body to eliminate it without losing vital fluids. Very young organisms tend to have trouble concentrating their urine and need more water to support themselves. Likewise, illness can interfere with this process and may result in the production of very dilute urine.This process takes place in the kidneys. Blood flows into the kidneys and through a network of structures known as nephrons that allow fluid and salts to flow across a semi-permeable membrane. When the body has excess salts and other materials it needs to eliminate, these pass readily through, leaving fluid behind. If there is too much fluid, the nephrons can excrete this across the membrane. Waste materials are prepared for elimination, while materials the body still uses can be recycled and sent into the bloodstream through the process of reabsorption. The amount of urine concentration that occurs depends on the hydration levels in the body and the production of a compound known as antidiuretic [**hormone**](https://www.wisegeek.com/what-are-hormones.htm), or [**vasopressin**](https://www.wisegeek.com/what-is-vasopressin.htm). This hormone triggers the kidneys to retain water, leading to more concentrated urine.

The body regulates urine concentration to maintain a stable balance of fluids and salts in the blood chemistry. People who are dehydrated tend to produce extremely concentrated urine which may be dark, with a strong odor. Dehydrated bodies need water, and can afford to excrete only a small amount to get rid of waste materials. After water loading, like drinking lots of water during sports to stay hydrated, the body may excrete relatively dilute urine.

Health conditions can adversely affect urine concentration. [**Kidney**](https://www.wisegeek.com/what-is-a-kidney.htm) damage may make it harder to filter the blood, which creates excessive thirst and very dilute urine. Patients who cannot concentrate their urine need ample supplies of water to flush unnecessary salts out of their bloodstream. Eventually, they may become so impaired that they require external hemodialysis to filter their blood. Such patients may ultimately need a [**kidney transplant**](https://www.wisegeek.com/what-is-a-kidney-transplant.htm).