

# What Kidneys Do and How They Fail

“One important job of the kidneys is to filter waste products and excess water from the blood.”

Although kidneys are relatively small (each one is about the size of your fist), when they are healthy, they process 100% of the body’s blood supply about every 5 minutes. Kidneys also perform many important functions.

## Cleaning Wastes From the Blood

One important job of the kidneys is to filter waste products and excess water from the blood. The kidneys work in the same way as a water filter does to take impurities from your drinking water. The “cleaned” blood stays in the body, while the waste products leave the body in urine.

## Managing Fluid in the Body

The balance of water (fluid) in your body needs to be just right – not too much, and not too little. The kidneys help maintain this fluid balance. Too much water in the body and the kidneys make more urine. Too little water and the kidneys produce less urine.

## Controlling Blood Pressure

Kidneys help control blood pressure by releasing an enzyme called renin. When blood pressure drops and kidneys don’t receive enough blood, renin is released; causing blood vessels to contract (tighten). When blood vessels contract, blood pressure goes up.

## Making Red Blood Cells

Your kidneys produce a hormone called erythropoietin that signals the bone marrow to make red blood cells. Red blood cells carry oxygen to all the cells in the body. This is important because the body needs oxygen for life.

## Balancing Acidity and Mineral Composition

Your kidneys are master chemists that help maintain the proper balance of acid and minerals, including sodium, calcium, potassium and magnesium, in the blood. Without this balance, bones can become weak and break easily. This balance also keeps your heart beating normally.



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## Kidney Failure

Kidneys fail when they are no longer able to clean waste from the blood and balance fluid and mineral levels.

Let's take a look at some of the most common causes of kidney failure.

## Diabetes

Diabetes can cause damage to the kidneys, which is called diabetic nephropathy. Diabetes is the most common cause of kidney disease in the United States.

In diabetes, the body is not able to process sugar properly. As levels of sugar build up in the body, diabetes causes damage to blood vessels, including those in the kidney. The high levels of sugar cause more blood to flow through the kidneys, and this puts an added strain on the tiny blood vessels and raises blood pressure. Damaged kidneys are not able to remove waste products and excess fluid well, so these build up in the blood. As the waste builds up, your kidneys have to work harder, and the kidneys eventually fail. Because kidney failure in diabetics occurs slowly, the patient may not notice symptoms until the kidneys actually start to fail.

## High Blood Pressure

High blood pressure can cause damage to the kidneys. It is interesting that kidney damage can also cause high blood pressure, too.

If high blood pressure damages the blood vessels in the kidneys, the kidneys will not be able to remove wastes and extra fluid. The extra fluid can cause blood pressure to rise even more.

If kidneys produce too much of the enzyme, renin, blood pressure will rise too high. Over time, high blood pressure can cause blood vessels in the kidneys to thicken and narrow. This can lead to reduced blood supply and reduced kidney function. As with diabetes, eventually, the damage may become so great that the kidneys fail.

High blood pressure is the second leading cause of kidney failure. Every year in the United States, there are about 15,000 new cases of kidney failure due to high blood pressure.

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## Glomerular Diseases

The kidneys contain about a million little clusters of looping blood vessels. Each cluster is called a glomerulus. When we talk about more than one glomerulus, we call them glomeruli.

Each glomerulus is connected to a small tube called a tubule, and each glomerulus and tubule unit is known as a nephron. The body has about one million nephrons in each kidney. The glomeruli work to filter the blood, and then waste products and fluid travel through the tubule and become urine.

When someone suffers from a glomerular (kidney) disease, it means that their glomeruli are no longer working the way they should. Waste products and extra fluid build up in the body. As a result, a person’s face, hands, ankles or feet may swell.

Glomerular diseases, the third leading cause of kidney failure, come in many forms, but they fall into two major categories:

- Glomerulonephritis happens when the glomeruli are inflamed (swollen).
- Glomerulosclerosis takes place when the glomeruli become scarred or hardened.

Glomerular disease has many causes, including other diseases such as diabetes, lupus and HIV. Toxic drugs and infection also can result in glomerular disease. In some cases, the cause is not known.

## Polycystic Kidney Disease (PKD)

Polycystic kidney disease (PKD) is an inherited disorder, although it may not be diagnosed until adulthood. PKD causes large, fluid-filled cysts to grow within the kidney. The cysts press against the kidney tissue until finally the kidney stops working effectively. It usually takes many years before kidney failure happens.

## Other Causes of Kidney Disease

Birth defects can occur that affect kidney function. One is a narrowing of the ureters that can prevent the normal outflow of urine, causing it to flow back up into the kidneys. This often causes infections and may damage the kidneys.

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Autoimmune diseases, including lupus and scleroderma, affect the body’s immune system and can damage organs, including the kidneys.

Obstructions caused by problems such as kidney stones, tumors or an enlarged prostate gland can also prevent normal urine flow, leading to infections and kidney damage.

Repeated urinary tract infections may also cause permanent damage to the kidneys.

### Summary

Regardless of the cause of chronic kidney failure, there is no cure. However, you may be able to slow the progression of kidney disease or obtain life-saving options, such as a kidney transplant, peritoneal dialysis or hemodialysis, depending on what stage CKD you have. Dialysis, along with certain medicines and a careful diet, does what the damaged kidneys can no longer do: dialysis removes the wastes and extra fluid from the blood. A kidney transplant is another option for some people with kidney failure. Researchers are hopeful that someday all causes of kidney failure may be prevented.

If you would like to see a doctor who specializes in the care of kidneys, called a nephrologist, you can use DaVita’s Find a Kidney Doctor tool ([www.davita.com/find-a-kidney-doctor/](http://www.davita.com/find-a-kidney-doctor/)) to locate a nephrologist in your area.