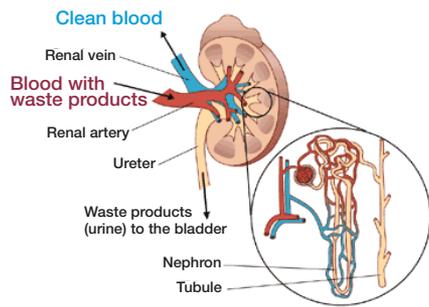


What Do the Kidneys Do?

The kidneys, two bean-shaped organs about the size of a fist, act as a filtering system for the body. They remove waste from the bloodstream and send it out of the body as urine. Kidneys sit just below the rib cage, toward your back.

Blood flows into the kidneys through the renal artery, and then into smaller components called nephrons. Each kidney has a million or more nephrons. Each nephron contains a filtering unit, called a glomerulus, and a tubule. Blood passes through the glomerulus and waste is filtered out. The waste then moves into the tubule where water and chemicals may be added or removed. The final product is urine, which passes out of the kidney through a tube called the ureter, and into the bladder. The cleansed blood flows back out of the glomerulus and out of the kidney through the renal vein.



During this filtering process, the kidneys also regulate the body's fluids, and control its levels of salt, potassium and other chemicals.

The kidneys put three crucial hormones into the body: erythropoietin, which stimulates red blood cell production; calcitriol, a type of vitamin D that helps keep bones strong; and renin, which helps to control blood pressure.





What Diseases Occur in the Kidneys?

Several different diseases affect the kidneys. Most involve damage to the nephrons, hampering their ability to filter wastes out of the blood. The most common causes of kidney disease are hypertension (high blood pressure) and diabetes.

Chronic kidney disease (CKD) is a gradual loss of kidney function. CKD is often silent for years, causing no symptoms. CKD can progress to complete kidney failure. CKD is also called chronic renal insufficiency.

End-stage renal disease (ESRD) is defined as a total or near-total loss of kidney function, or kidney failure. When the kidneys fail, a person will need either a kidney transplant or dialysis.

An **acute kidney injury (AKI)** is a sudden loss of kidney function, often caused by an accident, severe blood loss, poisoning or other cause. It is

also known as acute renal failure.

Polycystic kidney disease (PKD) is a condition in which cysts grow in the kidneys, eventually replacing much of the kidney tissue. Diabetic kidney disease is a condition that occurs as a complication of diabetes; the nephrons are damaged by excess glucose (sugar) in the blood.

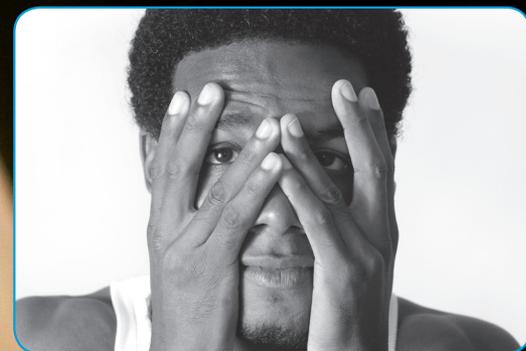
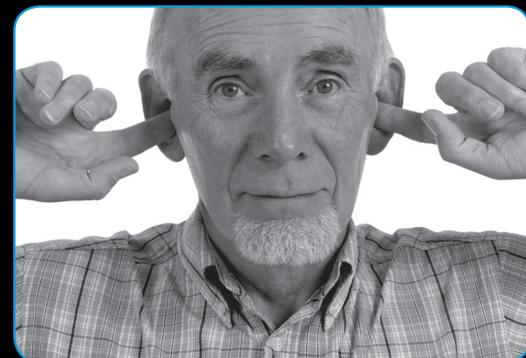
Glomerular diseases are a group of kidney diseases that involve the glomeruli, the kidney's filtering units. This group includes autoimmune-related diseases, infection-related diseases and sclerotic diseases. Common glomerular diseases are membranous nephropathy, IgA nephropathy, and focal segmental glomerulosclerosis.

Kidney cancer is cancer that forms in the lining of the kidney tubes.



What Causes Kidney Disease?

The most common causes are high blood pressure and diabetes.



Who Gets Kidney Disease?

Kidney disease is very common. In 2010, **20 million** people aged 20 and older in the U.S. had chronic kidney disease, according to the Centers for Disease Control and Prevention. That's more than 10% of adults. Among adults with diabetes, **35%** have chronic kidney disease. Of those with high blood pressure, **20%** have chronic kidney disease. Among all adults 65 and older, more than **40%** have CKD. It is more common in women than men.

According to the most recent data from the National Institutes of Health, more than **527,000** people in the U.S. were being treated for end-stage renal disease. (The condition was attributed to diabetes or hypertension in 61% of them.)

Also in 2007, African Americans were noted to be four times more likely than whites to develop ESRD. Hispanics are also at higher risk for kidney disease; they are **1.5** times more likely to develop kidney failure, compared to non-Hispanic whites.

People who have diabetes or hypertension are at a higher than average risk of developing CKD. Other factors that put someone at higher risk of CKD include high cholesterol, obesity, a family history of the disease, and cardiovascular disease.

In 2011, about **70,000** people will develop kidney cancer, and **13,120** will die from the disease, according to the American Cancer Society.



How is Kidney Disease Diagnosed?

In early stages, kidney disease often has no symptoms, so many people are unaware they have it. Later on, symptoms may include frequent urination, fatigue, loss of appetite, nausea and vomiting, swollen hands or feet, itchiness, dark skin, muscle cramps and trouble concentrating.

Several different laboratory tests on the blood and urine are used to detect kidney disease.

Lab tests can detect protein in the urine, which is a sign of disease. When kidneys are not working correctly, they are unable to properly filter protein out of the wastes that the body turns into urine. So protein is excreted in the urine. The microalbumin test looks for very small amounts of the protein albumin in the urine. If protein is detected, the condition is called microalbuminuria.

If kidney function gets worse, more albumin is released into the urine along with other proteins, a condition called proteinuria. A urine protein test can easily detect these proteins.

The kidneys also routinely excrete creatinine, a byproduct of metabolism, into urine. Another measure of protein in the urine looks at the ratio of protein to creatinine.

The glomerular filtration rate (GFR) is a measure of how well the kidneys are filtering wastes out of the blood. In practice, the estimated GFR, or eGFR, is used to assess kidney function. It is based on how much creatinine is in the bloodstream, and is calculated using a formula that takes into account your age, race and gender. An eGFR of 60 or above indicates normal kidney function; an eGFR below 15 indicates kidney failure.

A blood urea nitrogen (BUN) test measures the amount of urea in the bloodstream. Kidneys that are not functioning properly will leave too much urea in the blood.

Kidney imaging tests such as ultrasound, magnetic resonance imaging (MRI) and computed tomography (CT scan) can show blockages and growths in the kidneys.

A kidney biopsy, in which a needle is used to remove some tissue from the kidney, may also be used to help diagnose problems.



How is Kidney Disease Treated

Chronic kidney disease often cannot be cured. Treatment usually focuses on trying to prevent the condition from getting worse, by keeping diabetes and high blood pressure under control. A doctor might also suggest dietary changes, such as limiting protein, sodium and potassium.

In the case of glomerular disease, treatment may be with immunosuppressive drugs or steroids.

If the kidneys stop working, treatment options are dialysis (cleansing the blood through artificial means) , kidney transplant, or , in some cases, palliative or hospice care.

There are two primary methods of dialysis. In hemodialysis, a patient's blood flows through a machine that removes wastes, and then back into the body. Most people have the procedure done at a dialysis

center three times a week; each treatment takes three to four hours. Dialysis treatment at home is also an increasingly utilized option for some patients. The other form of dialysis is called peritoneal dialysis. A fluid is injected into the abdomen through a catheter; it collects wastes from the blood and is then drained out of the body. It is often also performed at home, instead of in a dialysis center.

A kidney transplant involves surgically placing a “new” kidney in the patient. Donated kidneys can be from cadavers or from a living person. The first successful kidney transplant was done in 1954. In 2010, **28,662** kidney transplants took place in the U.S. Of those, 21,853 kidneys were from deceased donors; the rest were from living donors.

Currently, nearly **90,000** people in the U.S. are waiting for a kidney transplant.

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