

Understanding Kidney Disease

How your kidneys work and why sometimes they don't

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Kidneys and what they do

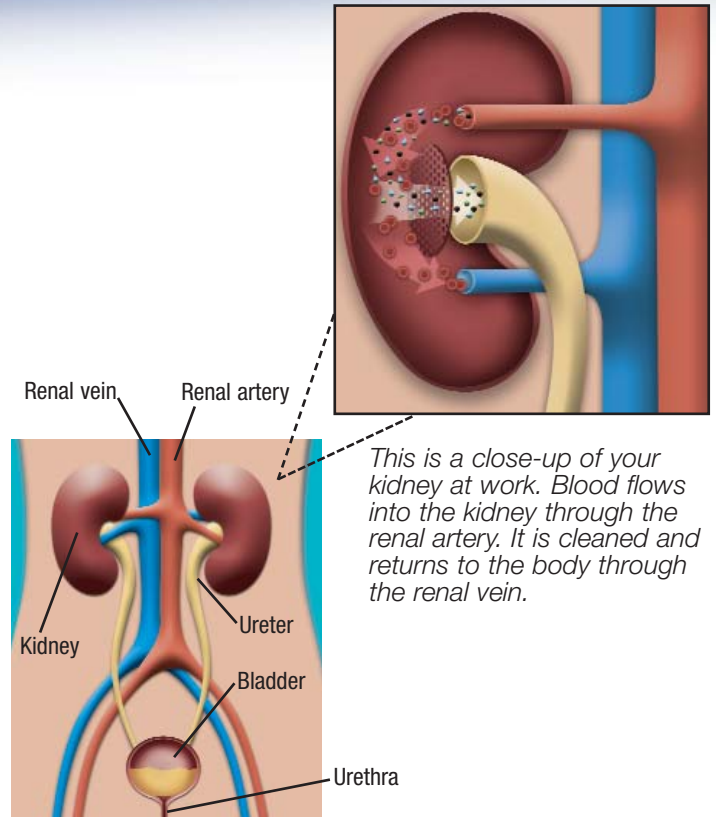
Most people are born with two kidneys, each the size of a fist. They are located on either side of the backbone, just above the small of the back. Each kidney weighs just $\frac{1}{4}$ of a pound, but plays an enormous and critical role in your health.

When your kidney function starts to deteriorate, you will need referral to and treatment by a kidney specialist.

Your kidneys are vital organs. Think of your kidneys as the body's cleaners: they filter waste, toxins and extra fluids from your blood.

Blood flows into the kidneys through the renal arteries and leaves through the renal veins. **Renal** is the medical term meaning "related to the kidneys." Every day, the kidneys produce about two quarts of urine, which contains waste and extra fluid. Urine leaves the kidneys through tubes called **ureters** and is held in the bladder. Urine leaves the bladder through another tube called the **urethra** when you urinate. This is called the **urinary tract system**.

Kidneys keep you healthy in other ways. These are described at the right.



This is a close-up of your kidney at work. Blood flows into the kidney through the renal artery. It is cleaned and returns to the body through the renal vein.

The urinary tract system.

How your kidneys keep you healthy

Your kidneys:

- Clean the blood of wastes
- Remove extra fluid (water)
- Keep your body chemicals in balance: sodium, potassium, calcium and phosphorous
- Help control blood pressure
- Help make red blood cells
- Produce Vitamin D, which helps maintain the health of your bones

Notes:

Symptoms and treatment of kidney failure

Symptoms of kidney failure

In some patients the kidneys become damaged and are unable to perform their normal functions. You can have a lot of kidney damage and not even feel ill. That's why kidney disease is often called a silent disease. It is only when kidney damage is severe that you may feel sick.

In most patients kidney diseases affect both kidneys. When your kidney function is below 15%, you may begin to have symptoms such as feeling tired or weak, or losing your appetite. You will then need some form of treatment to replace some of the functions of a healthy kidney.



Monitoring your kidney function

It is very important to learn how quickly your kidney disease is developing. You and your kidney doctor (**nephrologist**) will be able to tell how your condition is progressing by keeping a close watch on these tests:

■ **Serum creatinine**—A blood test that measures the amount of creatinine, a waste product found in the blood. A higher level in the blood means the kidneys are removing less from the body

■ **Glomerular filtration rate**—A measure of kidney function calculated from a urine collection. This determines how your kidneys are filtering waste products. A lower number means your kidney function is getting worse

The results of these tests will help your doctor decide what actions to take to keep you as healthy as possible.

Treatments

The two treatments used when kidneys fail are *dialysis* and *transplantation*.

Dialysis is a treatment performed to remove extra fluid and waste from your body.

Kidney transplantation means getting a new kidney to replace your damaged kidneys.

Both dialysis and transplantation are effective treatments for kidney failure.

If you do nothing, your health will continue to get worse. If left untreated, kidney failure can lead to death.

Important things you can do are:

- Learn about kidney disease
- Take an active role in your health
- Stay in touch with your doctor
- Ask questions

Some things you can do to help protect your kidneys

- Discuss all medications, even over-the-counter drugs, with your doctor
- Take all medications as prescribed
- If you have diabetes, keep your blood sugar under control by taking your medications, watching your diet, and monitoring your blood sugar level
- Exercise with your doctor's approval
- If you have high blood pressure, check your blood pressure regularly. Take your medications even if you feel fine
- Follow any special diet instructions

Notes:

Finding kidney disease early can help you and your doctor plan to slow the progress of the disease.

Diabetes and kidney disease



Diabetes is the most common cause of kidney disease in the U.S., and is responsible for almost half of the new cases of kidney disease each year. If diabetes goes untreated for too long, you can develop complications. One of these complications may be kidney disease.

Diabetic nephropathy is the medical term for kidney damage caused by diabetes. It can take 20 years or more for a person with diabetes to develop kidney failure.

What is diabetes?

Diabetes is a disease that causes a high **glucose** (sugar) level in the blood. Your body normally changes the food you eat into glucose. Your blood carries the glucose into your cells, where it is used for energy or stored to be used later.

Insulin, a hormone made by the pancreas, helps the glucose move from the blood into your cells. If you have diabetes, either your pancreas no longer makes enough insulin, or the insulin it makes doesn't get into the cells. Your body cannot move the glucose from the blood into cells, so it builds up.

When glucose levels in your blood remain high, the extra glucose affects many parts of your body. High levels of blood glucose can damage the small blood vessels in the kidneys so they cannot remove fluid and wastes as well.

Many people with diabetes also have high blood pressure. High blood pressure can also damage the blood vessels of the kidneys.

How kidney damage is diagnosed early in people with diabetes

Normal kidneys keep **albumin**, a protein, in the blood. People with normal kidneys leak very tiny amounts of albumin into their urine.

When the kidneys are damaged from diabetes, the amount of albumin in the urine rises. This is called **microalbuminuria** and can be detected by doing a simple urine test. More than 90% of people who develop this condition will eventually develop kidney disease.

Your doctor may find changes in your blood and urine tests long before you feel any symptoms of kidney disease.

Finding kidney disease early can help you and your doctor plan to slow the progress of the disease. This is why it is extremely important that you see your doctor regularly, even if there is no change in the way you feel.

Controlling blood glucose can lower the risk of kidney disease

Diabetes can cause kidney disease to progress more rapidly. Recent studies have proven good glucose control can lower the risk of developing kidney disease or delay its progression.

How to delay the progression of kidney disease due to diabetes

- See your doctor for regular checkups, even if you are feeling well
- Keep your glucose level and blood pressure under control
- Follow your doctor's recommendations about what you eat
- Exercise regularly (after checking with your doctor)
- If you are overweight, lose weight
- Reduce stress
- Stop smoking
- Limit alcohol and caffeine

Notes:

Elevated glucose levels and uncontrolled high blood pressure can cause kidney disease to progress faster.

High blood pressure and kidney disease

More than 25% of new cases of kidney failure each year are caused by blood pressure that is higher than normal, also known as ***hypertension***. Uncontrolled high blood pressure can cause kidney disease and also cause it to progress faster. Kidney disease can also cause high blood pressure.

What is high blood pressure?

Your blood pressure measures how hard your heart is working to pump blood through your body. If your blood pressure is high, it means that your heart is working too hard to pump blood.

Two numbers are used to describe blood pressure. The first number, ***systolic***, is the pressure within the heart as it beats, pumping blood through your body. The second number, ***diastolic***, describes pressure in the heart and blood vessels at rest.

What causes high blood pressure?

For most people with ***essential*** or ***primary hypertension***, there is no clear reason why their blood pressure is high. ***Secondary hypertension*** means that a disease, physical problem or drug is the cause of high blood pressure.

Many factors can increase blood pressure. These include:

- stress
- being overweight
- smoking
- a diet high in salt
- heavy use of alcohol

Family history, gender, age and race also play roles in the development of high blood pressure.

How to know if you have high blood pressure

High blood pressure typically causes no symptoms for many years. You may not even know you have it. In fact, it is usually discovered when you're seeing a doctor for something else. High blood pressure cannot be diagnosed from just one blood pressure reading. Normal blood pressure is less than 120/80. If your blood pressure remains higher than 130/85 on two or more days, you should see your doctor.

How high blood pressure is treated

Treatment depends on how high your blood pressure is and what other medical conditions you have. Lifestyle changes and medications can help control your blood pressure.

High blood pressure that goes untreated can lead to heart disease, stroke and kidney failure.

Good blood pressure control can slow or prevent kidney disease. It can also reduce the risk of damage to the heart and other body organs.



Lifestyle changes you can make to help manage your blood pressure

- Visit your doctor regularly even if you are feeling well
- Talk to your doctor about learning to measure your own blood pressure
- Check your blood pressure as often as instructed by your doctor and keep a chart of the readings
- Take all your medications exactly as prescribed and tell your doctor immediately if you experience any side effects
- Limit salt or sodium if directed by your doctor
- Exercise regularly (after consulting with your doctor)
- If you are overweight, lose weight
- Reduce stress through relaxation and/or counseling
- Stop smoking
- Limit alcohol and caffeine

Notes:

Reach out if you need help. Stay in touch with your doctor—and work together to protect your kidneys.

Other causes of kidney failure

Glomerulonephritis is caused by inflammation and damage to the filtering unit of the kidney (glomerulus), and may be caused by immune disorders, infection and other causes. It usually affects both kidneys and may be hereditary.

Polycystic Kidney Disease (PKD) is a disease where cysts grow and damage the kidneys. The kidneys then get larger and eventually stop working properly. PKD tends to run in families.

Lupus is an immune system disease that often damages the kidneys. Lupus may affect many systems of the body, including the **vascular system** (arteries and veins), **nervous system** (nerves), and skin.

Obstructive Uropathy is a blockage that may be caused by kidney stones, prostate enlargement, or a birth defect of the urinary tract. This stops the normal flow of urine.

Chronic Pyelonephritis is an infection affecting the kidneys. Repeated kidney infections may lead to kidney failure in some rare cases.

Trauma, such as an automobile accident, can deliver a direct, forceful blow to the kidneys, causing them to shut down. These instances are rare.

Some over-the-counter medicines, like aspirin, acetaminophen and ibuprofen, taken in very large quantities, may be harmful to your kidneys—especially if your kidneys are not functioning normally.

Take control of your health—and your life

Kidney disease is serious—but you can live a productive life with it. The good news is that kidney disease can be treated. Today, there are even ways to slow down the rate of damage to your kidneys as well.

Keeping a healthy attitude

With the help of a renal dietician, your doctor and medical team, you can improve the way you feel by eating right, getting proper exercise and taking your medications as prescribed. Your attitude can improve the way you feel, too. Keeping a positive outlook on life can really affect your health.

You may be worried or upset when your doctor tells you you have kidney disease. It helps to surround yourself with people who believe in you and want to help you create a good life for yourself.

If you are experiencing feelings of sadness, anger, or even denial, a **renal social worker** can help you to cope with kidney disease.

Prepare to make adjustments

Like any change in life, with kidney disease you'll have to make some adjustments. You may feel more secure if you plan for lifestyle changes. Some people feel better knowing they have filled out their insurance forms or found out what assistance is available. Speak with a renal social worker for information on insurance and other financial assistance programs for people with kidney disease.

You and your loved ones may have feelings of anger, sadness, or isolation. This is normal. Talking about your feelings—with your family, your doctor, a counselor, a renal social worker or in a support group—may be a good way to help you feel better.

Adjustment takes time, but you have a lot going for you. You are already taking the first steps that will help you make a good life for yourself. You are learning about living well with kidney disease.

Face the future

Having a positive attitude and a sense of humor will help you gain the best results from your treatment.

As you face the future, don't give up your important plans, people or dreams. Focus on the things that matter most to you—your spouse, children or grandchildren, your home and neighbors, your job, your spiritual needs, your pets or hobbies, or the places you like to visit. Kidney disease does not have to change the most important things in your life.

Reach out if you need help. Stay in touch with your doctor—and work together to protect your kidneys.

There are thousands of people with kidney disease who take care of themselves and live happy, active lives. They feel well. You can too.

Remember, the more you educate yourself about your condition, the better your chances of living well with it.

A glossary of medical terms

Albumin: A protein found in urine, blood, and other body tissues. It is found in excess amounts in the urine of people with damaged kidneys. (pg. 6)

Artery: A main blood vessel that carries blood from the heart to the rest of the body. (pg. 2)

Bladder: The organ where urine collects before being passed out of the body. (pg. 2)

Blood glucose: Glucose is a kind of sugar. Blood glucose is the sugar present in your blood. A blood test can show the level of blood glucose. High blood glucose may be caused by diabetes. (pg. 5)

Blood pressure: Tells you how hard the heart is working to pump blood through the body. Blood pressure varies with health, age, and stress levels. (pg. 4,5,7)

Creatinine: The waste substance that is produced when muscles are used. Measuring the creatinine level in the blood gives an indication of how well or how poorly the kidneys are working. (pg. 3)

Cysts: Small sacs that form in the body that contain gas, fluids, or partly solid material. (pg. 8)

Diabetes: A disease that causes a high blood glucose (blood sugar) level. Diabetes can cause kidney disease. (pg. 5)

Diabetic nephropathy: Kidney disease, leading to kidney failure, caused by diabetes. (pg. 5)

Dialysis: A treatment that filters the waste products and removes the excess fluid from your body when your kidneys are no longer able to. (pg. 4)

Diastolic: The pressure within the heart at rest after pushing blood through the body. This second number in the equation is used to record blood pressure (e.g., xx/80). (pg. 7)

Glomerular filtration rate: A measure of kidney function calculated from a urine collection. This determines how your kidneys are filtering waste products. A lower number means your kidney function is getting worse. (pg. 3)

Glomerulonephritis: Is caused by inflammation and damage to the filtering unit of the kidney (glomerulus), and may be caused by immune disorders, infection and other causes. It usually affects both kidneys and may be hereditary. (pg. 8)

Glucose: See Blood glucose. (pg. 5)

Hereditary: A disease, trait, or condition that is passed on in a family (blood relatives). (pg. 8)

Hypertension: A more formal term for high blood pressure. Hypertension can cause kidney disease. (pg. 7)

Immune system: The body system that includes organs, tissues, cells, and cell products, like antibodies, that reduce the effects of organisms or substances that might cause disease. (pg. 8)

Insulin: A hormone made by the pancreas. It helps move glucose from the blood into your cells. (pg. 5)

Lupus: A systemic immune disease that can damage the kidneys. (pg. 8)

Microalbuminuria: Too much albumin in the urine, which may indicate that the person is developing kidney disease caused by diabetes. (pg. 6)

Nephrologist: A doctor trained in internal medicine who is a specialist in kidney disease. (pg. 3)

Obstructive uropathy: A blockage of the kidney, ureter, urethra, or bladder, which may be caused by kidney stones or a birth defect. The blockage is any condition that blocks the natural flow of urine out of the kidney, and makes it hard for the kidneys to get rid of wastes and extra fluids. (pg. 8)

Organ: A part inside your body made of specialized tissues that performs a specific job in the body. Your heart, lungs, liver, and kidneys are all organs. (pg. 2)

Polycystic disease: Polycystic means many cysts. Cysts are small sacs that form in the body that contain gas, fluids, or partly solid material. Many cysts in a kidney can cause it to stop working correctly. (pg. 8)

Red blood cells: Blood cells that carry oxygen throughout the body. (pg. 2)

Renal: A medical term that means related to the kidneys. (pg. 2)

Renal artery: An artery is a main blood vessel that carries blood away from the heart. The renal artery carries blood from the heart to the kidney. (pg. 2)

Renal dietitian: A nutrition expert who has further specialized in the effects of diet on the health of people with kidney disease. (pg. 9)

Renal social worker: An expert who helps patients and their families cope with kidney disease and adjust to the feelings they are experiencing. A social worker can also provide information on insurance and other information and resources relating to kidney disease. (pg. 10)

Renal vein: A vein is a blood vessel that carries blood toward the heart. The renal vein carries blood cleaned by the kidneys back to the heart. (pg. 2)

Sodium: A mineral that is present in many foods, especially salty ones. Sodium is very important in controlling blood pressure and in your fluid balance. (pg. 8)

Systolic: The pressure within the heart when it is pumping blood. This first number in the equation is used to record blood pressure (e.g., 110/xx). (pg. 7)

Toxins: Something poisonous is toxic. Some of the wastes produced by the body are toxins. They must be removed from the body by the kidneys or by dialysis, or they will poison the body. (pg. 2)

Transplantation: A treatment for kidney disease. A kidney from a living donor or from someone who has died is surgically placed into a patient's body to perform the work the patient's kidneys can no longer do. (pg. 4)

Ureter: A tube that connects the kidney to the bladder. (pg. 2)

Urethra: A tube that drains urine from the bladder. (pg. 2)

Urinary tract: Urinary means related to urine. Urine contains the extra fluid and waste that the kidneys remove from the body. Urine passes through the urinary tract. (pg. 2)

Urate: The passing of urine out of the body. Urine is the extra fluid and waste removed from the body by the kidneys. (pg. 2)

Urine: The kidneys filter out unneeded fluids and wastes (toxins) that leave the bladder as urine. (pg. 2)

Vein: A vein is a blood vessel that carries blood toward the heart. (pg. 2)

Baxter Healthcare Corporation
Renal Division
1620 Waukegan Road
McGaw Park, IL 60085
1-877-543-6394

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