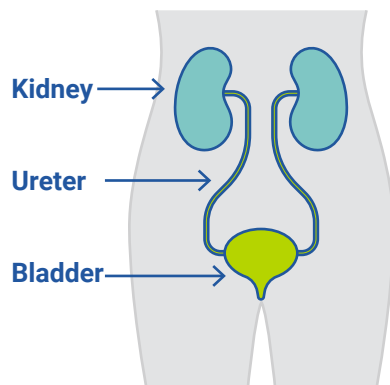


All about the kidneys

WHAT DO YOUR KIDNEYS DO?

The kidneys are two bean-shaped organs located near the middle of your back, one on each side of your spine. Each kidney is connected to the bladder by a thin tube called a ureter.



The kidneys remove waste and extra fluid out of the blood to make urine.

- Every day, your kidneys filter about 30 gallons of blood to remove about two quarts (half a gallon) of extra water and waste products. The waste products in your blood come from the food you eat and the use of your muscles. This waste and extra water make up your urine. Your urine travels to your bladder through tubes called ureters. The bladder stores the urine until you are ready to urinate (pee).
- Without the kidneys, the body would not be able to make urine to get rid of waste. You need at least one kidney to live.

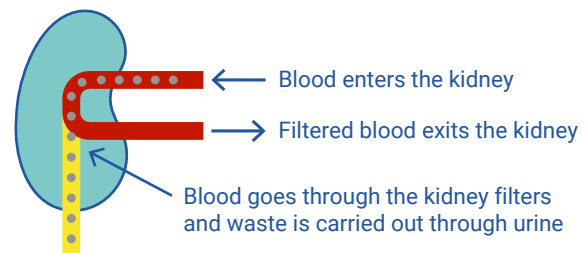
Your kidneys do other important jobs including:

- Control chemicals and fluid in your body
- Help control your blood pressure
- Help keep your bones healthy
- Help your body make red blood cells

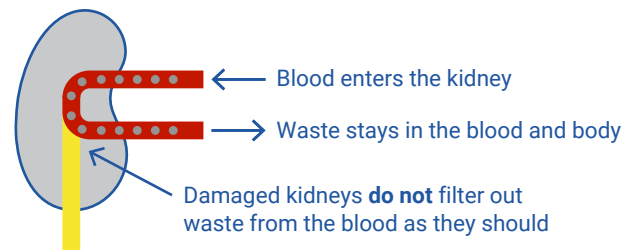
WHAT HAPPENS IN YOUR BODY WHEN YOUR KIDNEYS ARE DAMAGED?

When your kidneys do not work the way they should, they allow waste and water to flow back into your bloodstream instead of sending them out through your urine. This causes waste and water to build up in your body. The problems that are caused by having poor kidney function make it harder for the rest of your body to work the way it should. Kidney failure is when your kidneys do not work at all.

Healthy kidney



Damaged kidney





Diabetes and kidney disease

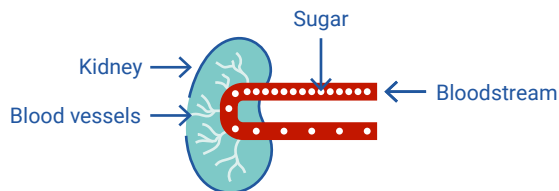
Diabetes is the most common cause of kidney disease. Diabetes is a disease that causes your body to have trouble making or using insulin. Insulin is a hormone (a chemical your body makes) that helps your body turn the sugar you eat and drink into energy. Insulin controls the amount of sugar in your blood, and keeps the sugar at a healthy level.

DIABETES AND YOUR KIDNEYS

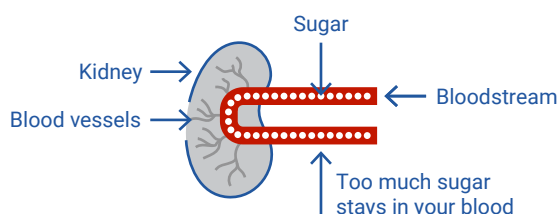
In a person with diabetes, insulin is not used the right way, and too much sugar stays in your blood. Over time, having too much sugar in your blood can damage the small blood vessels in your kidneys and can lead to kidney disease.

Diabetes can also damage the body's nerves. The nerves in your bladder make you feel like you need to urinate (pee) when your bladder is full. If your nerves are damaged, you might not feel the need to urinate. This can cause urine to build up in the bladder, or stay in the bladder too long, which can lead to kidney damage.

Healthy kidney



Diabetic kidney



YOU ARE AT HIGHER RISK FOR DIABETES IF YOU:

- Are over 45 years old
- Are overweight
- Have a family member with diabetes
- Are Black, Hispanic, Native American, Asian American or Pacific Islander
- Have high blood pressure

If you think you might be at risk, talk to your doctor about getting tested.

TESTS FOR DIABETES

Fasting glucose test: measures how much glucose (sugar) is in your blood after fasting (not eating or drinking) overnight.

- ↓ **Low risk of diabetes:** less than 99
- ↑ **High risk of diabetes:** 100 or higher

Non-fasting glucose test: measures how much glucose (sugar) is in your blood about 2 hours after you have had something to eat or drink.

- ↓ **Low risk of diabetes:** less than 140
- ↑ **High risk of diabetes:** 141 or higher

A1C blood test: used to diagnose diabetes or measure how well you are managing your diabetes if you already have it. It measures the average amount of glucose (sugar) that has been in your blood over the last three months.

- ✓ **Normal:** less than 5.7%
- ! **Pre-diabetes:** 5.7%-6.4%
- ! **Diabetes:** 6.5% or higher



Diabetes and kidney disease

CONTROL YOUR DIABETES TO SLOW DOWN KIDNEY DAMAGE AND PREVENT OR DELAY KIDNEY FAILURE.



Control your blood sugar

- Take your medicine exactly the way your doctor told you to.
- If you have diabetes, check your blood sugar often to know your levels. When you have diabetes, your blood sugar should be:
 - 70-130 before eating
 - less than 180 two hours after eating
 - 90-150 at bedtime
- Visit your doctor regularly, and have an A1C blood test at least two times a year. Aim to have an A1C of 7% or less if you have diabetes.



Work with your health care team

- Visit your doctor regularly. Tell them if your blood sugar is often too high or too low.
- Meet with a diabetes educator. A diabetes educator is a healthcare professional who can teach you how to manage your diabetes.



Keep a healthy weight

- Talk to your doctor about how much you should weigh.
- Even losing just a few pounds can make a big difference for your health.



Follow a healthy meal plan

- Meet with a dietitian. A dietitian can help you create a diabetes- and kidney-friendly eating plan that is right for you.
- Keep a low-salt, low-sugar diet. Limit unhealthy fats. Eat less than 13mg saturated fat per day and avoid trans fats (found on a nutrition label).
- Eat nutrient-rich foods like fruits, vegetables and whole grains. Choose foods that are high in fiber. Drink water instead of juice or soda.
- Practice portion control. Fill half your plate with fruits and vegetables, one quarter with lean protein (like chicken breast or fish) and one quarter with whole grains.



Exercise most days of the week

- Set a goal to exercise for 30 minutes a day, 5 days per week.
- Be creative! Try walking, dancing or playing a sport.



Do not smoke or use tobacco

- Smoking can make diabetes and kidney disease worse.
- Get advice from your doctor about how to quit.

For more information about the connection between diabetes and kidney disease, visit: [KidneyFund.org/diabetes](https://www.kidneyfund.org/diabetes)



Blood pressure and kidney disease

High blood pressure is the second most common cause of kidney disease.

Your heart pumps your blood through tubes (blood vessels) called arteries and veins. When your blood moves through the blood vessels, it pushes against the inside of them and creates pressure. Blood pressure is the pressure created inside your arteries and veins when your blood flows through.

BLOOD PRESSURE TEST

A blood pressure test measures how hard your heart is working to pump blood. It uses an inflatable cuff that tightens around your arm and slowly loosens. As it loosens, a meter measures the pressure in your arteries when your heart pumps.

- ✓ **Healthy blood pressure:** less than 120/80 (120 over 80)
- ! **High blood pressure:** 140/90 (140 over 90) or higher. **High blood pressure (hypertension)** means your heart is working too hard to pump your blood. It usually shows no signs. The only way to know if you have high blood pressure is to get tested.

A blood pressure test can be done by your doctor or nurse, at home, or in some pharmacies and grocery stores. Check your blood pressure regularly, and tell your doctor if you get a high result.

HIGH BLOOD PRESSURE AND YOUR KIDNEYS

High blood pressure can cause kidney disease.

When blood flows too forcefully through the tiny blood vessels in your kidneys, this can hurt or weaken these tiny vessels. Over time, this can lead to kidney disease.

Kidney disease can cause high blood pressure.

Healthy kidneys help control your blood pressure. When your kidneys do not work well, they do not do a good job controlling your blood pressure. This can cause high blood pressure.



Blood pressure and kidney disease

KEEP A HEALTHY BLOOD PRESSURE TO SLOW DOWN KIDNEY DAMAGE AND PREVENT OR DELAY KIDNEY FAILURE.



Take your medicine every day, as directed

- Skipping doses of your medicine can be harmful to your health.
- If your doctor told you to take medicine to lower your blood pressure, take your medicine exactly how your doctor told you to.



Follow a heart-healthy meal plan

- There are certain changes you can make in your diet that can help keep your heart healthy.
- Limit salt. Eat less than 2,300 milligrams (mg) of sodium (salt) per day.
- Limit unhealthy fats. Eat less than 13mg saturated fat per day and avoid trans fats (found on a nutrition label).
- Eat nutrient-rich foods like fruits, vegetables and whole grains.
- Talk to a dietitian about how to include heart-healthy foods in your kidney-friendly eating plan.



Do not smoke or use tobacco

- Smoking raises your blood pressure and can make kidney disease worse.
- Get advice from your doctor about how to quit.



Exercise most days of the week

- Exercise is important for heart health.
- Set a goal to exercise for 30 minutes a day, 5 days per week.
- Be creative! Try walking, dancing, or playing a sport. Keep a healthy weight
- Even losing just a few pounds can make a big difference for your health.
- Talk to your doctor about what a healthy weight is for you.



Limit alcohol

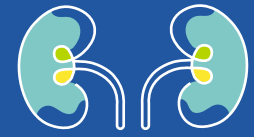
- Drinking too much can increase your blood pressure.
- Men should have no more than 2 drinks per day, women should have no more than 1 drink per day.



Reduce stress

- Stress can raise your blood pressure.
- Work with your doctor to learn ways to manage and cope with stress.

For more information about the connection between high blood pressure and kidney disease, visit: [KidneyFund.org/hbp](https://www.kidneyfund.org/hbp)



How to delay or prevent kidney failure

Just because you were diagnosed with kidney disease does not mean that it will progress to kidney failure. Although damage cannot be fixed, you can take steps to keep your kidneys as healthy as possible for as long as possible and slow down the progression of your kidney disease.

KEEP YOUR KIDNEYS AS HEALTHY AS POSSIBLE.



If you have diabetes, control your blood sugar.



Keep a healthy blood pressure.



Follow a low-fat, low-salt diet.



Take all medicines as your doctor prescribes.



Do not smoke or use tobacco.



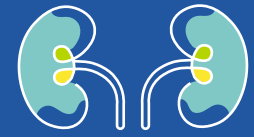
Set a goal to exercise for 30 minutes a day, 5 days per week.



Stay at a healthy weight.

WORK WITH YOUR HEALTH CARE TEAM TO CREATE A TREATMENT PLAN THAT IS RIGHT FOR YOU.

- **Have regular appointments with a nephrologist** to track your kidney disease and get your kidneys checked.
- **Meet with a dietitian** to help you create a kidney-friendly meal plan you can follow. Your doctor may recommend you limit fluids and certain nutrients.
- **Ask your doctor if there are any medicines you should take** to protect your kidneys, such as blood pressure medicines, like ACE inhibitors and ARBs.



How to delay or prevent kidney failure

KNOW WHAT PROGRESSION OF KIDNEY DISEASE MEANS.

Progression is the term used to describe kidney disease moving into higher stage numbers as it gets worse. The higher the number, the worse the damage and the less your kidneys work.

WHAT HAPPENS IF MY KIDNEYS FAIL?

Kidney failure, also called end-stage renal disease (ESRD) or end-stage kidney disease (ESKD), is the last stage of chronic kidney disease. When your kidneys fail, it means they have stopped working well enough for you to survive without dialysis or a kidney transplant. Diabetes and high blood pressure are the most common causes of kidney failure.

Stage of CKD	EGFR	Do I have too much protein in my urine?	What is my risk for kidney disease progression?
No kidney disease	60 or higher	No	Low risk
Stage 1	90 or higher	Yes	Moderate risk
Stage 2	60-89	Yes	Moderate risk
Stage 3a	45-59	Yes	High risk
Stage 3b	30-44	Yes	Very high risk
Stage 4	15-29	Yes	Very high risk
Stage 5 (kidney failure)	less than 15	Yes	Very high risk



Getting started:

What to ask when newly diagnosed with CKD

After finding out you have kidney disease, you may have a lot of questions about your diagnosis and how your life may change. Set aside time to learn more about what it means to have kidney disease, what you can do to take care of yourself, and what your treatment options are. Talking to your doctor and other health care professionals can help you feel more empowered about managing life with kidney disease. Here are some key questions to ask:

QUESTIONS TO ASK ABOUT YOUR KIDNEY DISEASE DIAGNOSIS

- What stage of kidney disease do I have?
- What does my stage mean?
- How did I get kidney disease?
- If my kidney disease starts to get worse, will I feel the difference?
- If I have diabetes, high blood pressure, or both, what does that mean for my kidney disease?

QUESTIONS TO ASK ABOUT YOUR TEST RESULTS

- What tests did you do?
- What do my test results mean?
- Will you test my kidney disease at every visit?
- How long does it take to get the test results back?

QUESTIONS TO ASK ABOUT KIDNEY DISEASE MANAGEMENT

- What do I need to do to slow the progression of kidney disease?
- What new medicines will I need to take to manage my kidney disease?
- How often do I need to visit my primary care provider?
- Are there other specialists I should be seeing? How often?

QUESTIONS TO ASK ABOUT DIALYSIS AND TRANSPLANT

- What is kidney failure?
- Will I need to go on dialysis?
- What happens during a dialysis treatment?
- Will I need a kidney transplant?
- How do I get a kidney transplant?



Stages of chronic kidney disease

There are 5 stages of chronic kidney disease (CKD), from very mild kidney damage in stage 1 to complete kidney failure in stage 5. The stages of kidney disease are based on the **estimated glomerular filtration rate, or eGFR number**, which measures how well your kidneys filter waste and extra fluid from your blood. In the early stages of kidney disease, your kidneys are still able to filter out waste from your blood. In the later stages, your kidneys must work harder to get rid of waste and may stop working altogether.

Stage of CKD	EGFR	Do I have too much protein in my urine?	What is my risk for kidney disease progression?
No kidney disease	60 or higher	No	Low risk
Stage 1	90 or higher	Yes	Moderate risk
Stage 2	60-89	Yes	Moderate risk
Stage 3a	45-59	Yes	High risk
Stage 3b	30-44	Yes	Very high risk
Stage 4	15-29	Yes	Very high risk
Stage 5 (kidney failure)	less than 15	Yes	Very high risk



The only way to track your kidney disease and know how well your kidneys are working is to get tested.



Stages of chronic kidney disease

1 STAGE 1 CKD:
eGFR of 90 or higher with signs of very mild kidney damage

2 STAGE 2 CKD:
eGFR Between 60 and 89 with signs of mild kidney damage

What are signs of kidney damage?

Most of the time, an eGFR of 60 or higher means your kidneys are healthy and working well but in stages 1 and 2, there are other signs of kidney damage like:

- Protein in your urine (pee)
- Physical damage to your kidneys

3 STAGE 3 CKD:
eGFR Between 30 and 59

Stage 3 CKD means there is some damage to your kidneys and they are not working as well as they should.

Stage 3 is separated into two stages:

- Stage 3a means you have an eGFR between 45 and 59
- Stage 3b means you have an eGFR between 30 and 44

Talk to your doctor about what you can do to keep your stage 1-3 kidney disease from getting worse. In these early stages of kidney disease, following a healthy lifestyle can help you prevent or delay kidney failure.

4 STAGE 4 CKD:
eGFR Between 15 and 29

Stage 4 CKD means your kidneys are severely damaged, and are not working as they should. In stage 4, start talking with your nephrologist about how to prepare for kidney failure. Once your kidneys have failed, you will need to start dialysis or have a kidney transplant to live.

What are the symptoms of kidney disease?

Most people with stages 1-3 kidney disease do not have any symptoms. In stage 4 kidney disease, many people have symptoms such as:

- Swelling in your hands and feet
- Back pain
- Urinating (peeing) more or less than normal

Additional symptoms of kidney failure are:

- Itching
- Muscle cramps
- Feeling sick and throwing up
- Not feeling hungry
- Trouble breathing
- Trouble sleeping

5 STAGE 5 CKD:
eGFR Less than 15

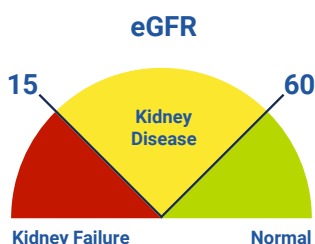
An eGFR less than 15 means the kidneys are getting very close to failure or have completely failed. Stage 5 CKD is also called kidney failure or end-stage renal disease. If your kidneys fail, waste builds up in your blood, which makes you very sick. Once your kidneys have failed, you will need to start dialysis or have a kidney transplant to live. Talk to your doctor about how you can prepare.



Tests for kidney disease

BLOOD CREATININE TEST: ESTIMATED GLOMERULAR FILTRATION RATE (EGFR)

- The way doctors measure how well your kidneys filter waste from your blood is by the estimated glomerular filtration rate (eGFR).
- Your eGFR is a number based on blood tests and other factors.
- Healthy kidneys filter creatinine out of your blood. As your kidney disease gets worse, the amount of creatinine in your blood increases.



eGFR less than 15 is kidney failure and you may need to start dialysis or have a kidney transplant.

eGFR below 60 for 3 months or more means you have kidney disease.

eGFR of 60 or higher usually means your kidneys are working the way they should.

URINE TEST

- A urine test looks for blood or protein (albumin) in your urine.
- A technician will look at a sample of your urine under a microscope to check for blood or protein.

Increased amounts of blood or protein in your urine could be a sign that your kidney disease is getting worse.

BLOOD PRESSURE TEST

- A blood pressure test measures how hard your heart is working to pump your blood.
- High blood pressure is the second most common cause of kidney disease.
- Kidney disease can also cause high blood pressure.
- ✓ **Healthy blood pressure:** Less than 120/80 (120 over 80)
- ! **High blood pressure:** 140/90 (140 over 90) or higher

BODY MASS INDEX (BMI) TEST

- BMI is a measure of body fat based on your height and weight.
- Being overweight or obese can increase your risk of your kidney disease getting worse.

	BMI
Underweight	Less than 18.5
Normal	18.5 - 24.9
Overweight	25 - 29.9
Obese	30 or higher



Tests for kidney disease

TESTS FOR DIABETES

Fasting glucose test: measures how much glucose (sugar) is in your blood after fasting (not eating or drinking) overnight.

- ↓ **Low risk of diabetes:** less than 99
- ↑ **High risk of diabetes:** 100 or higher

Non-fasting glucose test: measures how much glucose (sugar) is in your blood about 2 hours after you have had something to eat or drink.

- ↓ **Low risk of diabetes:** less than 140
- ↑ **High risk of diabetes:** 140 or higher

A1C blood test: used to diagnose diabetes or measure how well you are managing your diabetes if you already have it. It measures the average amount of glucose (sugar) that has been in your blood over the last three months.

- ✓ **Normal:** less than 5.7%
- ! **Pre-diabetes:** 5.7%-6.4%
- ! **Diabetes:** 6.5% or higher

If you have diabetes:

- Check your blood sugar often to know your levels. In most cases, your blood sugar should be:
 - 70-130 before eating
 - less than 180 two hours after eating
 - 90-150 at bedtime
- Aim to have an A1C of 7% or less if you have diabetes.

IMPORTANT THINGS TO REMEMBER

- 1** Diabetes and high blood pressure are the most common causes of chronic kidney disease and kidney failure.
- 2** Keep a healthy blood sugar level and a healthy blood pressure to slow kidney damage and prevent or delay kidney failure.
- 3** Treating kidney disease early may help prevent kidney failure. Take all medicines the way your doctor prescribes.
- 4** Get regular blood and urine tests to monitor your kidney disease and track how well your kidneys are working.

For more information about testing for kidney disease, visit: [KidneyFund.org/tests](https://www.kidneyfund.org/tests)



10 kidney-friendly eating tips for every stage of kidney disease

What you eat and drink affects your health. Eating a healthy portion of kidney-friendly foods helps keep your kidneys healthy for as long as possible. Making changes to the way you eat and the amount of fluids you consume may help you prevent further damage to your kidneys and slow down the progression to kidney failure.



Avoid added salt to keep a healthy blood pressure and prevent fluid buildup in your body.

- Use fresh or dried herbs and spices to add extra flavor to your dishes, instead of salt.
- Shop for snacks, canned and jarred foods that say "no salt added" on the package.



Eat less fat to stay at a healthy weight and lower your risk for heart disease.

- Bake, grill or broil your foods instead of frying them.
- Shop for fat-free or low-fat dairy products, salad dressing and mayonnaise.



Avoid excess sugar to prevent unwanted weight gain and high blood sugar.

- Choose foods with natural sugar, like fruit, as a healthy alternative to sweets, like cookies, cakes and candies.
- Check food labels of packaged foods for hidden sugars.



Eat plenty of fruits and vegetables.

- Fill half of your plate with fruit and non-starchy vegetables for a variety of vitamins, minerals, nutrients and fiber.



Choose whole grains for carbs that are full of nutrients and give your body energy.

- Look for foods that say "made with 100% whole grains" on the package.



Ask your doctor and dietitian how much lean protein you should have each day.

- Starting in stage 3 kidney disease, you may need to limit the protein you eat. This prevents your kidneys from having to work harder to filter protein waste, which could wear them out faster.



Ask your doctor and dietitian how much fluid you should have each day.

- Starting in stage 3 kidney disease, you may need to limit your fluid intake, so your kidneys do not have to work as hard. Fluid can build up in your body, make you feel bloated and uncomfortable, and make your blood pressure go up.



Ask your doctor and dietitian about your potassium and phosphorus levels.

- You may need to limit your phosphorus or potassium intake. Your doctor may also prescribe medicines called binders to control the level of these nutrients in your blood. High potassium and high phosphorus can have negative health effects.



Meet with a dietitian to help you create a kidney-friendly food and fluid plan that works for you and your family.



For more tips, kidney-friendly recipes and guides to help you cook and shop, visit: [KidneyFund.org/KidneyKitchen](https://www.kidneyfund.org/KidneyKitchen)