

STAGES  
1-4

# Diabetes and Chronic Kidney Disease









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## Stages of chronic kidney disease

There are 5 stages of kidney disease as shown in the table below. Your healthcare provider will tell you the stage of kidney disease, based on how well your kidneys are working and your estimated glomerular filtration rate (eGFR). The eGFR number comes from a lab test that measures the amount of blood your kidneys are filtering each minute. As CKD gets worse, the eGFR number goes down.

### STAGES OF KIDNEY DISEASE

STAGE	DESCRIPTION	ESTIMATED GLOMERULAR FILTRATION RATE (eGFR)	KIDNEY FUNCTION
1	Kidney damage (e.g., protein in the urine) with <b>normal</b> kidney function	90 or above	 90-100%
2	Kidney damage with <b>mild loss</b> of kidney function	60 to 89	 60-89%
3a	<b>Mild to moderate</b> loss of kidney function	45 to 59	 45-59%
3b	<b>Moderate to severe</b> loss of kidney function	30 to 44	 30-44%
4	<b>Severe loss</b> of kidney function	15 to 29	 15-29%
5	Kidney <b>failure</b>	Less than 15	 Less than 15%

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## What is diabetes?

Diabetes is a serious disease. It occurs when your body does not make enough insulin or cannot use the insulin it makes. Insulin is a hormone. It controls the amount of sugar (called glucose) in your blood. A high blood sugar level can cause problems in many parts of your body.

## Are there different types of diabetes?

Yes. There are two main types:

### TYPE 1 DIABETES

If you have this type of diabetes, your body does not make insulin. It usually starts when you are a child or young adult, but it can occur at any age. It is treated by taking daily insulin shots or using an insulin pump and by following a special meal plan. In America, 5.2 percent of diagnosed adult diabetes cases are type 1.

### TYPE 2 DIABETES

If you have this type of diabetes, your body makes some insulin but cannot use it properly. Type 2 is partially preventable and is typically brought on by poor diet and lack of exercise. Very often heredity plays a part. It usually starts when you are over age 40, but it can happen earlier. It is treated with exercise, weight loss, and special meal planning. People with type 2 diabetes may need insulin, but in most cases medications given in pills (called hypoglycemics) are prescribed if diet and exercise alone do not control the disease. Type 2 is the most common type of diabetes.

## How does diabetes affect my body?

When diabetes is not well controlled, the sugar level in your blood goes up. This is called *hyperglycemia*. High blood sugar can cause damage to many parts of your body, especially:

- kidneys
- heart
- blood vessels
- eyes
- feet
- nerves

Diabetes can also cause high blood pressure and hardening of the arteries (called arteriosclerosis). These can lead to heart and blood vessel disease.





## What is chronic kidney disease?

Your kidneys are important because they keep the rest of your body in balance. They:

- Remove waste products from the body
- Balance the body's fluids
- Help keep blood pressure under control
- Keep bones healthy
- Help make red blood cells

Chronic kidney disease (CKD) means that the kidneys have been damaged. Kidneys can get damaged from a physical injury or a disease like diabetes or high blood pressure. Once your kidneys are damaged, they

cannot filter your blood or do other jobs as well as they should. There are five stages of kidney disease (see page 2). Treatment in the early stages can help keep kidney disease from getting worse.

### **Are people with diabetes at greater risk for getting kidney disease?**

Yes. About a third of people with diabetes may get chronic kidney disease. Certain groups may have a higher risk of getting kidney disease than others. Your risk may be greater if you:

- Are age 60 or older
- Have high blood pressure
- Have a family member who has kidney failure
- Are overweight or obese

Usually, developing kidney disease is not because of any one single reason, but due to a number of physical, environmental, and social factors.

## What can people with diabetes do to prevent kidney disease?

People with diabetes can take steps to avoid developing kidney disease or kidney failure. Talk to your healthcare provider about your risks for developing kidney disease. The best way to prevent developing kidney disease from diabetes is to:

- Control your blood sugar level
- Keep blood pressure under control
- Ask your healthcare provider to test you for kidney disease at least once each year
- Take medicines to help control your blood glucose, cholesterol, and blood pressure if your healthcare provider orders them for you
- Follow your diet for diabetes
- Get regular exercise
- Avoid alcohol
- Do not smoke
- See your healthcare provider as often as you are told





## How does diabetes harm the kidneys?

Diabetes can harm the kidneys by causing damage to:

### **BLOOD VESSELS IN THE KIDNEYS**

The filtering units of the kidney are filled with tiny blood vessels. Over time, high sugar levels in the blood can cause these vessels to become narrow and clogged. Without enough blood, the kidneys become damaged and albumin (a type of protein) passes through these filters and ends up in the urine where it should not be.

### **NERVES IN YOUR BODY**

Diabetes can also cause damage to the nerves in your body. Nerves carry messages between your brain and all other parts of your body, including your bladder. They let your brain know when your bladder is full. But if the nerves of the bladder are damaged, you may not be able to feel when your bladder is full. The pressure from a full bladder can damage your kidneys.

## URINARY TRACT

If urine stays in your bladder for a long time, you may get a urinary tract infection. This is because of bacteria. Bacteria are tiny organisms, like germs, that can cause disease. They grow rapidly in urine with a high sugar level. Most often these infections affect the bladder, but they can sometimes spread to the kidneys.



## How do I know if I have kidney damage?

Most people with early kidney damage do not have symptoms. The best way to find early kidney damage is to have a **urine test** called uACR once a year. This test checks for very small amounts of protein in the urine. It helps detect kidney damage at an early stage in people with diabetes.

If your uACR is positive, your healthcare professional will want to find out how well your kidneys are working. This will help to determine the best treatment for you. Your healthcare provider will start by:

### CHECKING YOUR eGFR (ESTIMATED GLOMERULAR FILTRATION RATE)

eGFR is the best way to find out how well your kidneys are working. Your healthcare provider will begin by testing your blood for a waste product called creatinine. When the kidneys are damaged, they have trouble removing creatinine from your blood. Creatinine is stored in muscle tissue and blood. The blood test for creatinine will help your healthcare professional find out how well your kidneys are working. But it is only the first step of the eGFR test.

Next, your healthcare professional or lab will take the result of your creatine test and put it into a math calculation that includes your age and gender. The number that results from this calculation is called your eGFR (estimated glomerular filtration rate). It tells your healthcare professional how well your kidneys are working. You should have this test at least once a year.

Once your eGFR is known, your healthcare professional can tell which stage of kidney disease you have. There are five stages of kidney disease (see the chart on page 2). Your treatment will depend on your stage of kidney disease.

### **ORDERING A KIDNEY BIOPSY**

Your healthcare professional may also order a kidney biopsy. This can help your healthcare professional find the main cause of your kidney disease. Not all kidney damage is caused by diabetes. Other diseases can be involved. If your kidney disease is caused by diabetes, it is called diabetic kidney disease.

Your healthcare professional will begin treatment based on the stage of kidney disease you have and what caused it. With the right treatment, you and your healthcare professional can keep your kidneys working as long as possible.

Not everyone with kidney disease gets kidney failure. With the right treatment, you can help keep kidney disease from getting worse.



## What can be done to keep my kidneys working as long as possible?

Your healthcare professional should plan your treatment with you and your family. Some patients may be asked to see a kidney doctor, called a nephrologist. A kidney dietitian may be helpful too. The following things can help your kidneys work better and last longer:

### CONTROLLING YOUR BLOOD SUGAR

The best way to prevent or slow kidney damage is to keep your blood sugar well controlled. This is usually done with diet, exercise, and, if needed, insulin or hypoglycemic pills (to lower your blood sugar level).

Your healthcare professional may also recommend that you start taking an SGLT2 inhibitor. Originally, SGLT2 inhibitors were developed as oral antidiabetic (blood sugar lowering) drugs. Later clinical trial data showed significant improvement in kidney function in people with diabetes who already had diabetic nephropathy.

SGLT2 inhibitors have been found to be effective at slowing the progression of kidney disease, reducing heart failure, and lowering the risk of kidney failure and death in people with kidney disease and type 2 diabetes. SGLT2 inhibitors also protect the kidneys in people with CKD who do not have diabetes.

A test called hemoglobin A1C should be done every three to six months to check your blood sugar. Ask your healthcare professional what your test result

should be. Daily blood sugar levels should also be checked so that your medication doses can be adjusted as needed.

### **CONTROLLING HIGH BLOOD PRESSURE**

High blood pressure can increase your chances of developing kidney failure. Ask your healthcare professional what your blood pressure target should be. You will probably need a medication called an ACE (angiotensin converting enzyme) inhibitor or an ARB (angiotensin receptor blocker) to control your blood pressure. In many cases, more than one high blood pressure medicine may be needed to reach this target.

Studies have shown that the use of these medicines can slow the loss of kidney function in people with diabetes—even if your blood pressure is normal. They also help reduce heart disease in people with diabetes. In addition, your healthcare professional may prescribe a diuretic (water pill) to help remove salt and water from your blood.

### **PROTECTING KIDNEY FUNCTION BY TAKING ACE INHIBITORS OR ARBS**

Your healthcare professional may have you take high blood pressure medicines (called ACE inhibitors or ARBs) even if your blood pressure is normal. Research suggests that these medicines can slow the loss of kidney function in people with diabetes—even those with normal blood pressure.



### **LIMITING HOW MUCH PROTEIN YOU EAT**

People with diabetes and kidney disease should eat enough protein for good health, but avoid overeating it. Research suggests that eating less protein can slow kidney damage. You should talk to your healthcare professional about this. If you need to go on a low-protein diet, you must plan this with a dietitian who specializes in kidney disease. Do not go on this type of diet without talking to a dietitian so that you have a healthy approach to dietary changes.

### **PROMPTLY REPORTING TO YOUR HEALTHCARE PROFESSIONAL ANY DIFFICULTY PASSING URINE**

Early treatment for urinary tract infections is important. Some signs of urinary infection could be: frequent need to urinate, burning or pain with urination, cloudy or blood-spotted urine, or a strong odor to your urine.

### **LIMITING THE AMOUNT OF SALT IN YOUR DIET**

Help control high blood pressure and reduce body swelling by not eating as much salt.

### **NOT USING MEDICINES THAT MAY DAMAGE THE KIDNEYS**

NSAIDs (non-steroidal anti-inflammatory drugs), such as ibuprofen and naproxen, can be very hard on the kidneys.

### **CHECKING WITH YOUR HEALTHCARE PROFESSIONAL**

Before taking any herbal supplements, make sure you speak with your doctor.

### **PREVENTING FURTHER DAMAGE TO LARGER BLOOD VESSELS**

(such as those in the brain and heart) By keeping cholesterol and lipid levels under control, you can prevent any further damage to large blood vessels, including those in the brain and heart.

### **What about cholesterol and lipids?**

Many people with diabetes and kidney disease have high levels of lipids in the blood. Lipids are fatty substances like cholesterol. High blood lipid levels can cause the blood vessels to become clogged. This lessens the blood supply to the heart and brain, and raises your chance of having a heart attack or stroke. Your healthcare professional will check your cholesterol and lipids at least once a year. If they are too high, you may need drugs called statins to help lower them.





## What about pregnancy?

Having both diabetes and kidney disease is serious. It can affect your health and the health of your unborn child. If you are thinking about becoming pregnant, talk to your healthcare team. If you become pregnant, you should be under the care of a specialist in high-risk pregnancy and a specialist in kidney disease. Some women may also have a higher risk for kidney failure during pregnancy. You should:

- Keep your blood sugar levels under control
- Ask your healthcare professional about using insulin to control your blood sugar while pregnant
- Tell your healthcare professional about any medicines you are taking, especially medicines for high blood pressure or high cholesterol

With good healthcare and careful blood sugar control, it is possible to have a healthy pregnancy.

## Key points to remember

- About a third of people with diabetes may develop kidney failure.
- Because diabetes may harm the blood vessels in the body, it can cause kidney damage.
- Early kidney damage from diabetes can be found by a test called uACR that checks for a tiny amount of protein in the urine. A test called eGFR lets your healthcare professional know how much kidney function you have.
- Treatment with some high blood pressure medicines called ACE inhibitors or ARBs can slow the loss of kidney function in people with diabetes, even in people with normal blood pressure.
- Treatment with oral antidiabetic (blood sugar lowering) drugs called SGLT2 inhibitors can slow the loss of kidney function in people with and without diabetes.
- Reducing the amount of sodium (salt) in your diet may be needed if there is kidney damage or high blood pressure. The most common form of sodium is found in table salt.
- Other things that can cause kidney damage and affect kidney function are: blocking of urine flow, urinary tract infection, and certain medicines (especially NSAIDs such as ibuprofen [Motrin®] and naproxen [Aleve®]).

- Early kidney disease rarely has symptoms. That is why it is so important to be tested regularly by your healthcare professional for kidney damage. An early sign of kidney damage is protein in the urine.
- If chronic kidney disease causes kidney failure, you will need hemodialysis, peritoneal dialysis, or a kidney transplant to replace the work of your kidneys. The type of treatment that is best depends on overall health, lifestyle, and personal preference.
- Diet is a very important part of the treatment for all patients with diabetes, even if they do not have chronic kidney disease.



## Diabetes: A growing epidemic

### Did you know these facts about diabetes?

- As of 2018, over 34 million people in the United States (about 10.5 percent of the population) have diabetes, and 7.3 million people do not even know they have the disease.
- Diabetes is the leading cause of chronic kidney disease.
- Diabetes accounts for 40 to 45 percent of kidney failure.
- Worldwide, 422 million people have diabetes.
- Almost 37 percent of people older than 65 years have diabetes.



## Where can I get more information?

If you have questions, speak with your healthcare team. They know your medical history best and can help to answer your questions.

There are two ways to learn about the many free English and Spanish resources available to you:

- Call the NKF Cares Patient Information Help Line toll-free at **855.NKF.CARES** (855.653.2273) or email **[nkfcares@kidney.org](mailto:nkfcares@kidney.org)**
- Learn more at **[kidney.org](https://www.kidney.org)**

Becoming an educated patient is very important to being healthy!

## Other Resources

### Association of Diabetes Care & Education Specialists

125 S Wacker Dr  
Suite 600  
Chicago, IL 60606  
800.338.3633  
**diabeteseducator.org**

### American Diabetes Association

ATTN: Center for Information  
2451 Crystal Drive, Suite 900  
Alexandria, VA 22202  
800.DIABETES (800.342.2383)  
**diabetes.org**

## Setting a standard for care

The National Kidney Foundation, through its *Kidney Disease Outcomes Quality Initiative* (KDOQI®), defines stages of kidney disease and offers guidelines that help your doctor and healthcare team make important decisions about your medical treatment.

The information in this booklet is based on those recommended guidelines.



*The information contained in this publication is based on current data and expert guidance available at the time of publication. The information is intended to help patients become aware of their disease and its management. This publication is not intended to set out a preferred standard of care and should not be construed as one. Neither should the information be interpreted as prescribing an exclusive course of management. Patients should always consult with their healthcare providers regarding decisions about their individual plan of care.*



# NATIONAL KIDNEY FOUNDATION®

The National Kidney Foundation is revolutionizing the fight to save lives by eliminating preventable kidney disease, accelerating innovation for the dignity of the patient experience, and dismantling structural inequities in kidney care, dialysis, and transplantation.

30 E. 33RD ST. | NEW YORK, NY 10016 | 800.622.9010

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