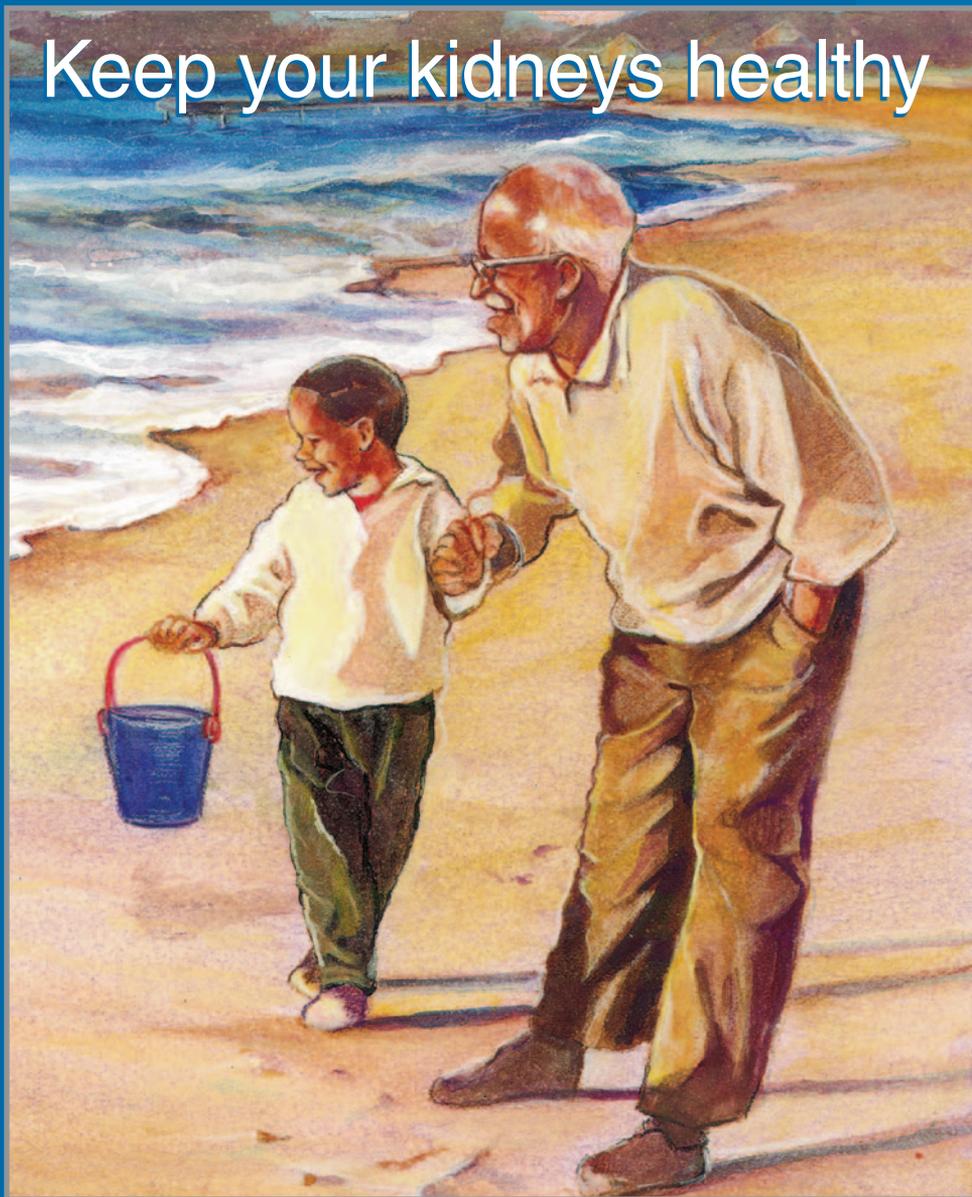


# Prevent diabetes problems

# Keep your kidneys healthy



U.S. Department  
of Health and  
Human Services

NATIONAL INSTITUTES OF HEALTH

**NIDDK** | NATIONAL INSTITUTE OF  
DIABETES AND DIGESTIVE  
AND KIDNEY DISEASES

National Diabetes Information Clearinghouse



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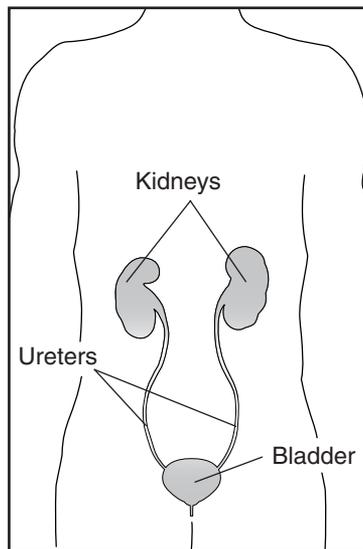
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## What are diabetes problems?

Too much glucose in the blood for a long time can cause diabetes problems. This high blood glucose, also called blood sugar, can damage many parts of the body, such as the heart, blood vessels, eyes, and kidneys. Heart and blood vessel disease can lead to heart attacks and strokes. You can do a lot to prevent or slow down diabetes problems.



Your kidneys are two bean-shaped organs about the size of your fist. They are located just below the rib cage, near your back.

## What should I do each day to stay healthy with diabetes?



Follow the healthy eating plan that you and your doctor or dietitian have worked out.



Be active a total of 30 minutes most days. Ask your doctor what activities are best for you.



Take your medicines as directed.



Check your blood glucose every day. Each time you check your blood glucose, write the number in your record book.



Check your feet every day for cuts, blisters, sores, swelling, redness, or sore toenails.



Brush and floss your teeth every day.



Control your blood pressure and cholesterol.



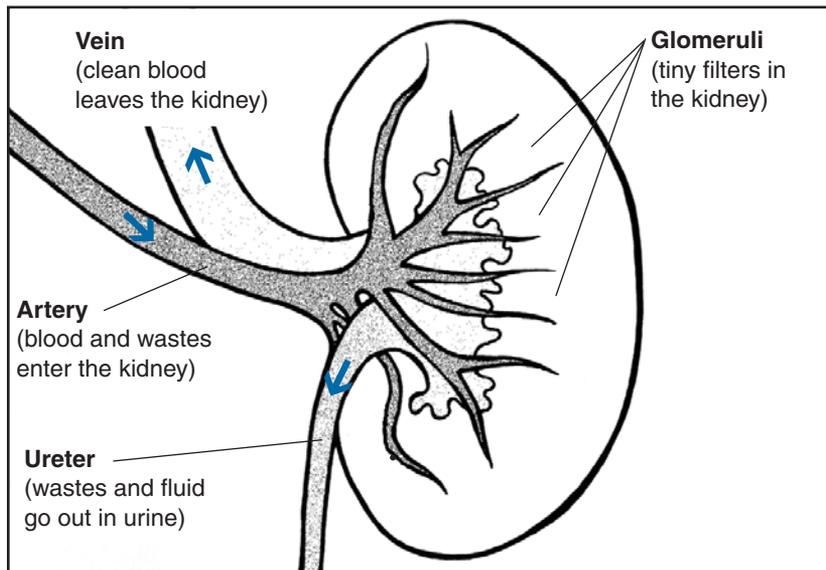
Don't smoke.

## What do my kidneys do?

The kidneys act as filters to clean the blood. They get rid of wastes and send along filtered fluid.

The tiny filters in the kidneys are called **glomeruli**.\*

When kidneys are healthy, the **artery** brings blood and wastes from the bloodstream into the kidneys. The glomeruli clean the blood. Then wastes and extra fluid go out into the urine through the ureter. Clean blood leaves the kidneys and goes back into the bloodstream through the vein.



You have two kidneys. Your kidneys clean your blood and make urine. This drawing shows a cross section of a kidney.

\*See page 14 for tips on how to say the words in **bold** type.

## How can I prevent diabetes kidney problems?

- Keep your blood glucose as close to your goal as you can. For many people, this level is as close to normal as possible. For others, a higher blood glucose goal may be better. Ask your doctor what blood glucose numbers are healthy for you.
- Keep your blood pressure below 130/80 to help prevent kidney damage. Blood pressure is written with two numbers separated by a slash. For example, 120/70 is said as “120 over 70.”

For some people, a higher blood pressure goal may be better. Ask your doctor what numbers are best for you. If you take blood pressure pills every day, take them as your doctor tells you. Keeping your blood pressure under control will also slow down or prevent damage to your eyes, heart, and blood vessels.



Keep your blood pressure under good control.

- Ask your doctor if you should take pills to slow down kidney damage. Two kinds are available:
  - ACE (**angiotensin**-converting enzyme) **inhibitor**
  - ARB (angiotensin receptor blocker)
- Follow the healthy eating plan you work out with your doctor or dietitian. If you already have kidney problems, your dietitian may suggest you cut back on protein, especially animal products such as meat, milk, cheese, and eggs.
- Have your kidneys checked at least once a year by having your urine tested for protein. This test is called the urinary **albumin** test.
- Have your blood tested at least once a year for **creatinine**. The result of this test should be used to find your **glomerular** filtration rate (GFR), a measure of kidney function.



Pills can help you control your blood pressure and slow down kidney damage.

- Have any other kidney tests your doctor thinks you need.
- Avoid taking painkillers regularly. Daily use of pills like aspirin or acetaminophen can damage the kidneys. Taking a single dose of aspirin every day to protect the heart, however, should be safe. Taking acetaminophen for occasional pain should also be safe. But if you are dealing with chronic pain, such as arthritis, work with your doctor to find a way to control your pain without putting your kidneys at risk.
- See a doctor right away for bladder or kidney infections. You may have an infection if you have these symptoms:
  - pain or burning when you urinate
  - a frequent urge to go to the bathroom
  - urine that looks cloudy or reddish
  - fever or a shaky feeling
  - pain in your back or on your side below the ribs

## How can my doctor protect my kidneys during special x-ray tests?

X-ray tests using a contrast agent pose a risk to your kidneys. If you need x rays, your doctor can give you extra fluid and medicine before and after the x rays to protect your kidneys. Or your doctor may decide to order a test that does not use a contrast agent.

## How can diabetes hurt my kidneys?

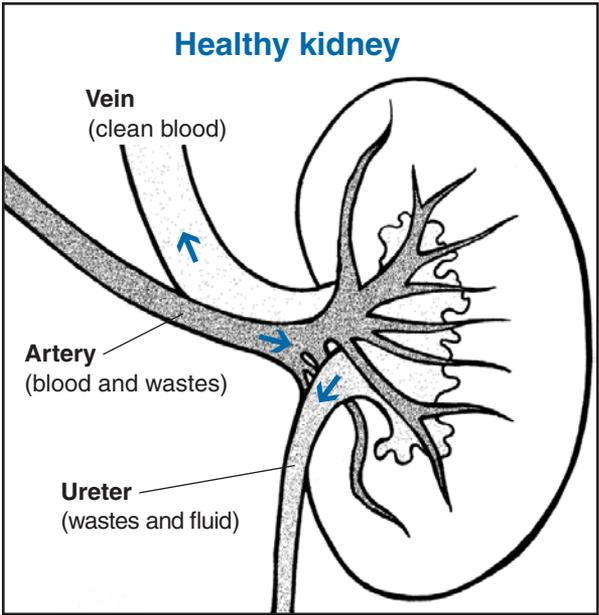
When the kidneys are working well, the tiny filters in your kidneys, the glomeruli, keep blood proteins inside your body. You need these proteins to stay healthy.

High blood glucose and high blood pressure damage the kidneys' filters. When the kidneys are damaged, proteins leak out of the kidneys into the urine. The urinary albumin test detects this loss of protein in the urine. Damaged kidneys do not do a good job of filtering out wastes and extra fluid. Wastes and fluid build up in your blood instead of leaving the body in urine.

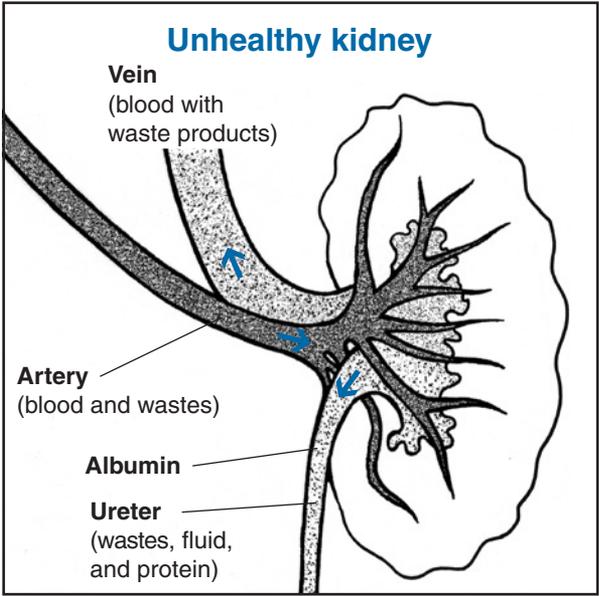
Kidney damage begins long before you notice any symptoms. An early sign of kidney damage is when your kidneys leak small amounts of a protein called albumin into the urine. But the only way to know about this leakage is to have your urine tested.

With more damage, the kidneys leak more and more protein. More and more wastes build up in the blood. This damage gets worse until the kidneys fail.

Diabetic kidney disease (DKD) is the medical term for kidney problems caused by diabetes. DKD affects both kidneys at the same time.



No albumin, a protein, is leaking from the healthy kidney.



Albumin, a protein, is leaking from the healthy kidney.

## What can I do if I have kidney problems caused by diabetes?

Once you have kidney damage, you can slow it down or stop it from getting worse by controlling your blood glucose and blood pressure. Taking an ACE inhibitor or an ARB is important for both controlling your blood pressure and reducing kidney damage. However, if you are pregnant, you should not take an ACE inhibitor or ARB.

If you have diabetes, you should have your urine and blood tested regularly to see how well your kidneys are working. The test results should be given to you as your urine albumin and GFR results.



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Keeping blood pressure under control helps to keep your kidneys healthy.

## How will I know if my kidneys fail?

At first, you cannot tell. Kidney damage from diabetes happens so slowly that you may not feel sick at all for many years. You will not feel sick even when your kidneys do only half the job of normal kidneys. You may not feel any signs of kidney failure until your kidneys have almost stopped working. However, getting your urine and blood checked every year can tell you how well your kidneys are working.

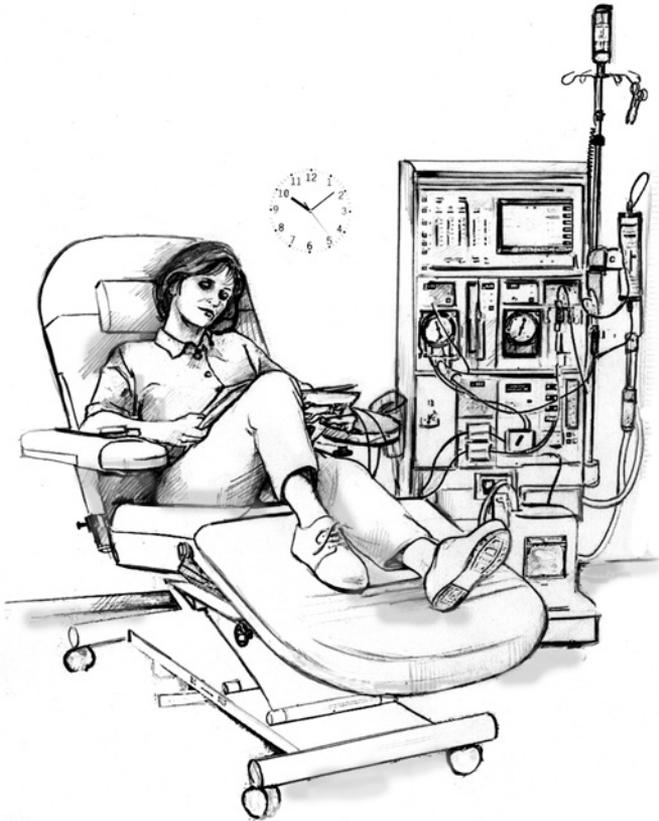
Once your kidneys fail, you may feel sick to your stomach and tired all the time. Your hands and feet may swell from extra fluid in your body.



You may feel sick to your stomach when your kidneys stop working.

## What happens if my kidneys fail?

One way to treat kidney failure is with **dialysis**. Dialysis is a treatment that does some of the work your kidneys used to do. Two types of dialysis are available (see page 12). You and your doctor will decide what type will work best for you.



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Dialysis is a treatment that takes waste products and extra fluid out of your body.

1. **Hemodialysis.** In **hemodialysis**, your blood flows through a tube from your arm to a machine that filters out the waste products and extra fluid. The clean blood flows back to your arm.
2. **Peritoneal dialysis.** In **peritoneal** dialysis, your belly is filled with a special fluid. The fluid collects waste products and extra water from your blood. Then the fluid is drained from your belly and thrown away.

Another way to treat kidney failure is to have a kidney transplant. This operation gives you a new kidney. The kidney can be from a close family member, friend, or someone you do not know. A new kidney must be a good match for your body. You may be on dialysis for a long time because many people are on a waiting list for a new kidney from donors they do not know. You are more likely to have a kidney transplant if you know someone who is able to donate a kidney to you.

## Will I know if I start to have kidney problems?

Not likely. You will know you have kidney problems if your doctor checks your blood for creatinine to measure your GFR and your urine for albumin. Do not wait until you feel ill to have your blood and urine checked for signs of DKD.

## How can I find out if I have kidney problems?

Two lab tests can tell you and your doctor how well your kidneys are working.

- Each year, make sure your doctor checks a sample of your urine to see if your kidneys are leaking small amounts of albumin.
- At least once each year, your doctor should check your blood to measure the amount of creatinine. Creatinine is a waste product your body makes. If your kidneys are not cleaning waste products from your blood, they can build up and make you sick. Your doctor can use your creatinine level to check your GFR. Results of this test tell you how well your kidneys are removing wastes from the blood.

## Pronunciation Guide

**albumin** (al-BYOO-min)

**angiotensin** (AN-jee-oh-TEN-sin)

**artery** (AR-tur-ee)

**creatinine** (kree-AT-ih-noon)

**dialysis** (dy-AL-ih-siss)

**glomerular** (gloh-MAIR-yoo-lur)

**glomeruli** (gloh-MAIR-yoo-ly)

**hemodialysis** (HEE-moh-dy-AL-ih-siss)

**inhibitor** (in-HIB-ih-tur)

**peritoneal** (PAIR-ih-toh-NEE-uhl)

## For More Information

**Diabetes Teachers** (nurses, dietitians, pharmacists, and other health professionals)

To find a diabetes teacher near you, call the American Association of Diabetes Educators toll-free at 1-800-TEAMUP4

(1-800-832-6874), or look on the Internet at [www.diabeteseducator.org](http://www.diabeteseducator.org) and click on “Find a Diabetes Educator.”



### **Dietitians**

To find a dietitian near you, contact the American Dietetic Association at [www.eatright.org](http://www.eatright.org) and click on “Find a Nutrition Professional.”

### **Government**

The National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC) is part of the National Institutes of Health (NIH). To learn more about kidney problems, write or call NKUDIC, 3 Information Way, Bethesda, MD 20892-3580, 1-800-891-5390; or see [www.kidney.niddk.nih.gov](http://www.kidney.niddk.nih.gov) on the Internet.

The National Kidney Disease Education Program (NKDEP) is part of the NIH. To learn more about kidney problems, write or call NKDEP, 3 Kidney Information Way, Bethesda, MD 20892, 1-866-454-3639; or see [www.nkdep.nih.gov](http://www.nkdep.nih.gov) on the Internet.

To get more information about taking care of diabetes, contact

**National Diabetes Information Clearinghouse**

1 Information Way

Bethesda, MD 20892-3560

Phone: 1-800-860-8747

TTY: 1-866-569-1162

Fax: 703-738-4929

Email: [ndic@info.niddk.nih.gov](mailto:ndic@info.niddk.nih.gov)

Internet: [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov)

**National Diabetes Education Program**

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Bethesda, MD 20814-9692

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TTY: 1-866-569-1162

Fax: 703-738-4929

Email: [ndep@mail.nih.gov](mailto:ndep@mail.nih.gov)

Internet: [www.ndep.nih.gov](http://www.ndep.nih.gov)

**American Diabetes Association**

1701 North Beauregard Street

Alexandria, VA 22311

Phone: 1-800-DIABETES (1-800-342-2383)

Internet: [www.diabetes.org](http://www.diabetes.org)

**Juvenile Diabetes Research Foundation  
International**

26 Broadway, 14th Floor

New York, NY 10004

Phone: 1-800-533-CURE (1-800-533-2873)

Fax: 212-785-9595

Email: [info@jdrf.org](mailto:info@jdrf.org)

Internet: [www.jdrf.org](http://www.jdrf.org)

**National Kidney Foundation**

30 East 33rd Street

New York, NY 10016

Phone: 1-800-622-9010

Internet: [www.kidney.org](http://www.kidney.org)

## More in the Series

The Prevent Diabetes Problems Series has seven booklets that can help you learn more about how to prevent diabetes problems.



For free single copies of these booklets, write, call, fax, or email the

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1 Information Way  
Bethesda, MD 20892-3560  
Phone: 1-800-860-8747  
TTY: 1-866-569-1162  
Fax: 703-738-4929  
Email: [ndic@info.niddk.nih.gov](mailto:ndic@info.niddk.nih.gov)

These booklets are also available at [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov) on the Internet.

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Internet: [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov)

The National Diabetes Information Clearinghouse (NDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIDDK is part of the National Institutes of Health of the U.S. Department of Health and Human Services. Established in 1978, the Clearinghouse provides information about diabetes to people with diabetes and to their families, health care professionals, and the public. The NDIC answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and Government agencies to coordinate resources about diabetes.

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