

High Blood Pressure and Kidney Disease

National Kidney and Urologic Diseases Information Clearinghouse



U.S. Department of Health and Human Services

NATIONAL INSTITUTES OF HEALTH

NIDDK
NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

The kidneys play a key role in keeping a person's blood pressure in a healthy range, and blood pressure, in turn, can affect the health of the kidneys. High blood pressure, also called hypertension, can damage the kidneys and lead to chronic kidney disease (CKD).

What is high blood pressure?

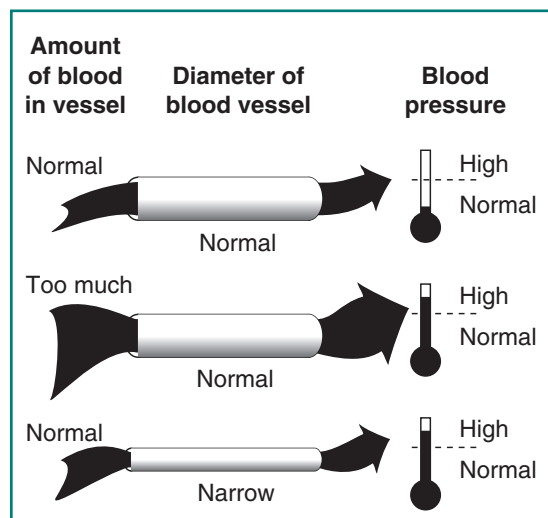
Blood pressure measures the force of blood against the walls of the blood vessels. Extra fluid in the body increases the amount of fluid in blood vessels and makes blood pressure higher. Narrow, stiff, or clogged blood vessels also raise blood pressure.

People with high blood pressure should see their doctor regularly.

How does high blood pressure hurt the kidneys?

High blood pressure makes the heart work harder and, over time, can damage blood vessels throughout the body. If the blood vessels in the kidneys are damaged, they may stop removing wastes and extra fluid from the body. The extra fluid in the blood vessels may then raise blood pressure even more. It's a dangerous cycle.

High blood pressure is one of the leading causes of kidney failure, also called end-stage renal disease (ESRD). People with kidney failure must either receive a kidney transplant or have regular blood-cleansing treatments called dialysis. Every year, high blood pressure causes more than 25,000 new cases of kidney failure in the United States.¹



Hypertension can result from too much fluid in normal blood vessels or from normal fluid in narrow, stiff, or clogged blood vessels.

What are the signs and symptoms of high blood pressure?

Most people with high blood pressure have no symptoms. The only way to know whether a person's blood pressure is high is to have a health professional measure it with a blood pressure cuff. The result is expressed as two numbers. The top number, called the systolic pressure, represents the pressure when the heart

¹United States Renal Data System. *USRDS 2007 Annual Data Report*. Bethesda, MD: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, U.S. Department of Health and Human Services; 2007.

is beating. The bottom number, called the diastolic pressure, shows the pressure when the heart is resting between beats. A person's blood pressure is considered normal if it stays at or below 120/80, which is commonly stated as "120 over 80." People with a systolic blood pressure of 120 to 139 or a diastolic blood pressure of 80 to 89 are considered prehypertensive and should adopt lifestyle changes to lower their blood pressure and prevent heart and blood vessel diseases. A person whose systolic blood pressure is consistently 140 or higher or whose diastolic pressure is 90 or higher is considered to have high blood pressure and should talk with a doctor about the best ways to lower it.

What are the signs and symptoms of chronic kidney disease (CKD)?

Early kidney disease is a silent problem, like high blood pressure, and does not have any symptoms. People may have CKD but not know it because they do not feel sick. A person's glomerular filtration rate (GFR) is a measure of how well the kidneys are filtering wastes from the blood. GFR is estimated from a routine measurement of creatinine in the blood. The result is called the estimated GFR (eGFR).

Creatinine is a waste product formed by the normal breakdown of muscle cells. Healthy kidneys take creatinine out of the blood and put it into the urine to leave the body. When the kidneys are not working well, creatinine builds up in the blood.

An eGFR with a value below 60 milliliters per minute (mL/min) suggests some kidney damage has occurred. The score means that a person's kidneys are not working at full strength.

Another sign of CKD is proteinuria, or protein in the urine. Healthy kidneys take wastes out of the blood but leave protein. Impaired kidneys may fail to separate a blood protein called albumin from the wastes. At first, only small amounts of albumin may leak into the urine, a condition known as microalbuminuria, a sign of failing kidney function. As kidney function worsens, the amount of albumin and other proteins in the urine increases, and the condition is called proteinuria. CKD is present when more than 30 milligrams of albumin per gram of creatinine is excreted in urine, with or without decreased eGFR.

How can kidney damage from high blood pressure be prevented?

The National Heart, Lung, and Blood Institute (NHLBI), one of the National Institutes of Health (NIH), recommends that people with CKD use whatever therapy is necessary, including lifestyle changes and medicines, to keep their blood pressure below 130/80.

How can blood pressure be controlled?

The NHLBI recommends five lifestyle changes that help control blood pressure. People with prehypertension or high blood pressure should

- maintain their weight at a level close to normal.
- eat fresh fruits and vegetables, grains, and low-fat dairy foods.
- limit their daily salt, or sodium, intake to 2,000 milligrams. They should limit frozen foods and trips to fast food restaurants. They should read nutrition labels on packaged foods to learn how much sodium is in one serving. Keeping a sodium diary can help monitor sodium intake.
- get plenty of exercise—at least 30 minutes of moderate activity, such as walking, cycling, or swimming, most days of the week.
- avoid consuming too much alcohol. Men should have no more than two drinks—two 12-ounce servings of beer or two 5-ounce servings of wine or two 1.5-ounce servings of hard liquor—a day. Women should have no more than a single serving a day because differences in the way foods are broken down in the body make women more sensitive to the effects of alcohol.

Can medicines help control blood pressure?

Many people need medicine to control high blood pressure. Several effective blood pressure medicines are available. The most common types of blood pressure medicines doctors prescribe are diuretics, angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), beta blockers, and calcium channel blockers. Two of these medicines, the ACE inhibitors and ARBs, have an added protective effect on the kidneys. Studies have shown that ACE inhibitors and ARBs reduce proteinuria and slow the progression of kidney damage. Diuretics, also known as “water pills,” help a person urinate and get rid of excess fluid in the body. A combination of two or more blood pressure medicines may be needed to keep blood pressure below 130/80.

Who is at risk for kidney failure related to high blood pressure?

Everyone has some risk of developing kidney failure from high blood pressure. African Americans, however, are more likely than Caucasians to have high blood pressure and its related kidney problems—even when their blood pressure is only mildly elevated. In fact, African Americans are six times more likely than Caucasians to develop hypertension-related kidney failure.²

²United States Renal Data System. *USRDS 2007 Annual Data Report*. Bethesda, MD: National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, U.S. Department of Health and Human Services; 2007.

People with diabetes also have a greater risk of developing kidney failure. Early management of high blood pressure is especially important for African Americans with diabetes.

The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), also part of the NIH, sponsored the African American Study of Kidney Disease and Hypertension (AASK) to find effective ways to prevent high blood pressure and kidney failure in this population. The results, published in the November 20, 2002, issue of the *Journal of the American Medical Association*, showed that an ACE inhibitor was the most effective drug at slowing the progression of kidney disease in African Americans. While ACE inhibitors help reduce the risk of kidney disease, they are less effective in lowering blood pressure in African Americans than in Caucasians.

Points to Remember

- Every year, high blood pressure causes more than 25,000 new cases of kidney failure in the United States.
- Chronic kidney disease (CKD) is present when the estimated glomerular filtration rate (eGFR) is below 60 milliliters per minute (mL/min).
- More than 30 milligrams of albumin per gram of creatinine in a urine sample is another sign of CKD.
- People with CKD should try to keep their blood pressure below 130/80.
- Two groups of medicines called angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs) lower blood pressure and have an added protective effect on the kidneys.
- African Americans are six times more likely than Caucasians to develop hypertension-related kidney failure.
- Early management of high blood pressure is especially important for African Americans with diabetes.

Hope through Research

In recent years, researchers have learned a great deal about kidney disease. The NIDDK sponsors several programs aimed at understanding kidney failure and finding treatments to stop its progression.

The NIDDK's Division of Kidney, Urologic, and Hematologic Diseases supports basic research into normal kidney function and the diseases that impair normal function, including diabetes, high blood pressure, glomerulonephritis, and polycystic kidney disease.

Participants in clinical trials can play a more active role in their own health care, gain access to new research treatments before they are widely available, and help others by contributing to medical research. For information about current studies, visit www.ClinicalTrials.gov.

For More Information

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Internet: www.kidney.org

You may also find additional information about this topic by

- searching the NIDDK Reference Collection at www.catalog.niddk.nih.gov/resources
- visiting MedlinePlus at www.medlineplus.gov

This publication may contain information about medications. When prepared, this publication included the most current information available. For updates or for questions about any medications, contact the U.S. Food and Drug Administration toll-free at 1-888-INFO-FDA (463-6332) or visit www.fda.gov. Consult your doctor for more information.

National Kidney Disease Education Program

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The National Kidney Disease Education Program (NKDEP) is an initiative of the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, U.S. Department of Health and Human Services. The NKDEP aims to raise awareness of the seriousness of kidney disease, the importance of testing those at high risk, and the availability of treatment to prevent or slow kidney disease.

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The National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC) 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 1987, the Clearinghouse provides information about diseases of the kidneys and urologic system to people with kidney and urologic disorders and to their families, health care professionals, and the public. The NKUDIC answers inquiries, develops and distributes publications, and works closely with professional and patient organizations and Government agencies to coordinate resources about kidney and urologic diseases.

Publications produced by the Clearinghouse are carefully reviewed by both NIDDK scientists and outside experts. This publication was originally reviewed by Vito M. Campese, M.D., University of Southern California, and Matthew Weir, M.D., University of Maryland. The 2008 version of this publication was reviewed by Eduardo Ortiz, M.D., National Heart, Lung, and Blood Institute.

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