

Solitary Kidney

National Kidney and Urologic Diseases Information Clearinghouse



National Institute of
Diabetes and Digestive
and Kidney Diseases

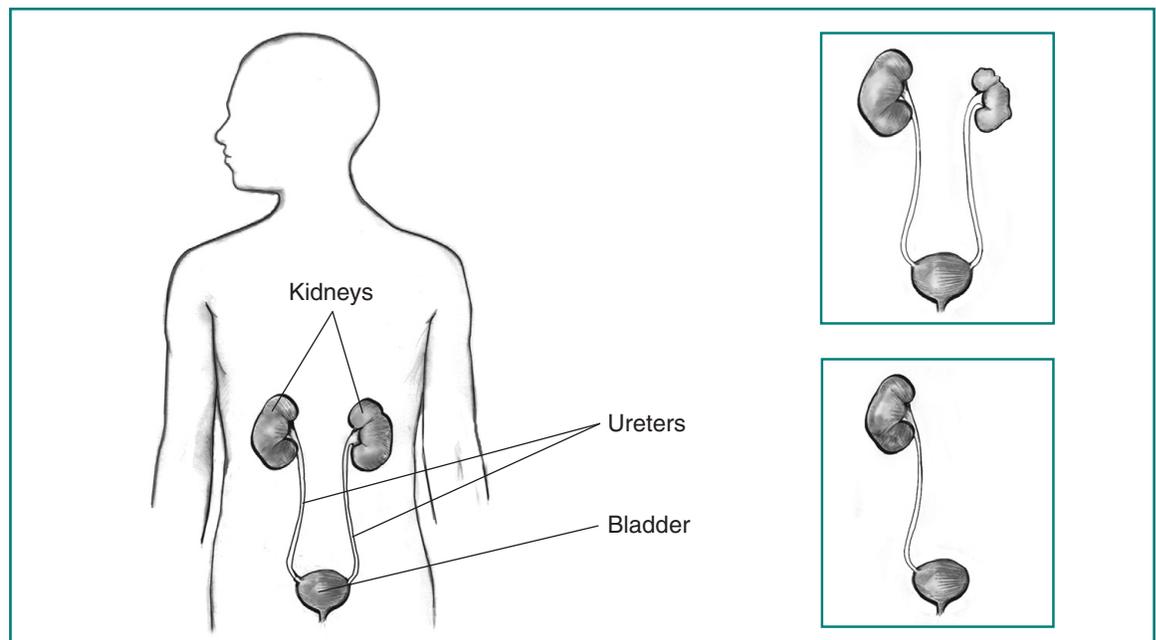
What is a solitary kidney?

When a person has only one kidney or one working kidney, this kidney is called a solitary kidney. The three main causes of a solitary kidney are

- **birth defects.** People with kidney agenesis are born with only one kidney. People born with kidney dysplasia have both kidneys; however, one kidney does not function. Many people with kidney agenesis or kidney dysplasia do not discover that they have a solitary kidney until they have an x ray, an ultrasound, or surgery for an unrelated condition.

- **surgical removal of a kidney.** Some people must have a kidney removed to treat cancer or another disease or injury. When a kidney is removed surgically due to disease or for donation, both the kidney and ureter are removed.
- **kidney donation.** A growing number of people are donating a kidney to be transplanted into a family member or friend whose kidneys have failed.

In general, people with a solitary kidney lead full, healthy lives. However, some people are more likely to develop kidney disease.



When a person has only one kidney or one working kidney, this kidney is called a solitary kidney. People born with kidney dysplasia have both kidneys; however, one kidney does not function (top right). When a kidney is removed surgically due to disease or for donation, both the kidney and ureter are removed (bottom right).

What are the kidneys and what do they do?

The kidneys are two bean-shaped organs, each about the size of a fist. They are located just below the rib cage, one on each side of the spine. Every day, the kidneys filter about 120 to 150 quarts of blood to produce about 1 to 2 quarts of urine, composed of wastes and extra fluid. The urine flows from the kidneys to the bladder through tubes called ureters. The bladder stores urine until releasing it through urination.

Do people with a solitary kidney need to be monitored for kidney damage?

People with a solitary kidney should be tested regularly for the following signs of kidney damage:

- albuminuria
- decreased glomerular filtration rate (GFR)
- high blood pressure

Albuminuria Testing

Albuminuria is an elevated level of the protein albumin in the urine. Albumin acts like a sponge, drawing extra fluid from the body into the bloodstream, where it remains until removed by the kidneys. When albumin leaks into the urine, the blood loses its capacity to absorb extra fluid from the body. Although the increased albumin in the urine may not cause any symptoms, it often indicates an increased chance of kidney disease.

Dipstick test for albumin. The presence of albumin in the urine can be detected with a dipstick test performed on a urine sample. The urine sample is collected in a special container in a health care provider's office or a commercial facility and can be tested in the same location or sent to a lab for analysis. With a dipstick test, a nurse or technician places a strip of chemically treated paper, called a dipstick, into the person's urine sample. Patches on the dipstick change color when protein is present in urine.

Albumin and creatinine measurement. A more precise measurement is usually needed to confirm albuminuria. A single urine sample or a 24-hour collection of urine is sent to a lab for analysis. With the single urine sample, the lab measures both albumin and creatinine, a waste product of normal muscle breakdown. The results are reported as a urine albumin-to-creatinine ratio. A urine sample containing more than 30 mg of albumin for each gram of creatinine may signal a problem. With a 24-hour collection of urine, the lab measures only the amount of albumin present. Although both tests are effective, the single urine sample is easier to collect than the 24-hour sample and is usually sufficient to diagnose and monitor kidney disease.

Decreased GFR Testing

Blood drawn at a health care provider's office or a commercial facility and sent to a lab for analysis can be tested to estimate how much blood the kidneys filter each minute, called the estimated glomerular filtration rate (eGFR). The results of the test indicate the following:

- eGFR of 60 or above is in the normal range.
- eGFR below 60 may indicate kidney damage.
- eGFR of 15 or below may indicate kidney failure.

High Blood Pressure Monitoring

Blood pressure is the force of blood pushing against the blood vessel walls as the heart pumps out blood. Blood vessels are also called arteries. High blood pressure, also called hypertension, is an increase in the amount of force the blood places on the blood vessels as it moves through the body. Blood pressure is written with two numbers separated by a slash. For example, a blood pressure result of 120/80 is said as "120 over 80." The first number is called the systolic pressure and represents the pressure as the heart beats and pushes blood through the blood vessels. The second number is called the diastolic pressure and represents the pressure as the heart rests and the blood vessels relax between heartbeats.

A person's blood pressure is considered normal if it stays below 120/80.

Prehypertension is a systolic pressure of 120 to 139 or a diastolic pressure of 80 to 89. High blood pressure is a systolic pressure of 140 or above or a diastolic pressure of 90 or above.¹ High blood pressure is diagnosed when multiple blood pressure tests—often repeated over several visits to the health care provider's office—show that blood pressure is consistently above 140/90. Health care providers measure blood pressure with a blood pressure cuff. People can also buy blood pressure cuffs at places such as discount chain stores and drugstores to monitor their blood pressure at home.

High blood pressure can damage blood vessels in the kidneys, reducing their ability to work properly. Damaged kidneys may be less able to remove salt and extra fluid, raising blood pressure further and creating a dangerous cycle.

¹National Heart, Lung, and Blood Institute. *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure*. Washington, D.C.: U.S. Government Printing Office; 2004. NIH publication 04-5230. Report.

What steps can people with a solitary kidney take to protect their health?

People with a solitary kidney can protect their health by eating a nutritious diet, keeping their blood pressure at the appropriate level, and preventing injury to the working kidney.

Eating, Diet, and Nutrition

People with a solitary kidney do not need to eat a special diet. However, people with reduced kidney function may need to make changes to their diet to slow the progression of kidney disease. Read more about recommended dietary changes in *Nutrition for Early Chronic Kidney Disease in Adults* and *Nutrition for Advanced Chronic Kidney Disease in Adults* at www.kidney.niddk.nih.gov and on the National Kidney Disease Education Program website at www.nkdep.nih.gov/living/diet-lifestyle-changes.shtml. People should talk with their health care provider about what diet is right for them.

Controlling Blood Pressure

People can control their blood pressure by not smoking, eating a healthy diet, and taking certain medications. Medications that lower blood pressure can also significantly slow the progression of kidney disease. Two types of blood pressure-lowering medications,

angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs), have proven effective in slowing the progression of kidney disease. Many people require two or more medications to control their blood pressure. In addition to an ACE inhibitor or ARB, a diuretic—a medication that helps the kidneys remove fluid from the blood—may be prescribed. Beta-blockers, calcium channel blockers, and other blood pressure medications may also be needed.

Preventing Injury

For people with a solitary kidney, loss of the remaining working kidney results in the need for dialysis or kidney transplant. People should make sure their health care providers know they have a solitary kidney to prevent injury from medications or medical procedures. People who participate in certain sports may be more likely to injure the kidney; this risk is of particular concern with children, as they are more likely to play sports. The American Academy of Pediatrics recommends individual assessment for contact, collision, and limited-contact sports. Protective equipment may reduce the chance of injury to the remaining kidney enough to allow participation in most sports, provided that such equipment remains in place during activity. Health care providers, parents, and patients should consider the risks of any activity and decide whether the benefits outweigh those risks.

Points to Remember

- When a person has only one kidney or one working kidney, this kidney is called a solitary kidney. The three main causes of a solitary kidney are birth defects, surgical removal of a kidney, and kidney donation.
- In general, people with a solitary kidney lead full, healthy lives. However, some people are more likely to develop kidney disease.
- People with a solitary kidney should be tested regularly for the following signs of kidney damage:
 - albuminuria
 - decreased glomerular filtration rate (GFR)
 - high blood pressure
- People with a solitary kidney can protect their health by eating a nutritious diet, keeping their blood pressure at the appropriate level, and preventing injury to the working kidney.

Hope through Research

In recent years, researchers have learned much about kidney disease. The National Institute of Diabetes and Digestive and Kidney Diseases (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 development in the embryo and the genetic causes of birth defects that may result in a solitary kidney. New imaging techniques can help diagnose a solitary kidney before birth.

Clinical trials are research studies involving people. Clinical trials look at safe and effective new ways to prevent, detect, or treat disease. Researchers also use clinical trials to look at other aspects of care, such as improving the quality of life for people with chronic illnesses. To learn more about clinical trials, why they matter, and how to participate, visit the NIH Clinical Research Trials and You website at www.nih.gov/health/clinicaltrials. For information about current studies, visit www.ClinicalTrials.gov.

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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.

You may also find additional information about this topic by visiting MedlinePlus at www.medlineplus.gov.

This publication may contain information about medications and, when taken as prescribed, the conditions they treat. 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 (1-888-463-6332) or visit www.fda.gov. Consult your health care provider for more information.

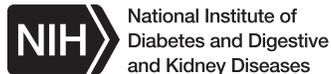
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The National Kidney and Urologic Diseases Information Clearinghouse (NKUDIC) is a service of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The NIDDK is part of the National Institutes of Health of the U.S. Department 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.

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www.kidney.niddk.nih.gov.



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