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## Kidney stones

A kidney stone is a solid mass made up of tiny crystals. One or more stones can be in the kidney or ureter at the same time.

### Causes



Watch this video about:  
Kidney stones

Kidney stones are common. Some types run in families. They often occur in premature infants.

There are different types of kidney stones. The cause of the problem depends on the type of stone.

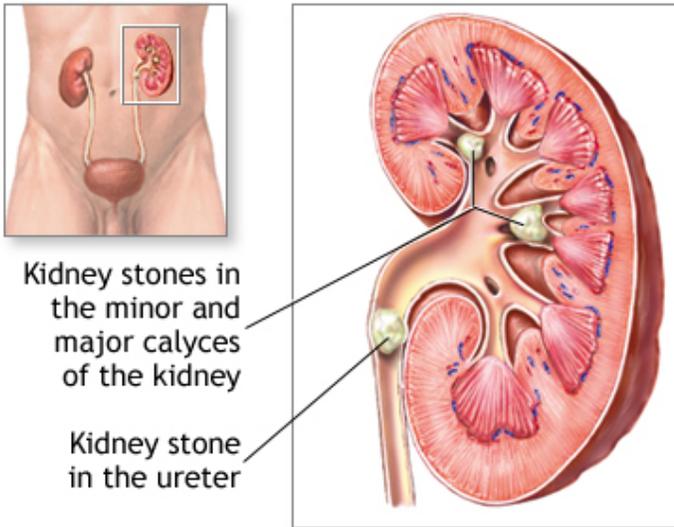
Stones can form when urine contains too much of certain substances that form crystals. These crystals can develop into stones over weeks or months.

- Calcium stones are most common. They are most likely to occur in men between ages 20 to 30. Calcium can combine with other substances to form the stone.
- Oxalate is the most common of these. Oxalate is present in certain foods such as spinach. It is also found in vitamin C supplements. Diseases of the small intestine increase your risk of these stones.

Calcium stones can also form from combining with phosphate or carbonate.

Other types of stones include:

- Cystine stones can form in people who have cystinuria. This disorder runs in families. It affects both men and women.
- Struvite stones are mostly found in women who have a urinary tract infection. These stones can grow very large and can block the kidney, ureter, or bladder.
- Uric acid stones are more common in men than in women. They can occur with gout or chemotherapy.
- Other substances such as certain medicines also can form stones.



ADAM.

The biggest risk factor for kidney stones is not drinking enough fluids. Kidney stones are more likely to occur if you make less than 1 liter (32 ounces) of urine a day.

## Symptoms

You may not have symptoms until the stones move down the tubes (ureters) through which urine empties into your bladder. When this happens, the stones can block the flow of urine out of the kidneys.

The main symptom is severe pain that starts and stops suddenly:

- Pain may be felt in the belly area or side of the back.
- Pain may move to the groin area (groin pain), testicles (testicle pain) in men, and labia (vaginal pain) in women.

Other symptoms can include:

- Abnormal urine color
- Blood in the urine
- Chills
- Fever
- Nausea and vomiting

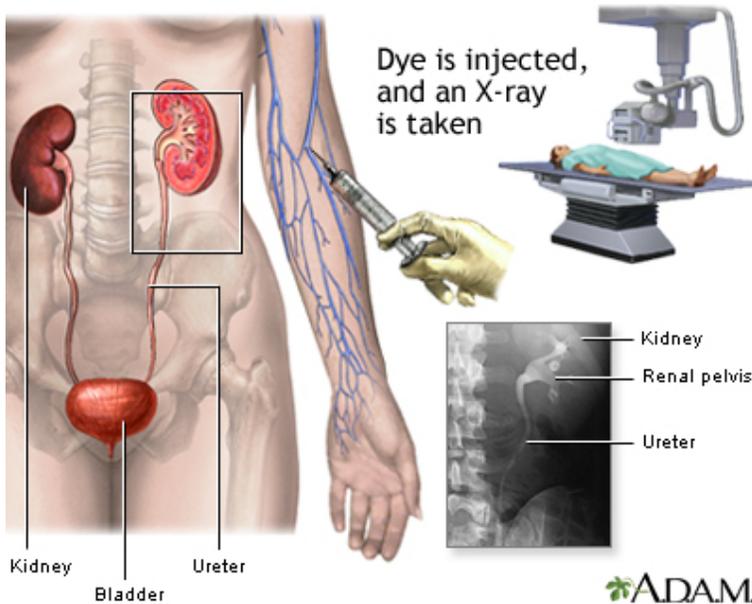
## Exams and Tests

The health care provider will perform a physical exam. The belly area (abdomen) or back might feel sore.

Tests that may be done include:

- Blood tests to check calcium, phosphorus, uric acid, and electrolyte levels
- Kidney function tests

- Urinalysis to see crystals and look for red blood cells in urine
- Examination of the stone to determine the type



Stones or a blockage can be seen on:

- Abdominal CT scan
- Abdominal/kidney MRI
- Abdominal x-rays
- Intravenous pyelogram (IVP)
- Kidney ultrasound
- Retrograde pyelogram

## Treatment

Treatment depends on the type of stone and the severity of your symptoms.

Kidney stones that are small most often pass through your system on their own.

- Your urine should be strained so the stone can be saved and tested.
- Drink at least 6 to 8 glasses of water per day to produce a large amount of urine. This will help the stone pass.
- Pain can be very bad. Over-the-counter pain medicines (for example, ibuprofen and naproxen), either alone or along with narcotics, can be very effective.

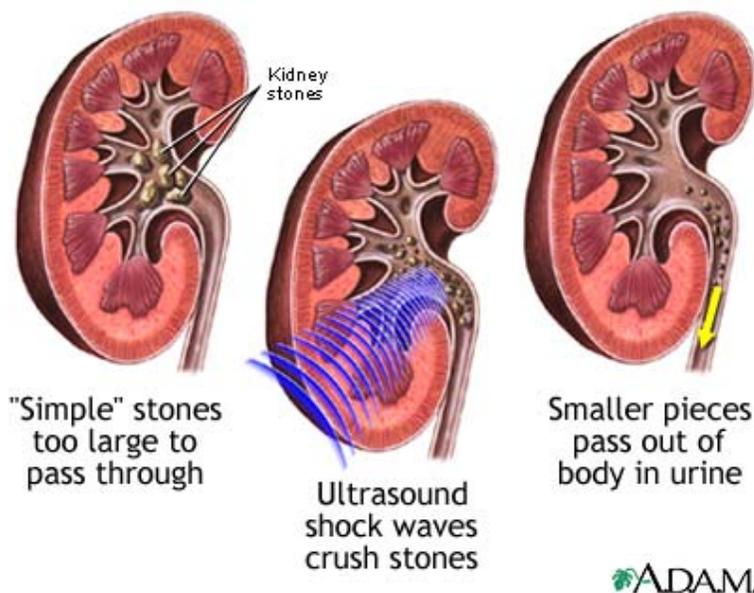
Some people with severe pain from kidney stones need to stay in the hospital. You may need to get fluids through an IV into your vein.

For some types of stones, your provider may prescribe medicine to prevent stones from forming or help break down and remove the material that is causing the stone. These medicines can include:

- Allopurinol (for uric acid stones)
- Antibiotics (for struvite stones)
- Diuretics (water pills)
- Phosphate solutions
- Sodium bicarbonate or sodium citrate
- Water pills (thiazide diuretics)
- Tamsulosin to relax the ureter and help the stone pass

Surgery is often needed if:

- The stone is too large to pass on its own
- The stone is growing
- The stone is blocking urine flow and causing an infection or kidney damage
- The pain cannot be controlled



Today, most treatments are much less invasive than in the past.

- Lithotripsy is used to remove stones slightly smaller than a half an inch (1.25 centimeters) that are located in the kidney or ureter. It uses sound or shock waves to break up stones into tiny fragments. Then, the stone fragments leave the body in the urine. It is also called extracorporeal shock-wave lithotripsy or ESWL.
- Procedures performed by passing a special instrument through a small surgical cut in your skin on your back and into your kidney or ureters are used for large stones, or when the kidneys or surrounding areas are incorrectly formed. The stone is removed with a tube (endoscope).
- Ureteroscopy may be used for stones in the lower urinary tract.
- Rarely, open surgery (nephrolithotomy) may be needed if other methods do not work or are not possible.

Talk to your provider about what treatment options may work for you.

You will need to take self-care steps. Which steps you take depend on the type of stone you have, but they may include:

- Drinking extra water and other liquids
- Eating more of some foods and cutting back on other foods
- Taking medicines to help prevent stones
- Taking medicines to help you pass a stone (anti-inflammatory drugs, alpha-blockers)

## **Outlook (Prognosis)**

Kidney stones are painful but most of the time can be removed from the body without causing lasting damage.

Kidney stones often come back. This occurs more often if the cause is not found and treated.

You are at risk for:

- Urinary tract infection
- Kidney damage or scarring if treatment is delayed for too long

## **Possible Complications**

Complication of kidney stones may include the obstruction of the ureter (acute unilateral obstructive uropathy).

## **When to Contact a Medical Professional**

Call your provider if you have symptoms of a kidney stone:

- Severe pain in your back or side that will not go away
- Blood in your urine
- Fever and chills
- Vomiting
- Urine that smells bad or looks cloudy
- A burning feeling when you urinate

If you have been diagnosed with blockage from a stone, passage must be confirmed either by capture in a strainer during urination or by follow-up x-ray. Being pain free does not confirm that the stone has passed.

## **Prevention**

If you have a history of stones:

- Drink plenty of fluids (6 to 8 glasses of water per day) to produce enough urine.
- You may need to take medicine or make changes to your diet for some types of stones.

- Your provider may want to do blood and urine tests to help determine the proper prevention steps.

## Alternative Names

Renal calculi; Nephrolithiasis; Stones - kidney; Calcium oxalate - stones; Cystine - stones; Struvite - stones; Uric acid - stones; Urinary lithiasis

## Patient Instructions

- Hypercalcemia - discharge ([../patientinstructions/000044.htm](#))
- Kidney stones and lithotripsy - discharge ([../patientinstructions/000136.htm](#))
- Kidney stones - self-care ([../patientinstructions/000135.htm](#))
- Kidney stones - what to ask your doctor ([../patientinstructions/000186.htm](#))
- Percutaneous urinary procedures - discharge ([../patientinstructions/000137.htm](#))

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