

# KIDNEY STONE

Information for a Kidney Stone Patient From a Kidney Stone Patient



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# 10

## FACTS ABOUT KIDNEY STONES



1. There is an escalation of incidence of stone disease world-wide.
2. Stone formation can affect people of any age group but the highest incidence is noted in people between 40-60 years age.
3. Men are 2-3 times more likely to form stones than women.
4. Highest prevalence of stone disease is found in hot, arid or dry climates such as mountain, desert or tropical areas.
5. Heat exposure and dehydration are two most important risk factors for stone formation- people working as cooks, engineering room personnel, steel workers, individuals in sedentary occupations have more incidence of stone formation.
6. Obesity is associated with higher prevalence of calcium oxalate and uric acid stones.
7. First time stone formers have a 50% risk of stone recurrence in the next 10 years.
8. Calcium is the major constituent in 75% calculi. Calcium oxalate stones are noted in 60%, uric acid stones in 10%, struvite stones in 10%.
9. Approximately 10-20% of individuals with stone disease has a metabolic disorder predisposing to stone disease and this needs to be identified and corrected to prevent recurrent stone formation.
10. Liberal water intake remains a key strategy in prevention of stone formation as well as expulsion of small renal and ureteric stones.





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## How the Urinary System Works ?

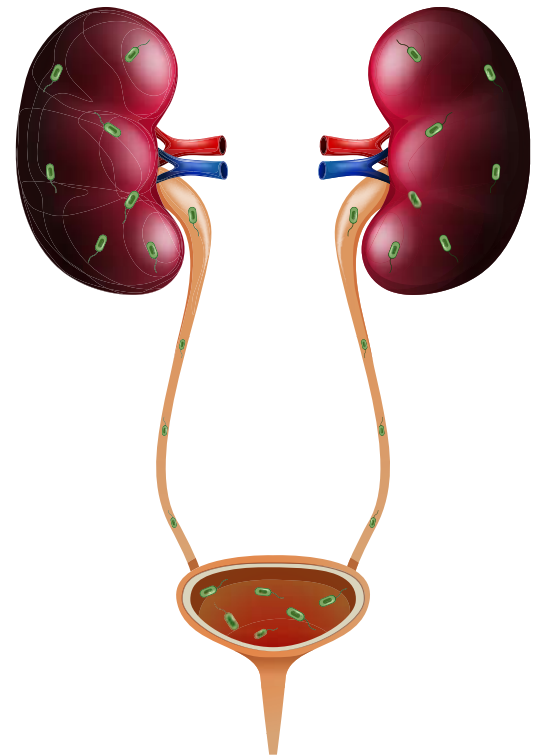
To understand what happens with a kidney stone, first you need to know a little about your “plumbing,” or **urinary system**.

Your **kidneys** are 2 purplish-brown organs that sit below your ribs toward the middle of your back. They filter extra fluids, salts, and waste products from your blood to form urine (pee).

Urine flows through narrow tubes called **ureters** [YUR-eh-terz] to the **bladder**.

The bladder stores urine. When you urinate, it squeezes to send the urine through your **urethra** [yuh-REETH-ruh] and out of your body.

The urinary system works the same for men and women.



## A Close Look at your Kidney Stone

Every kidney stone is different. Some are as small as a grain of sand, others as large as a pearl, and others are even larger than that, up to several inches in size. Some are smooth, others jagged. Some stones stay in the kidney, while others travel down the urinary tract. Explore how a kidney stone forms, what it's made out of and where it goes – all factors your doctor will consider when determining your treatment plan.

### Formation

It all starts with waste products that the kidney filters into the urine. Usually these substances pass harmlessly out of the body. In some cases, though, if these substances become too concentrated in the urine, they may form a solid mass of crystals that can increase in size. Most people produce enough liquid in urine to pass the crystals and other stone-forming chemicals – calcium, oxalate, urate, cystine, xanthine and phosphate – out of the body. But when these substances become too highly concentrated in your urine, a kidney stone can form.



## Common Types

**Calcium Stones** – The most common type of kidney stone forms in two primary ways: calcium combining with oxalate in your urine (calcium oxalate) or a high amount of calcium plus increased pH levels in your urine (calcium phosphate).

**Uric acid Stones** – If you eat a high-protein diet, are obese, or suffer from gout, you may have an increased level of uric acid in your urine. If uric acid becomes too concentrated, which may occur when the urine pH becomes abnormally low, or if uric acid combines with calcium, it can form a stone.

**Struvite Stones** – If your kidney or urinary tract becomes infected, you may develop struvite stones, which can grow rapidly and become very large in size. Left untreated, they can cause chronic infection and seriously damage your kidney.

**Cystine Stones** – These rarer stones are due to a genetic disorder that causes the amino acid cystine to leak into urine from your kidneys, forming crystals that may accumulate into stones.

## Location

The location of your stone is critical. After a stone forms, it may stay in your kidney or travel down your urinary tract. Often, small stones will pass through the body without causing much pain. However, larger stones can get stuck somewhere along the path – your kidney, urinary tract, bladder, or ureter – blocking the flow of urine and triggering severe pain.

## Causes and Risk Factors

### Why you may be more (or less) likely to get a kidney stone ?

While anyone can get a kidney stone, some people are more at risk. Stones are more common in men than women. Some ethnicities – such as non-Hispanic Caucasians – are affected at a higher rate. If you are overweight or obese, you are more likely to develop a stone. Diet and lifestyle may play a big role in the cause of your kidney stone as well. These are all key considerations when discussing your symptoms and diagnosis.

## Causes

A kidney stone forms when substances in your urine become highly concentrated – which makes fluid intake one of the biggest contributing factors. If you do not drink enough water, you may put yourself at a higher risk for developing a stone.

### Other possible causes include:

- ↻ Exercise (too much or too little)
- ↻ Family or personal history of kidney stones
- ↻ Food with too much salt or sugar
- ↻ Infections and Medications
- ↻ Obesity
- ↻ Weight-loss surgery



## Risk Factors

**You may be at an increased risk to develop a kidney stone if you have:**

- ↪ Blockage of your urinary tract
- ↪ Chronic inflammation of your bowel
- ↪ Cystic kidney disease – Disorder that causes fluid-filled sacs to form on your kidneys
- ↪ Cystinuria – Condition in which your urine contains high levels of the amino acid cystine
- ↪ Family history of kidney stones
- ↪ Gout – Disorder that causes painful swelling of your joints.
- ↪ History of gastrointestinal tract surgery
- ↪ Hypercalciuria – Genetic condition in which your urine contains high levels of calcium
- ↪ Hyperoxaluria – Condition in which your urine contains high levels of oxalate
- ↪ Hyperparathyroidism – Condition in which the parathyroid glands in your neck release too many hormones, generating extra calcium in your blood
- ↪ Hyperuricosuria – Condition in which your urine contains high levels of uric acid
- ↪ Renal tubular acidosis – Disease in which your kidneys fail to excrete acids into urine, causing your blood to remain too acidic and the urine to be too alkaline

**You may also have an elevated risk of kidney stones if you take certain medications, such as:**

- ↪ Calcium-based antacids
- ↪ Diuretics – Medication that helps kidneys remove fluid from your body
- ↪ Indinavir (Crixivan™) – Protease inhibitor used to treat HIV infection
- ↪ Topiramate (Topamax™) – Anti-seizure medication



## Symptoms and Diagnosis

### How to know if you have a kidney stone ?

Kidney stones are most associated with one palpable symptom: pain. Yet while many people experience severe pain with a kidney stone, others feel only vague discomfort or no pain at all. Your symptoms depend on the characteristics of your stone – its size, shape, and location in your body – all of which will help to confirm your doctor’s diagnosis and, ultimately, your treatment plan.

## Symptoms

### If you have a kidney stone, you may experience:

- ↪ Sharp pain in your back or lower abdomen
- ↪ Vague discomfort or dull pain, like a stomachache that doesn’t go away
- ↪ Pain while urinating or blood in your urine
- ↪ Pain in your groin or thigh (if you have a ureteral stone)
- ↪ Pain in your testicles
- ↪ Nausea and occasional vomiting
- ↪ Fever and chills
- ↪ Cloudy or foul-smelling urine

If your stone creates an irritation or blockage, your pain may ramp up rapidly. Most stones pass without causing damage – but usually not without causing pain. While pain relievers may be the only treatment needed for small stones, your doctor may recommend other treatment options if you are in danger of further complications.



## Severe Pain (Renal Colic)

If a stone blocks the normal urine flow through your ureter, you may experience a condition known as renal colic – sharp, severe pain on the side of your body caused by a sudden increase of pressure in your urinary tract and ureteral wall. The pain comes in waves and has been described as one of the most painful experiences, similar to childbirth.



*Renal colic can be an emergency situation and you should contact your doctor or visit a hospital. If the pain is accompanied by a high fever, seek medical help immediately.*

## No Pain or Symptoms

Some kidney stones do not cause any discomfort, pain or symptoms of any kind. These asymptomatic stones are often small and located in places within the kidney where they do not block the flow of urine. Asymptomatic stones are typically found during an imaging scan or X-ray for other conditions.

## Diagnosis

If you are experiencing any of the symptoms above and have not yet seen your doctor for a diagnosis, now is the time. At your appointment, your doctor will perform a physical exam and take a medical history, including questions about your family history of kidney stones, your diet and any gastrointestinal problems.

**To complete your kidney stone diagnosis, your doctor may also perform a:**

- ↻ Blood test to reveal any biochemical problems that can lead to kidney stones
- ↻ An imaging test such as an X-ray, ultrasound or CT scan to find your stone's location and show any conditions that may have caused it to form.
- ↻ Urinalysis –to determine whether you have an infection or if your urine contains substances that may form stones.

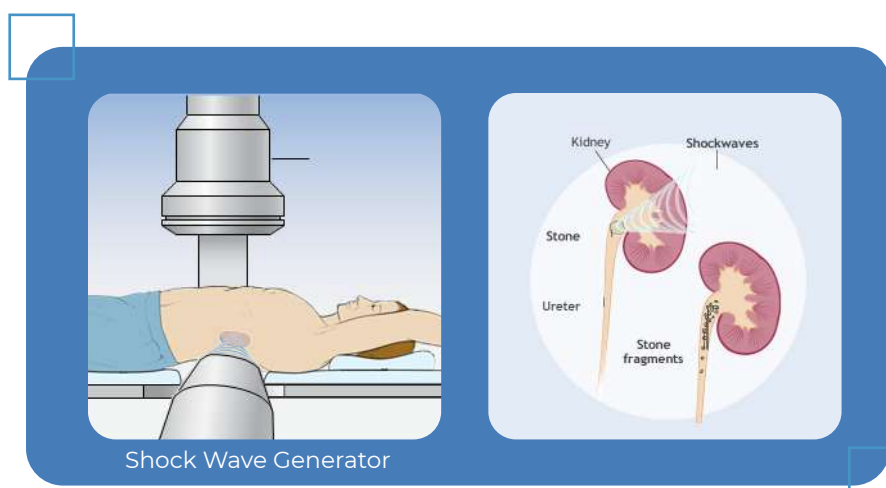




## What Are My Treatment Options?

Treatments help remove kidney stones, using one or more of these strategies:

- ↻ Breaking up the stone so the smaller pieces can pass (a procedure called ESWL, sometimes called “shocking”).
- ↻ Removing the stone through the ureter (a procedure called ureteroscopy, sometimes called “basketing”).
- ↻ Removing the stone from the kidney (a procedure called PCNL, and sometimes called PERC).  
Holding the ureter open using a temporary tube called a stent so stone fragments pass more easily.



## ESWL

ESWL stands for Extracorporeal [ex-trah-ko-POR-ee-uhl] Shock Wave Lithotripsy [LITH-uh trip-see], a procedure that uses focused shock waves to break up kidney stones.

### What happens during ESWL?

1. Getting ready. In most cases, you'll have an IV (intravenous) line placed in your wrist or arm to give you a sedative that helps you relax. Then you'll lie on an exam table with a shock wave generator.
2. Finding the stone. Your healthcare provider will use x-rays or ultrasound to find the stone. You will be positioned so the stone is directly in line with the shock wave generator.  
Breaking up the stone. When the stone is in position, the generator sends approximately
3. 2,000 to 3,000 shock waves at the stone. The shock waves cause the stone to break into small pieces. You can usually go home the same day, and the smaller stone fragments should pass on their own.

### When can ESWL be used?

ESWL works best for stones smaller than 10 mm that are located in the kidney or high in the ureter. Stones low in the ureter (near the pelvis and bladder) don't usually respond well to ESWL treatment. Some stones, such as monohydrate [mono-HY-drate] and cystine [SIS-teen], are too hard to break with ESWL and require other treatment.

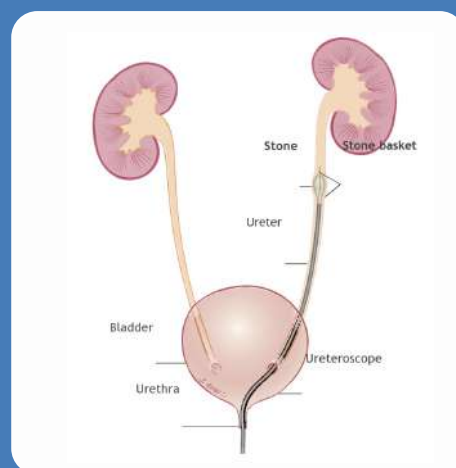
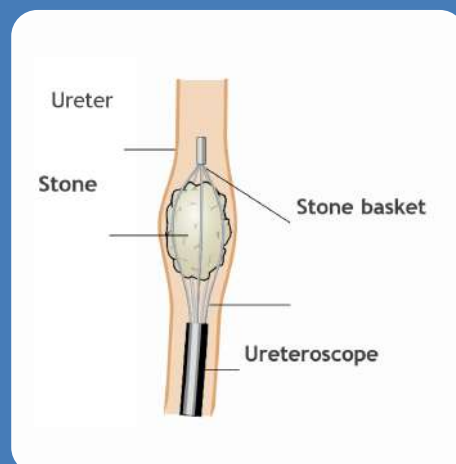
## Ureteroscopy

**Ureteroscopy** [yur-eh-ter-OSS-kuh-pee] involves moving a catheter up through your bladder and ureter to find and remove the stone.

### What happens during ureteroscopy?

- 1. General anesthesia.** You'll have medication to help you sleep through the surgery so you won't feel it or remember it.
- 2. Inserting a scope and finding the stone.** Your doctor will insert a catheter (a tiny tube with a camera called a **ureteroscope**) into your urethra, up through your bladder, and then up the ureter to find the stone.
- 3. Removing the stone.** Some stones can be taken out using a tiny snare or "basket" passed through the scope. Other stones will need to be broken up, using a special stone laser attached to the scope, before they can be removed using the basket.
- 4. Inserting a stent.** A stent (tube) is often placed inside the ureter. The stent is temporary and will need to come out several weeks later. See page 7 to learn more about stents.

Risks of ureteroscopy include bleeding, infection, or, rarely, injury to the ureter. Sometimes the ureter is very narrow and will not allow the small scope to move up to the level of the stone. In these cases, you may need a stent in place for 1 to 2 weeks to dilate (widen) the ureter before trying the ureteroscopy again. Once the ureter is wider, it is usually easier to get to the stone.





## PCNL

**PCNL** stands for **Percutaneous** [per-cue-TANE-ee-ous] **Nephrolithotomy** [neff-roh-lith-AH-tuh-mee], a surgery that removes the stone directly from the kidney. For a large stone (10 mm to 20 mm or more), it can be faster and easier if the surgeon goes directly from your back into the kidney to take out the stone, avoiding the ureter.

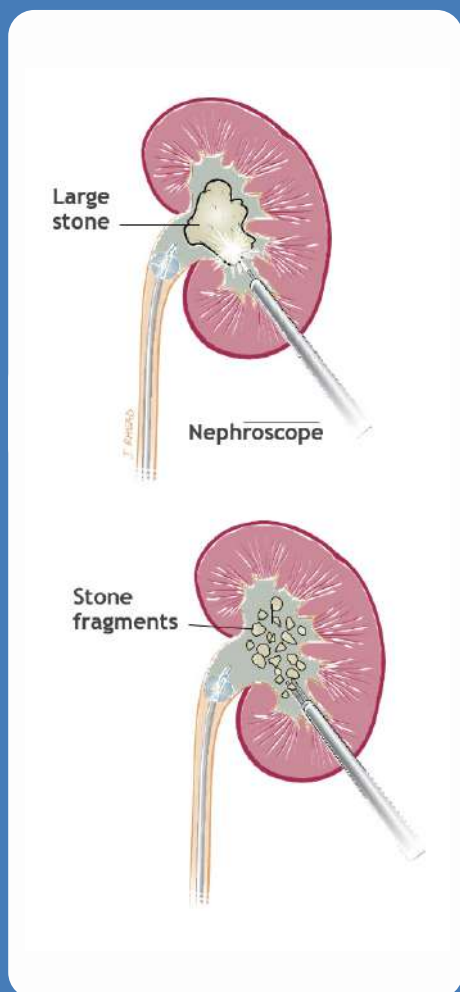
For very large stones (often called “staghorn stones”) that fill the entire hollow part of the kidney, several PCNL procedures might be needed to remove all the pieces of the stone.

### What happens during PCNL?

- **General anesthesia.** You’ll have medication to help you sleep through the surgery so you won’t feel it or remember it.
- **Inserting a tube.** Your doctor will make a small incision (cut) in your back and insert a small tube called a **nephroscope** [**NEFF-ruh- scope**]. Using x-ray guidance, your doctor will put the tube directly into the kidney.
- **Removing the stone.** Using laser or ultrasound, your doctor will break the stone into small pieces. The pieces will be removed through the tube.
  - Inserting a stent. In some cases, a ureteral stent will be inserted during the surgery (see the page 7 for more information).
- **Short hospital stay.** In most cases, you’ll need to stay in the hospital for a day or two. A tube will be left in the kidney. The tube runs directly out of the skin to your back or side and drains the kidney until the urine clears and the swelling goes down.

**PCNL can cause complications in rare cases. These include:**

- Rarely, tearing of the kidney that can cause bleeding or urine leaking around the kidney.
- Rarely, bleeding from the hole in the kidney that can’t be controlled. This requires another procedure to place a small clot in the artery, using x-ray guidance.
- Very rarely, injury to the intestine, liver, or spleen.



## About ureteral stents

A ureteral stent is a tiny, hollow tube that runs from the kidney to the bladder and stays in place for several weeks after a kidney stone procedure. A stent helps you in 3 important ways:

- ↪ **It holds your ureter open.** Your ureter has some normal swelling after a kidney stone procedure. The stent keeps this swelling from blocking the ureter.
- ↪ **It prevents severe pain after a procedure.** If your ureter is swollen shut, you can have severe stone-like pain for 3 to 7 days. With a stent, urine flows freely and you don't experience this pain.
- ↪ **It can widen the ureter** so small stone fragments pass more easily. A stent also causes its own temporary difficulties. Be sure to ask your doctor what to expect. Some common questions are answered below.

### Why does urination hurt while I have the stent?

While you have the stent, you can expect pain in your bladder, urethra, and kidney when you urinate. Why? The stent temporarily changes the way the bladder, ureter, and kidney work together.

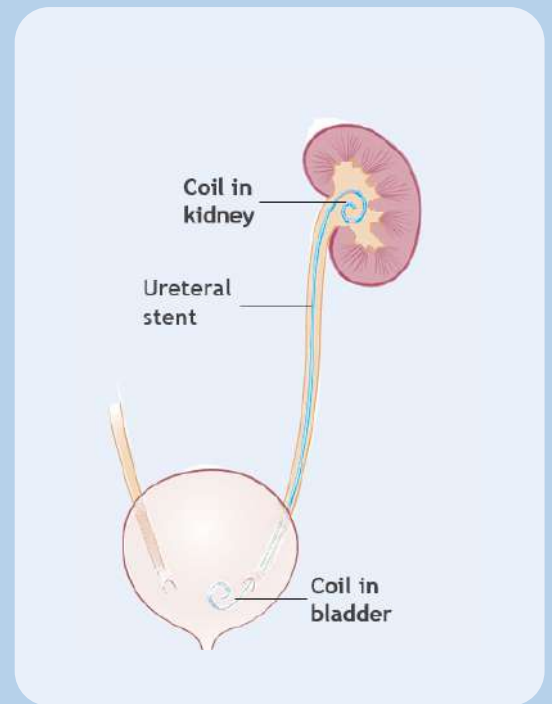
- ↪ **Normally:** The ureter has a one-way valve where it enters the bladder. When the bladder squeezes to during urination, the valve keeps the urine from flowing back into the ureter and kidney.
- ↪ **With a stent:** The stent is a hollow tube that extends through your ureter and into the bladder, and temporarily keeps the one-way valve from closing. This means that when your bladder squeezes as you urinate, some of the urine flows back up the ureter and presses on the kidney. This causes pain while you urinate.

### What else can happen with a stent?

A stent typically causes two other symptoms:

- ↪ **Feeling like you have to “go” all the time:** The end of the stent sits near the opening of the bladder and stimulates the area that tells your brain you have to urinate. The result is that even when your bladder is empty, it may still feel full.
- ↪ **Blood in your urine.** Expect to see blood in your urine until the stent is removed. This can come and go; some days the urine will be clear and the next day it may be bloody.

These symptoms, along with pain while you urinate, are normal so don't be alarmed when you see them. These symptoms don't mean anything is wrong. And keep in mind that having a stent is worth the difficulty.



### When can it come out?

Stents usually stay in for a few weeks, depending on the procedure you had. With some operations, the stent will stay in place for 6 weeks afterward. Your surgeon will give you the details.

### How is it removed?

To remove most stents, a soft, flexible scope (about the size of a urine catheter) is sent up the urethra to the bladder.

A grasper on the scope catches the stent and pulls it out through the urethra.

The urologist will put numbing jelly inside the urethra before inserting the scope. You may feel some burning as the scope moves past certain parts of the urethra, but the procedure lasts just a few minutes.

Pulling the stent feels a bit like pulling out a bladder catheter.

Sometimes a short string is attached to the stent and hangs out of the urethra. In these cases, the stent is removed by pulling the string.





### Taking prescription pain pills wisely

Follow these steps:

- Tell your doctor about ALL the medications you take. This includes prescriptions, over-the-counter remedies, patches, inhalers, vitamins, and herbal supplements.
- Follow the directions exactly. Don't change your dose without talking to your doctor.
- Don't drink alcohol of any kind.
- Talk to your doctor before you take sleep aids, anti-anxiety medication, or other pain relievers.
- Keep track of your pills and don't share them with others. Lock them up where they are safe.
- Get rid of unused pills. "Extra" pain pills can be dangerous to children or a target for thieves. Don't just toss them in the trash. Ask your pharmacist for directions on how to safely dispose of them.

## Can I Make Passing a Stone Any Easier?

While you wait for a stone to pass (or for stone fragments to pass after a procedure) you can take steps to manage the pain, care for yourself, and help make the process go better.

### Managing the pain

The pain of passing a stone, or living with a temporary stent, can't be removed entirely, but there are several ways you can manage and control it:

- ↪ **Pain medication.** Your doctor might suggest over-the-counter medication such as **acetaminophen [ah-seat-uh-MIN-oh-fen]** (Tylenol) to ease the pain. Or, your doctor might prescribe pain medication for you to take while you're passing the stone. See the information at left on how to safely take prescription pain medication.
- ↪ **Focus techniques.** When the pain surges, it can help to focus specifically on something else. This doesn't make the pain go away, but focusing your attention elsewhere can distract you. Try these tricks:
  - **Breath focus.** Count to 4 each time you inhale and exhale. Focus on your breath coming in and going out.
  - **Meditation.** Clear your mind while you focus on a specific word, phrase, or mental image. There are books and CDs that give instructions on how to do this.
  - **Distraction.** Focus intensely on a spot in the room, a mental puzzle, a movie, or music.
- ↪ **Warmth.** For some people using a hot water bottle or heating pad, or taking a hot shower or bath, can ease the pain somewhat.
- ↪ **Acute pain treatment.** If the pain is unbearable and no other pain management strategy helps, your doctor might admit you to the hospital to have stronger pain medication through an IV (intravenous) line.
- ↪ **Family or friends.** When you're in a lot of pain, the people around you often worry and want to help. Let them listen, take over some of your daily responsibilities, or help in some other way.

## Other steps to take

Follow these helpful steps during and after passing a stone:

- ↪ **Drink plenty of fluids.** Extra fluid can help flush the stone out in your urine. Water, coffee, soda, sports drinks, and juice all help!
- ↪ **Take other medications as directed.** Your doctor might prescribe medication to relax the ureter and encourage the stone to pass. If you have an infection, you might be prescribed antibiotics.
- ↪ **Capture the stones.** Your doctor might give you a strainer to urinate over, or you can urinate into a cup or jar and strain stones out of your urine using a strainer or coffee filter. Allow the stones to dry and store them in a container to take to your doctor. Analyzing the stones can help your doctor know how to prevent future stones.
- ↪ **If your doctor asks, collect your urine.** Your doctor might want you to collect your urine for 24 hours after passing the stone. Analyzing the urine can show the type and cause of the stone.

### What about home remedies?

The pain of passing a kidney stone is so intense that many home remedies have been suggested. Friends, family members, and colleagues will probably give you ideas, and you can find dozens of treatments and remedies that claim to dissolve kidney stones or cure the condition online.

**Most of these** home remedies don't have any research to support them, but you may want to do something — anything — to feel you're taking control and making the stone pass faster. If you decide to try a home remedy, keep these guidelines in mind:

- ↪ **Be wary of expensive “miracle cures.”** If a product or remedy seems too good to be true, it probably is. Most stones can't be dissolved by taking medications or special drinks. Don't waste your money.
- ↪ **Use common sense.** Don't try anything that could be dangerous. If you wouldn't recommend that a loved one do it, don't try it yourself.
- ↪ **Don't go it alone.** Let your doctor know what you're doing, especially if you plan to drink, eat, or take something as part of the solution. The information can be useful if you have complications and your doctor needs to help.



## Your risk of more stones

Unfortunately, after your first stone, you have a strong risk of developing another one.

Years after your first stone	Your risk of another stone
1 year	10% to 15%
5 years	35% to 40%
10 years	About 50%

## Which type of stone do you make?

The body can make about 16 different types. To prevent more stones, it's important to know what type you make.

Calcium Oxalate Monohydrate



Calcium Oxalate Dihydrate



Cystine



Calcium Phosphate

Uric Acid

Struvite

Carbonate Apatite

Magnesium Ammonium Phosphate

Hydroxyapatite Brushite

Magnesium Hydrogen Phosphate

Tricalcium Phosphate

Octacalcium Phosphate

Matrix

Indinavir

Ammonium Acid Urate



## Can My Doctor Help Prevent Another Stone?

Once you've had a kidney stone, you have a good chance of getting another one. In fact, you have a 50% chance of getting another stone in the next 10 years. Fortunately, you take steps to prevent them.

**How do you prevent kidney stones?** The answer is more complicated than you would think. You might get a lot of advice from family, friends, and colleagues who readily share their ideas, but you can't always count on these tips.

For example, one common piece of advice is to take calcium out of your diet, but the answer isn't that simple. For patients with a risk of osteoporosis, it can be the wrong thing to do. Some patients may need to increase the calcium in their diet or take a calcium supplement to prevent kidney stones, while others need to decrease their calcium. The cause of kidney stones for you may be completely different than for another patient.

**The key to prevention is a workup — a set of tests — to figure out why you are making kidney stones.** The workup is simple and painless, and has 3 basic steps.

### 1. Identifying the stone

To prevent more kidney stones, it's necessary to know what kind of stones you make. Most people make calcium stones, but there are different kinds of calcium stones. In fact, your body can produce about 16 different types of kidney stones.

**The first step is analyzing the stone.** For your stone to be analyzed, you'll need to capture it when you urinate (unless your doctor took it out during a procedure). Your doctor will give you a strainer to urinate in, or you can urinate into a cup and filter your urine. Your doctor will send the stone to a lab to determine the chemicals in the stones.

### 2. Identifying the cause

There are at least 24 different reasons why the body might make kidney stones. So the next step is figuring out the exact reason why your kidneys are making them. About 90% of the time, the reason you're getting kidney stones can be shown by doing one or more of the tests on the next page.



↪ **X-ray studies.** X-ray tests such as a CT scan or IVP scan can show whether there is a problem with the way your kidney drains urine into the bladder. A CT scan combines x-ray images to create a detailed picture of your urinary system. With an IVP scan, a special dye is injected into your vein to highlight parts of the urinary system on the x-rays. These tests can uncover:

- Kidney cysts or growths
- Blockages in the part of the kidney that connects to the ureter
- Other structural problems with the kidney, such as your two kidneys being connected at one point (“horseshoe kidney”)

↪ **Basic urine tests.** Testing a urine sample can show:

- The acid-base balance (pH level) of your urine.
- Whether you have an infection in your urinary system.

↪ **24-hour urine test.** For this test, you’ll collect all your urine in a special container for 24 hours. Your doctor will give you special instructions. This test can reveal:

- The amount of materials in your urine that can cause stones, such as calcium, oxalate, uric acid, sodium, and phosphate
- The amount of citrate in your urine (citrate can help prevent stones)
- How much urine you typically produce in a day
- The acid-base balance (pH level) of a full day’s urine

↪ **Blood tests.** Testing a blood sample can show problems such as:

- Too much calcium in your blood.
- Problems with your parathyroid glands which make a hormone that causes you to have too much calcium in your blood.
- Problems with your thyroid gland.
- Problems with your kidneys.



### 3. Creating a prevention plan

**Knowing the type of kidney stones you make and why, allows your doctor to recommend specific ways to prevent them.**

You might need to take prescription medication, alter your diet, or make other changes. After you’ve been following the plan for a while, your urologist will repeat some of the tests to see if the treatment is working to make your kidneys less likely to form another stone.



## How much do I have to drink to make 2 liters a day?

How much you have to drink each day depends on your job and day-to-day activities.

If you work outside in the heat, you might need to drink gallons of fluid.

If you work in an office, you can drink less and still make 2 liters of urine.

As your activities change, your fluid needs change. You may work indoors but have fun outside on the weekend, when you'll need more fluid. On a hike or at the lake, drink more.

## Check your protein

To figure the grams of protein you need, multiply your weight by 0.4. For example:

150 pounds x .4 = 60 grams daily

175 pounds x .4 = 70 grams daily

200 pounds x .4 = 80 grams daily

Examples of protein in foods:

Food	Protein
Hamburger (¼ lb.)	28 grams
Steak (6 oz.)	42 grams
Fish (3 oz.)	22 grams
Chicken breast	30 grams
Egg (large)	6 grams
Yogurt (1 cup)	8 to 12 grams

## General Prevention Guidelines

Along with a specific workup and prevention plan (see pages 10 and 11), there are 4 basic prevention steps you can try. While these aren't guaranteed to work for everyone, in most cases they can help make kidney stones less likely.

### 1 Drink more fluid

Unless you have poorly functioning kidneys, you should drink enough fluid to make 2 liters of urine each day. How much do you have to drink? It depends on your situation (see the box at the right). If you're drinking enough, your urine will be clear or pale yellow. If it's dark yellow, it means your urine is very concentrated, so calcium and other crystals will be more likely to form and grow another kidney stone.

### 2 Eat less protein

Extra protein can cause you to make kidney stones. And most Americans eat more protein than they need. The recommended daily allowance of protein for the average adult is just 0.4 grams of protein per pound of body weight. This means a 200-pound man needs only 80 grams of protein a day. Extra protein is converted to fat and changes urine conditions so kidney stones are more likely.

### 3 Cut the salt

For a normal adult, the maximum recommended daily amount of sodium is 2400 mg. The average American consumes almost twice the recommended amount, and 5 times more than the body needs for survival. Sodium causes your urine calcium to increase, making you more likely to have a kidney stone.

Start by eating your food without any added salt. In most cases, you're already getting more sodium than you need, since many prepared, canned, or frozen foods contain salt already.

### 4 Take in more citrate

Citrate is a chemical that inhibits the production of kidney stones. The more you have in your urine, the less chance you have of getting a stone. Citrate is in lemons, oranges, and grapefruit — so put more of these into your diet and drink more juice from these fruits. Your urologist can also prescribe a citrate supplement.



### What is a staghorn stone? ▼

These stones get their name from the shape they take as they grow inside the kidney. Staghorn stones often form because of repeated urinary tract infections (UTIs) with certain bacteria. Even though they can grow to a large size, you may have no idea you have them. They cause little or no pain. A staghorn stone can lead to poor kidney function, even without blocking the flow of urine. Most often, staghorn shaped stones are the struvite/infection type of stone.

### Will my children get kidney stones? ▼

Kidney stones are most common in people who have a family member with them. Some conditions that cause stones are inherited. But sometimes, kidney stones form simply because of the way we eat as a family. Similar habits and lifestyles can cause kidney stones among family members.

### Can kidney stones damage my kidneys? ▼

Yes, but rarely. Kidney stones can cause damage if they cause repeated or serious infections. Or, they can damage kidneys if there is a blockage for a long time. Some stones, if left untreated, can cause the kidney to stop working.

### How do I manage my kidney stone along with my other health problems, such as diabetes and/or a heart disorder? ▼

Diet changes for heart conditions also often help prevent stones. A healthy diet with lots of fresh fruits and vegetables and less animal protein and salt can help avoid stones as well as other conditions. You can learn more from your health care provider or dietician. Keeping a normal weight can also help avoid diabetes and stones.

### My stone has not passed. Do I need surgery? ▼

If a stone in the ureter does not pass in a reasonable time or is causing pain or infection, you may need surgery to remove it.

### What happens if I keep forming stones? ▼

You may get another stone even if you've had surgery, changed your diet or are taking medications. With the right diet and medical treatment, you may be less likely to get stones over and over again.



During treatment, your health care provider may ask you to do another 24 hour urine collection to see if your urine test results have improved or have your blood checked. Your health care provider may also check to see if you are having any side effects from your medications. If you form stones often, you may need monitoring with X-rays and urine studies to be sure no new stones are forming. Your health care provider may track you to make sure your medications and diet changes are working.



### Call your Doctor Immediately If:

- ↪ You have a temperature greater than 100 degrees Fahrenheit or experience chills.
- ↪ The pain medicine is not reducing your pain or you are having a side effect from pain medication.
- ↪ You cannot tolerate food or fluids.
- ↪ You have excessive blood in your urine - red, thick, unable to see through it - or if blood clots make it difficult to urinate. (Drinking fluids helps reduce the potential for blood clots to form in your urine).

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## We Help in Choosing Your Best Option!!!

Passing the Stone Naturally

Medical Explosive Therapy (MET)

Shock Wave Lithotripsy (SWL)

Ureteroscopy (URS)

Percutaneous Nephrolithotomy (PCNL)

Laparoscopy



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