

# Kidney Stones Patient Guide



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## Kidney & Adrenal Health Committee

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## Kim's Story: A Patient Story



Kim Sebaly, a 75 year-old retired university professor, has lived with stones for over 25 years.

In 1989, Kim had his first stone surgery, shock wave lithotripsy (SWL). This was an old way to treat stones. It involved shock waves fired at his stones while he sat in a large tub of water. He says today's SWL treatment is easier and more effective.

Many years later, in 2007, Kim was diagnosed with another stone. This one was removed with ureteroscopy surgery (URS). In 2013, his stones returned. This time he needed a percutaneous nephrolithotomy (PCNL) surgery to treat a very large stone. It was almost the size of a baseball!

When Kim first heard about the surgery, he questioned how it would go. It involved making small cuts in his back, and inserting scopes into the center of his kidneys. Later, he said he was amazed at how smoothly the stones were removed.

Unfortunately, small pieces of stones still remain in Kim's left kidney. Kim is now very careful about what he eats and drinks. He wishes he had known all along about how much your diet and fluids affect the way stones form. "I am much better educated today about how to prevent kidney stones," says Kim. "I drink a lot of fluids and eat less salt and foods that form my type of stones. If I had some general education about stones and prevention 25 years ago, I would not have needed the care that I've had."

Kim hopes his story will help the more than 1 million people diagnosed with kidney stones each year.

## Introduction: An Old Problem with New Solutions

Kidney stone disease is one of the most common problems of the urinary system. More than 1 million Americans will get a kidney stone this year. The number of people in the U.S. with stones is rising. In 1980, about 3 in every 100 people got a stone at some point in their life. In 1994, that number rose to about 5 in every 100 people. At this time, about 1 in 10 Americans will have a kidney stone during his or her lifetime. Children getting kidney stones has also become more common in recent years.

Race, gender and ethnicity play a part in who may get kidney stones. Whites are more likely to get kidney stones than African-Americans or other races. Men get kidney stones more often than women. Still, the number of women getting kidney stones is rising.

Kidney stones are often very painful, and can keep happening in some people. Kidney stone attacks lead to over 2 million visits to the doctor and over 600,000 visits to the ER each year. People tend to get stones in midlife.

Kidney stones can become a costly problem, in terms of time and money. The diagnosis, treatment and prevention of kidney stones, with lost time from work, costs almost \$5.3 billion each year.

This guide covers how stones are diagnosed and treated. It also explains how to prevent them with diet and medicine. It's important to know that imaging tests to diagnose stones and minor surgery to treat stones are better than ever.

## What are Kidney Stones?

**Urine\*** contains many dissolved minerals and salts. When your urine has high levels of these minerals and salts, stones can form. Kidney stones can start small but can grow larger in size. They can even fill the inner hollow structures of the **kidney**. Some stones stay in the kidney, and don't cause problems. Others can travel down the **ureter** (the tube between the kidney and the **bladder**). If the stone reaches the bladder, it can be passed out through urine. If the stone becomes lodged in the ureter, it blocks the urine flow. This causes great pain.

## How do the Kidneys and Urinary System Work?

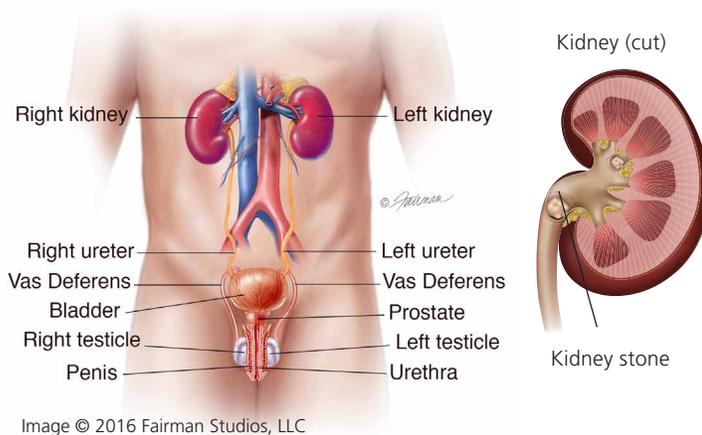


Image © 2016 Fairman Studios, LLC

The kidneys are fist-size organs that handle the body's fluid and chemical levels. Most people have two kidneys. Each one sits on each side of the spine behind the liver, stomach, pancreas and intestines. The kidneys, ureters and bladder are part of your **urinary tract**. The urinary tract makes, transports, and stores urine in the body.

The kidneys' main job is to clean waste from the blood. The waste becomes urine, which travels down the ureters into the bladder for storage. Urine leaves your body through the **urethra**. Healthy kidneys also control the levels of sodium, potassium and calcium in the blood.

Kidney stones form in the kidney, and sometimes move into the ureter. The ureters are tubes leading from the kidneys to the bladder. If a stone leaves the kidney and gets stuck in the ureter, it is called a ureteral stone.

## What are the Symptoms of Kidney Stones?

Stones in the kidney often do not cause any symptoms and can go undiagnosed. When a stone leaves the kidney, it can travel to the bladder and may get stuck in the ureter. When the stone blocks the flow of urine, it can cause the kidney to swell (**hydronephrosis**), This is often very painful.

Common symptoms of kidney stones are:

- A sharp, cramping pain in the back and side. The pain often moves to the lower abdomen or groin. Some women say the pain is worse than childbirth labor pains. The pain can start quickly and come in waves. It can come and go as the body tries to get rid of the stone.
- A feeling of intense need to urinate.
- Going to the bathroom more often or having a burning feeling when you go.
- Urine that is dark or red due to blood. Or sometimes urine has red blood cells that can't be seen with the naked eye.
- Nausea and vomiting.
- Men may feel pain at the tip of their penis.

## What are Kidney Stones Made of?

Kidney stones come in many different types and colors. How you treat them and stop new ones from forming depends on the type of stone you have.

### CALCIUM STONES (80% OF STONES)



Calcium stones are the most common type. There are two types of calcium stones: **calcium oxalate** and **calcium phosphate**. Calcium oxalate is more common. Some people have too much calcium in their urine, raising their risk. Even with normal amounts of calcium in the urine, calcium stones may form for other reasons.

## URIC ACID STONES (5–10% OF STONES)

Uric acid is a waste product that comes from chemical changes in the body. Uric acid crystals do not dissolve well in acidic urine. Instead it will form a **uric acid stone**.

Having acidic urine may come from:

- Being overweight
- Chronic diarrhea
- Type 2 diabetes (high blood sugar)
- Gout
- A diet that is high in animal protein and low in fruits and vegetables

## STRUVITE/INFECTION STONES (10% OF STONES)



**Struvite stones** are not a common type of stone. These stones are related to chronic **urinary tract infections (UTIs)**. Some bacteria make the urine less acidic and more basic or alkaline. Magnesium ammonium phosphate (struvite) stones form in alkaline urine. These stones are often large, with branches, and they often grow very fast.

People who get chronic UTIs, such as those with long-term tubes in their kidneys or bladders, or people with poor bladder emptying due to **neurologic disorders** (paralysis, **multiple sclerosis**, and **spina bifida**) are at the highest risk for developing these stones .

## CYSTINE STONES (LESS THAN 1% OF STONES)



Cystine is an amino acid that is in certain foods. It is one of the building blocks of protein. **Cystinuria** (too much cystine in the urine) is a rare, inherited **metabolic disorder**. It is when the kidneys do not reabsorb cystine from the urine. When high amounts of cystine are in the urine, it causes stones to form. **Cystine stones** often start to form in childhood.

## What Causes Kidney Stones?

### LOW URINE VOLUME

A major risk factor for kidney stones is constant low urine volume. Low urine volume may come from **dehydration**. This could be from the loss of body fluids from hard exercise, time spent in a hot place, or not drinking enough fluids. When urine volume is low, urine is concentrated and dark in color.

Concentrated urine means there is less fluid to keep salts dissolved. Drinking more will lower the salts in your urine. By doing this, you may lower your risk of stones forming.

If you've had stones, you should drink enough fluid to make at least 2.5 liters (2/3 gallon) of urine every day. On average, this will take about 3 liters (100 ounces) of fluid intake per day. While water is the best thing to drink, what matters most is getting enough fluid.

### DIET

Diet can also affect how stones form. A diet high in animal protein, such as beef, fish, chicken and pork, can raise the acid levels in the body and urine. High acid levels make it easier for calcium oxalate and uric acid stones to form. The breakdown of meat into uric acid also raises the chance that stones will form.

Avoiding foods rich in **oxalate** is a good idea.

One of the more common causes of calcium kidney stones is high levels of calcium in urine. High urine levels may be from the way your body handles calcium. It is not always due to how much calcium you eat. Studies show that lowering calcium in your diet can be bad for bone health and may increase kidney stone risk. People are not often asked to limit dietary calcium, but they also shouldn't eat too much.

Instead of eating less calcium, your health care provider may try to reduce your urine calcium level by asking you to eat less sodium. Too much salt in the diet is a risk factor for calcium stones. This is because too much salt keeps calcium from being reabsorbed from the urine into the blood. Reducing salt in the diet makes it less likely for calcium stones to form.

### BOWEL CONDITIONS

Certain bowel conditions can raise the risk of forming calcium oxalate kidney stones. For example, conditions that cause diarrhea (such as Crohn's Disease or ulcerative colitis) or surgeries (such as gastric bypass surgery) can cause stones. Diarrhea may result in the loss of large amounts of fluid from the body, lowering urine volume.

Your body may also absorb too much oxalate from the intestine. This causes more oxalate in your urine. Both low urine volume and high levels of urine oxalate can form calcium oxalate kidney stones.

## OBESITY

Obesity is a risk factor for stones. Obesity may change the acid levels in the urine, leading to stones.

## MEDICAL CONDITIONS

Some medical problems lead to kidney stones. If one or more of the parathyroid glands (found in the neck), which control calcium metabolism, grows abnormally, it can cause high calcium levels in the blood and urine. This can lead to kidney stones. Also, distal renal tubular acidosis, in which there is acid build-up in the body, can raise the risk of calcium phosphate kidney stones.

Some rare, inherited disorders can also make certain stones more likely to form. Examples include cystinuria, which causes too much of amino acid cystine to form in urine, and primary **hyperoxaluria**, where the liver makes too much oxalate.

## MEDICATION

Some medications, and calcium and vitamin C supplements, may increase your risk of forming stones. Be sure to tell your health care provider all the medications and supplements you take, as these could affect your risk of stone formation. Do not stop taking any of these unless your health care provider tells you to do so.

## FAMILY HISTORY

The chance of having kidney stones is much higher if you have a family history of stones, such as a parent or sibling.

## GET DIAGNOSED

### How are Kidney Stones Diagnosed?

“Silent” kidney stones, those that cause no symptoms, are often found with an **X-ray**. Other people have their stones diagnosed when sudden pain occurs while the stone is passing, and they may need medical help.

When a person has blood in their urine (**hematuria**) or sudden abdominal or side pain, tests may be ordered. An **ultrasound** or a **CT scan** can clearly diagnose a stone. These imaging tests tell the health care provider how big the stone is and where it is located. A CT scan is often used in the ER. It is used because it can make a quick and exact diagnosis .

A **urinalysis** is also done to learn whether or not you have a kidney infection. If your kidney stone(s) is in a difficult location, other imaging tests may be used.



## GET TREATED

Treatment of kidney stones depends on the following:

- The type of stone you have
- Location of the stone
- How bad it is
- Length of time you have had symptoms

There are different treatments to choose from. It is important to talk to your health care provider about what is best for you.

**While Kim had to have several procedures to get rid of his stones, most stones pass out of the body without treatment.**

### WAIT FOR THE STONE TO PASS BY ITSELF

Often you can simply wait for the stone to pass. Smaller stones are more likely than larger stones to pass on their own. The stones pass by leaving the body through normal urination.

Waiting 4 to 6 weeks for the stone to pass is safe as long as the pain is bearable, there is no infection, the kidney is not blocked and the stone is small enough to pass. While waiting for the stone to pass, you should drink normal amounts of water. You may need pain medication, like ibuprofen. Smaller stones and stones closer to the bladder will likely pass on their own.

### MEDICATION

Certain medications have been shown to help stones pass. The most common medicine prescribed is tamsulosin. Tamsulosin (Flomax) relaxes the ureter, making it easier for the stone to pass. You may also need pain and anti-nausea medicine as you wait.

### SURGERY

Your **urologist** may recommend surgery for a stone when:

- The stone fails to pass.
- The pain is too great to wait for the stone to pass.
- The stone is affecting kidney function. Small stones in the kidney may be left alone with no pain or infection. Some people choose to have their small stones removed. They do this because they are afraid the stone will start to pass and cause pain.

Before surgery an imaging test should be done to check that the stone didn't move or pass.

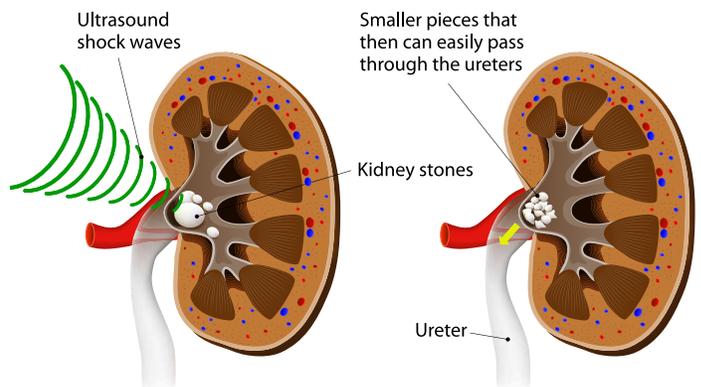
To prevent bleeding problems, a complete blood count

(CBC) and platelet count should be done before surgery.

Kidney stones should be removed by surgery if they cause repeated **infections** or because they are blocking the flow of urine. Today, surgery usually involves small or no **incisions** (cuts), minor pain and a quick recovery.

Surgeries to remove stones in the kidneys or ureters are:

### SHOCK WAVE LITHOTRIPSY (SWL)



**Shock Wave Lithotripsy (SWL)** is used to treat stones in the kidney and ureter. Shock waves are focused on the stone using X-rays or ultrasound to pinpoint the stone. Repeated firing of shock waves on the stone usually causes the stone to break into small pieces. These smaller pieces pass out in the urine over a few weeks.

Because of possible discomfort caused by the shock waves and the need to control breathing during the procedure, some form of **anesthesia** is often needed. SWL does not work well on hard stones, such as cystine, some types of calcium oxalate and calcium phosphate stones, or very large stones.

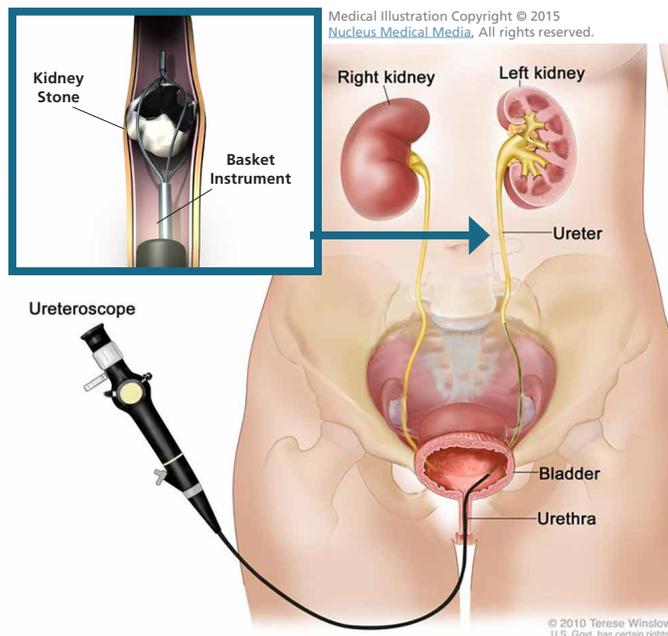
With SWL, you may go home the same day as the procedure. You may be able to resume normal activities in 2 to 3 days. You may also be given a strainer to collect the stone pieces as they pass. These pieces will be sent to a lab to be tested.

Although SWL is widely used and considered very safe, it can still cause side effects. You may have blood in your urine for a few days after treatment. Most stone pieces pass painlessly. Larger pieces may get stuck in the ureter, causing pain and the need for other removal procedures.

**In 1989, Kim had an SWL procedure. He says today's SWL procedures are easier on patients and more effective.**

## URETEROSCOPY (URS)

**Ureteroscopy (URS)** is used to treat stones in the kidney and ureter. URS involves passing a very small telescope, called an **ureteroscope**, into the bladder, up the ureter and into the kidney. Rigid telescopes are used for stones in the lower part of the ureter near the bladder. Flexible telescopes are used to treat stones in the upper ureter and kidney.

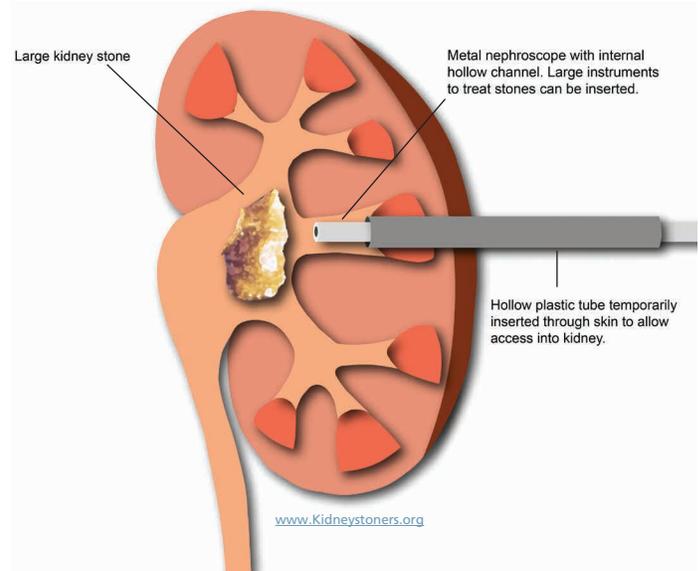


The ureteroscope lets the urologist see the stone without making an incision (cut). General anesthesia keeps you comfortable during the URS procedure. Once the urologist sees the stone with the ureteroscope, a small, basket-like device grabs smaller stones and removes them. If a stone is too large to remove in one piece, it can be broken into smaller pieces with a laser or other stone-breaking tools.

Once the stone has been removed in whole or in pieces, your health care provider may place a temporary **stent** in the ureter. A stent is a tiny, rigid plastic tube that helps hold the ureter open so that urine can drain from the kidney into the bladder. Unlike a **catheter** or a PCNL drain tube, this tube is completely within the body. It does not require an external bag to collect urine.

You may go home the same day as the URS and can begin normal activities in 2 to 3 days. If your urologist places a stent, he or she will remove it 4 to 10 days later. Sometimes a string is left on the end of the stent so you can remove it on your own. It is very important that the stent is removed when your urologist tells you. Leaving the stent in for long periods can cause an infection and loss of kidney function.

## PERCUTANEOUS NEPHROLITHOTOMY (PCNL)



**Percutaneous Nephrolithotomy (PCNL)** is the best treatment for large stones in the kidney. General anesthesia is needed to do a PCNL. PCNL involves making a half-inch incision in the back or side, just large enough to allow a rigid telescope (**nephroscope**) to be passed into the hollow center part of the kidney where the stone is located.

An instrument passed through the nephroscope breaks up the stone and suctions out the pieces. The ability to suction pieces makes PCNL the best treatment choice for large stones.

After the PCNL, a tube is usually left in the kidney to drain urine into a bag outside the body (**nephrostomy bag**). This will also help stop any bleeding. The tube is left in overnight or for a few days. You may have to stay in the hospital overnight after this operation.

Your urologist may choose to do X-rays while you are still in the hospital to see if any stone pieces remain. If there are pieces left, your urologist may want to look back into the kidney with a telescope again to remove them. You can begin normal activities after about 1 to 2 weeks.

### Other Surgery

Other kidney surgery is rarely used to remove stones. Open, **laparoscopic** or robotic surgery may be used only if all other less invasive procedures fail. A urethral stent (a thin tube placed in the ureter to help urine flow from the kidney) should only be used if there is a block or infection.

**In 2013, Kim had to have several PCNL treatments to remove a stone the width of a baseball. The stone was so large he said he was starting to lose kidney function.**

## Why am I Developing Stones?

Part of preventing stones is finding out why you get them. Your health care provider will perform tests to find out what is causing your stones. After finding out why you get stones, your health care provider will give you tips to help stop them from coming back. Some of the tests he or she may do are listed below.

### MEDICAL AND DIETARY HISTORY

Your health care provider will ask questions about your personal and family medical history. He or she may ask:

- Have you had more than one kidney stone before?
- Has anyone in your family had stones?
- Do you have a medical condition that may increase your chance of having stones, like frequent diarrhea, gout or diabetes?

Knowing your eating habits is also helpful. You may be eating foods that are known to raise the risk of stone. You may also be eating too few foods that protect against stones or not drinking enough fluids.

Understanding your medical, family and dietary history helps your health care provider find out how likely you are to form more stones.

### BLOOD AND URINE TESTS

After taking a complete history and doing a physical exam, your health care provider may take blood and urine samples for testing. Blood tests can help find if a medical problem is causing your stones. Your urine can be tested to see if you have a urinary tract infection or crystals that are typical of different stone types. If you are at high risk for getting stones in the future, a 24-hour urine collection can be done. This test will reveal the levels of different stone-forming substances in your urine. The results of this test can help your health care provider recommend specific diets and medications to prevent future stones.

### IMAGING TESTS

When a health care provider sees you for the first time and you have had stones before, he or she may want to see recent X-rays or order a new X-ray. They will do this to see if there are any stones in your urinary tract. Imaging tests may be repeated over time to check for stone growth. You may also need this test if you are having pain, hematuria (blood in your urine) or recurrent infections.

## STONE ANALYSIS

If you pass a stone or a stone is removed by surgery, your health care provider will want to test it. Testing the stone will determine what type of stone it is. This information helps your health care provider decide the best way to prevent future stones.

## How do I Stop Getting Kidney Stones?

Once your health care provider finds out why you are forming stones, he or she will give you tips on how to prevent them. This may include changing your diet and taking certain medications. There is no “one-size-fits-all” diet for preventing kidney stones. Everyone is different. Your diet may not be causing your stones to form. But there are dietary changes that you can make to stop stones from continuing to form.

### DIET TIPS TO PREVENT STONES

Check which diet tips your health care provider recommends for you:

#### Drink enough fluids each day.

If you are not producing enough urine, your health care provider will recommend you drink at least 3 liters of liquid each day. This equals about 3 quarts (about ten 10-ounce glasses). This is a great way to lower your risk of forming new stones. Remember to drink more to replace fluids lost when you sweat from exercise or in hot weather. All fluids count toward your fluid intake. But it's best to drink mostly no-calorie or low-calorie drinks. This may mean limiting sugar-sweetened or alcoholic drinks.

Knowing how much you drink during the day can help you understand how much you need to drink to produce 2.5 liters of urine. Use a household measuring cup to measure how much liquid you drink for a day or two. Drink from bottles or cans with the fluid ounces listed on the label. Keep a log, and add up the ounces at the end of the day or 24-hour period. Use this total to be sure you are reaching your daily target urine amount of at least 85 ounces (2.5 liters) of urine daily.

Health care providers recommend people who form cystine stones drink more liquid than other stone formers. Usually 4 liters of liquid (135 ounces) is advised to reduce cystine levels in your urine.

### ❑ Reduce the amount of salt in your diet.

This tip is for people with high sodium intake and high urine calcium or cystine. Sodium can cause both urine calcium and cystine to be too high. Your health care provider may advise you to avoid foods that have a lot of salt. The Centers for Disease Control (CDC) and other health groups advise not eating more than 2,300 mg of salt per day. The following foods are high in salt and should be eaten in moderation:

- Cheese (all types)
- Most frozen foods and meats, including salty cured meats, deli meats (cold cuts), hot dogs, bratwurst and sausages
- Canned soups and vegetables
- Breads, bagels, rolls and baked goods
- Salty snacks, like chips and pretzels
- Bottled salad dressings and certain breakfast cereals
- Pickles and olives
- Casseroles, other “mixed” foods, pizza and lasagna
- Canned and bottled sauces
- Certain condiments, table salt and some spice blends

### ❑ Eat plenty of fruits and vegetables.

Eating at least 5 servings of fruits and vegetables daily is recommended for all people who form kidney stones. Eating fruits and vegetables give you potassium, fiber, magnesium, antioxidants, phytate and citrate, all of which may help keep stones from forming.

A serving means one piece of fruit or one potato or one cup of raw vegetables. For cooked vegetables, a serving is ½ cup. If you are worried you may not be eating the right amount of fruits and vegetables, talk to your health care provider about what will be best for you.

### ❑ Eat foods with low oxalate levels.

This recommendation is for patients with high urine oxalate. Eating calcium-rich foods with meals can often control the oxalate level in your urine. Urinary oxalate is controlled because eating calcium lowers the oxalate level in your body. But if doing that does not control your urine oxalate, you may be asked to eat less of certain high-oxalate foods. Nearly all plant foods have oxalate, but a few foods contain a lot of it. These foods include spinach, rhubarb and almonds. It is usually not necessary to completely stop eating foods that contain oxalate. This needs to be determined individually and depends on why your oxalate levels are high in the first place.

### ❑ Eat less meat.

If you make cystine or calcium oxalate stones and your urine uric acid is high, your health care provider may tell you to eat less animal protein.

If your health care provider thinks your diet is increasing your risk for stones, he or she will tell you to eat less meat, fish, seafood, poultry, pork, lamb, mutton and game meat than you eat now. This might mean eating these foods 1 or 2 rather than 2 or 3 times a day, fewer times during the week, or eating smaller portions when you do eat them. The amount to limit depends on how much you eat now and how much your diet is affecting your uric acid levels.

### ❑ Eat the recommended amount of calcium.

If you take calcium supplements, make sure you aren't getting too much calcium. On the other hand make sure you aren't getting too little calcium either. Talk with your health care provider or dietitian about whether you need supplements. Good sources of calcium to choose from often are those low in salt. Eating calcium-rich foods or beverages with meals every day is a good habit. There are many non-dairy sources of calcium, such as calcium-fortified non-dairy milks. There are good choices, especially if you avoid dairy.

You can usually get enough calcium from your diet without supplements if you eat 3 to 4 servings of calcium-rich food. Many foods and beverages have calcium in them.

Some foods and beverages that might be easy to include on a daily basis with meals are:

FOODS RICH IN CALCIUM	AMOUNT	CALCIUM (MG)
Calcium-fortified non-dairy milks, juices	1 cup	400-450
Milk, buttermilk (lower fat is best)	1 cup	300
Kefir	1 cup	300
Yogurt from cow's milk; soy yogurt	3/4 cup	150-300

## MEDICATIONS TO PREVENT STONES

Changing your diet and increasing fluids may not be enough to prevent stones from forming. Your health care provider may give you medications to take to help with this. The type of stone and the urine abnormalities you have will help your health care provider decide if you need medicine and which medicine is best. Check which medication your health care provider recommends for you .

❑ **Thiazide diuretics** are for patients who have calcium stones and high levels of calcium in their urine. Thiazides lower urine calcium by helping the kidney take calcium out of the urine and put it back in the blood stream. When taking thiazides, you need to limit how much salt you eat, as these medications work best when urine sodium is low.

**Half of people who get a stone will get another one. Kim says he now watches his diet to try and prevent any more stones.**

❑ **Potassium citrate** is for patients with calcium stones and low urinary citrate, and for those with uric acid and cystine stones. Potassium citrate makes the urine less acidic or more alkaline (basic). This helps prevent cystine and uric acid stones. It also raises the citrate level in the urine, helping to prevent calcium stones.

❑ **Allopurinol** is frequently prescribed for gout, which is caused by high uric acid in the blood. Allopurinol not only lowers the level of uric acid in the blood but also in the urine, so it may also be prescribed to help prevent calcium and uric acid stones.

❑ **Acetohydroxamic acid (AHA)** is for patients who produce struvite or infection stones. These stones form because of repeated urinary tract infections (UTI). AHA makes the urine unfavorable for struvite stones to form. The best way to prevent struvite stones is to prevent repeated UTIs caused by specific types of bacteria and to completely remove the stones with surgery.

❑ **Cystine-binding thiol** drugs are used only for patients who form cystine stones. These medications (d-penicillamine or tiopronin) bind to cystine in the urine and form a compound that is less likely than cystine to crystallize in the urine. This drug is used when other measures fail, such as raising fluid intake, reducing salt intake or using potassium citrate.

❑ **Vitamin supplements** should be used carefully as some can increase your risk of forming kidney stones. Your health care provider and a dietitian may be good sources of information about over-the-counter nutritional supplements.

## FREQUENTLY ASKED QUESTIONS

### 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 BECAUSE I HAVE THEM?

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 recommended 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 and 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 will need surgery to remove it.

### WHAT HAPPENS IF I KEEP DEVELOPING STONES?

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

### WHY IS IT IMPORTANT THAT I FOLLOW UP WITH MY HEALTH CARE PROVIDER ABOUT MY KIDNEY STONES?

During treatment, your health care provider may ask you to do another 24-hour urine collection and have your blood work checked to see if your urine test results have improved. Your health care provider will also check to see if you are having any side effects from your medications.

If you form stones often, you will need monitoring with X-rays and urine studies to be sure no new stones are forming. Your health care provider will monitor you to make sure your medications and diet changes are working.

## GLOSSARY

### **ANESTHESIA**

Induced loss of sensitivity to pain in all or part of the body for medical reasons.

### **BLADDER**

The hollow, balloon-shaped organ in which urine is stored before it moves through the urethra.

### **CALCIUM OXALATE STONE**

Most common kidney stone, made up of hard crystals, often mixed with calcium phosphate.

### **CALCIUM PHOSPHATE STONE**

A stone caused by the combinations of high urine calcium and basic urine.

### **CATHETER**

A thin tube that is inserted through the urethra into the bladder to allow urine to drain or for performance of a procedure or test, such as insertion of a substance during a bladder X-ray.

### **CT SCAN**

A diagnostic imaging procedure. It uses both X-rays and computer technology to produce detailed images of the body. Also called computerized axial tomography.

### **CYSTINE STONE**

A rare form of kidney stone made up of the amino acid cystine.

### **CYSTINURIA**

A rare disorder where stones form because too much cystine is in the urine.

### **DEHYDRATION**

A dangerous lack of water in the body.

### **HEMATURIA**

A condition in which there are red blood cells in the urine.

### **HYDRONEPHROSIS**

A kidney that is swollen because of a blockage.

### **HYPEROXALURIA**

A rare disorder where stones form because the liver makes too much oxalate.

### **INCISION**

A cut.

### **INFECTION**

A condition resulting from bacteria or other germs.

### **KIDNEYS**

Two large, bean-shaped structures that remove waste from the blood.

### **LAPAROSCOPIC SURGERY**

Surgery done with thin, tube-like instruments that allow several small incisions to be made, rather than one large incision.

### **METABOLIC DISORDER**

An inherited problem in how the body breaks down and uses certain foods.

### **MULTIPLE SCLEROSIS**

A disease that affects the brain and spinal cord and slows down or blocks messages between the brain and body.

### **NEPHROSCOPE**

A rigid telescope used during Percutaneous Nephrolithotomy (PCNL) to remove a stone in the kidney.

### **NEPHROSTOMY BAG/TUBE**

A tube that is sometimes used after Percutaneous Nephrolithotomy (PCNL) procedure to drain urine and stone pieces from the kidney into a collection bag.

### **NEUROLOGIC (NEUROLOGICAL) DISORDERS**

Medical problems having to do with the nervous system (brain, spinal cord and nerves).

### **OXALATE**

A component of the most common type of kidney stone (calcium oxalate). Foods high in oxalate include almonds, spinach, beets and rhubarb.

### **PERCUTANEOUS NEPHROLITHOTOMY (PCNL)**

A surgical procedure used to treat large kidney stones.

### **SHOCK WAVE LITHOTRIPSY (SWL)**

A procedure that uses shock waves to break kidney stones into tiny pieces.

### **SPINA BIFIDA**

A condition when the brain, spinal cord and/or the meninges (the protective covering around the brain and spinal cord) do not develop completely.

### **STENT**

A tube inserted through the urethra and bladder and into the ureter. It is used to prevent stone fragments from blocking the flow of urine.

### **STRUVITE STONES**

Kidney stones associated with bacterial urinary infections.

### **ULTRASOUND**

A procedure that uses frequency waves to diagnose problems. It can also be used for therapeutic purposes.

## **URETEROSCOPE**

A very small telescope that is passed into the bladder, up the ureter and into the kidney.

## **URETEROSCOPY (URS)**

A procedure that uses a very small telescope to find and remove a stone in the kidney or ureter.

## **URETERS**

Two thin tubes that carry urine downward from the kidneys to the bladder.

## **URETHRA**

A thin tube that carries urine from the bladder out of the body (in men, it also carries semen, and it exits through the end of the penis).

## **URIC ACID STONES**

Kidney stones that develop when urine contains too much uric acid.

## **URINALYSIS**

A test of a urine sample that can reveal many problems of the urinary tract and some other body systems.

## **URINARY TRACT**

The organs that take waste from the blood and carry it out of the body as urine.

## **URINARY TRACT INFECTION (UTI)**

An illness caused by harmful bacteria, viruses or yeast growing in the urinary tract.

## **URINE**

A liquid, usually yellow in color, made by the kidneys and containing waste and water. Also known as pee.

## **UROLOGIST**

A doctor who specializes in the study, diagnosis and treatment of problems of the urinary tract.

## **UTI**

See Urinary tract infection.

## **X-RAY**

A test that uses radiation to make pictures of the tissues, bones and organs inside your body.

## ABOUT THE UROLOGY CARE FOUNDATION

The Urology Care Foundation is the world's leading urologic Foundation—and the official Foundation of the American Urological Association. We provide information for those actively managing their urologic health and those ready to make healthy changes in their lives. Our information is based on the American Urological Association resources and is reviewed by medical experts.

To learn more about different urologic issues, visit **UrologyHealth.org/UrologicConditions**. Go to **UrologyHealth.org/FindAUrologist** to find a doctor near you.

This information is not a tool for self-diagnosis or a substitute for professional medical advice. It is not to be used or relied on for that purpose. Please talk to your urologist or health care provider about your health concerns. Always consult a health care provider before you start or stop any treatments, including medications.

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