

UNDERSTANDING KIDNEY STONES AND CHRONIC KIDNEY DISEASE



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UNDERSTANDING KIDNEY STONES AND YOUR KIDNEYS

WHAT ARE KIDNEY STONES?

Urine is formed inside your kidneys and contains many substances, such as minerals and salts. If your urine has too many of these substances, hard deposits called kidney stones, can form. You may also hear kidney stones referred to as renal calculi, nephrolithiasis or urolithiasis.

DID YOU KNOW STONES MAY FORM FROM THE FOLLOWING SUBSTANCES?

- Calcium
- Oxalate
- Uric Acid
- Phosphate
- Cystine
- Xanthine

WHAT CAUSES KIDNEY STONES?

There are many complex factors that contribute to the formation of kidney stones. Sometimes it can be related to heredity and genetics. Other times, it can be related to dietary habits, such as a diet high in

sodium (salt), purine (a natural substance that can be found in food), and animal-based protein. The formation of kidney stones may also be related to obesity, Type 2 diabetes, or even over-the-counter supplements or prescribed medications, such as diuretics or immunosuppressants.

It is important for you and your healthcare provider to understand the underlying reason for the development of kidney stones.

WHAT ARE EXAMPLES OF HIGH-PURINE FOODS?

- All types of alcoholic beverages
- Red meat
- Organ meats (such as liver and sweetbreads)
- Anchovies
- Shellfish
- Sardines
- Mackerel



WHAT ARE THE SYMPTOMS OF KIDNEY STONES?

The severity and type of symptoms is related to the size and location of the stone within the urinary tract system. The stone can move through the kidney into one of the ureters (the tube that connects the kidney and the bladder), into the bladder, and be passed out of the body while urinating. However, if the stone is too large or becomes obstructed while traveling down the ureter, you may experience severe, relentless pain.

The symptoms may include:

- Relentless, sharp pain in the side or back
- Pain that radiates into the groin
- Pain or burning while urinating
- Frequent urination
- Blood in urine
- Nausea and/or vomiting
- Fever or chills (if an infection is present)

DID YOU KNOW THE URINARY TRACT SYSTEM INCLUDE THE FOLLOWING:

- Two kidneys
- Two ureters
- A urethra
- A bladder

HOW DO I KNOW IF I HAVE KIDNEY STONES?

It is possible to have a stone in the kidney and not have any symptoms at all. In fact, some stones are found incidentally. However, if your healthcare provider is concerned you have a kidney stone, there are several diagnostic tests that can be performed.

These diagnostic imaging tests include:

- X-rays
- Computed tomography (CT) scans
- Ultrasound

It is likely your healthcare provider will also perform blood and urine tests in addition to the diagnostic imaging tests.

These additional diagnostic tests include:

- Urinalysis
- 24-hour urine collection
- Routine blood tests, including calcium and uric acid levels

ARE KIDNEY STONES SERIOUS?

Yes. Kidney stones can be serious. If you have a kidney stone, there is a higher chance you may have a recurring stone. Kidney stones are associated with an increased risk of developing chronic kidney disease or even kidney failure if left untreated. If you have a kidney stone, it's important to discuss ways to prevent the recurrence of kidney stones. Your healthcare provider will discuss lifestyle changes, including dietary changes, to prevent future kidney stones.

CAN KIDNEY STONES HURT MY KIDNEYS?

Typically, kidney stones do not damage the kidneys. However, if you have repeated kidney stones and they cause infections or if the stone obstructs the urinary tract system and are left untreated, kidney stones could contribute to chronic kidney

disease or in the more extreme situation, kidney failure.

IF I AM ON DIALYSIS AND DON'T MAKE URINE, CAN I STILL GET KIDNEY STONES?

Yes! It is possible for persons that do not make urine to develop a kidney stone. This risk increases for persons with a history of kidney stones prior to starting dialysis. Because of this, it is important to inform your healthcare provider of any history of kidney stones. Treatment of kidney stones for persons on dialysis remains the same as for persons not on dialysis.

SHOULD I BE TESTED FOR KIDNEY STONES?

If you are diagnosed with a kidney stone, your healthcare provider may perform a stone analysis. This is performed after you pass the stone or after the stone is surgically removed. An analysis will identify what type of stone it is which is helpful in the event you have future stones. It will also help your healthcare provider decide if certain

medications will need to be prescribed to aid in decreasing your risk of a recurring stone. A stone analysis is typically performed when someone has recurring kidney stones and may not routinely be done after your first episode.



DID YOU KNOW?

While there are several different types of kidney stones, 80% of all kidney stones are calcium oxalate.

Calcium oxalate stones develop when you have a diet high in oxalate, low in calcium and don't drink enough fluids.

Uric acid stones come from high levels of purine.

If a stone analysis reveals your stone is calcium oxalate, you should increase your intake of calcium and decrease your intake of oxalate.

FOODS HIGH IN CALCIUM

- Dairy products
- Broccoli
- Kale
- Salmon



FOODS HIGH IN OXALATE (DECREASE INTAKE)

- Spinach
- Dried peas and beans
- Nuts
- Soy products



WHO IS AT-RISK FOR KIDNEY STONES?

There are several things that may put you at-risk for kidney stones:

- Lifestyle habits
- Metabolic disorders
- Hypercalcemic (high calcium levels) disorders
- Urine composition
- Inadequate water intake
- Recurrent urinary tract infections
- Genetic/inherited disorders (family history of stones, PH1)
- Anatomical abnormalities
- Hypertension (high blood pressure)
- Obesity

WHAT IS PRIMARY HYPEROXALURIA TYPE 1 (PH1)?

Primary Hyperoxaluria Type 1 (PH1) is a rare, autosomal recessive genetic disease caused by a mutation in a gene called alanine glyoxylate aminotransferase (AGXT). In individuals with a PH1 variant, the body produces too much oxalate. Oxalate is a natural substance found in many foods that become waste once your

body has used what it needed. The kidneys are responsible for removing oxalate but if there is too much of it, excess oxalate can form crystals in various organs, including the kidneys. These crystals can cause kidney stones and damage the kidneys.

It is important to share your past medical history with your healthcare provider since recurrent kidney stones or having kidney stones as a child may be a sign of having the PH1 variant. If you are diagnosed with PH1, you will work closely with your healthcare provider to find the most appropriate treatment option.

CAN KIDNEY STONES BE TREATED?

Yes! Kidney stones can be treated. It will be important for your healthcare provider to know the location and size of your stone in order to determine which treatment option is the best for you.

- Wait-and-watch approach: If you are tolerating the pain and it's a smaller-sized stone, you may wait for the

stone to pass on its own. As long as there are no signs of obstruction or infection and you can tolerate the pain, a wait-and-watch approach is appropriate. Be sure to drink water during this period and follow any recommendations from your healthcare provider.

- **Surgery:** It may be necessary to have surgery to remove the stone if the stone is too large to pass, if the stone is blocking the flow of urine, if the stone is causing an infection, or if the pain is too unbearable and not able to be managed with pain medication. The most common types of surgeries performed are minimally invasive and only require a small incision in the body.

TYPES OF SURGERIES TO REMOVE THE STONE INCLUDE:

- Shock Wave Lithotripsy (SWL)
- Ureteroscopy (URS)
- Percutaneous Nephrolithotomy (PNL)
- Open stone surgery (rarely performed)

RED FLAG SIGNS THAT REQUIRE IMMEDIATE MEDICAL ATTENTION:

- Pain not being controlled by your pain medication
- Fever, chills
- Difficulty urinating or unable to urinate
- Pain accompanied with nausea and vomiting

WHICH MEDICATIONS ARE USED TO TREAT KIDNEY STONES?

There are several medications your healthcare provider may prescribe if you are diagnosed with a kidney stone.

- Pain medications such as ibuprofen (examples: Motrin®, Aleve®), acetaminophen (example: Tylenol®) or opiates may be prescribed.
- Anti-nausea medications such as ondansetron (example: Zofran®) may be provided if you have nausea.
- Alpha-blocker such as tamsulosin (example: Flomax®) or Calcium channel-blockers such

as nifedipine (examples: Procardia® or Adalat®) may be prescribed to relax the lining of the ureter and may help you pass the stone.

USE CAUTION IF TAKING IBUPROFEN.

Ibuprofen may increase the risk of chronic kidney disease if taking it while you are experiencing an acute kidney stone.

WHAT ELSE CAN I DO TO PREVENT KIDNEY STONES?

It is important to consider your diet:

- Choose fresh fruits and vegetables
- Eat less animal protein
- Decrease salt intake
- Drink water and stay well-hydrated
- Avoid sodas

If you are overweight, losing weight may help. It's important to speak to your healthcare provider on an appropriate way to lose weight and what your weight goal should be.

Did you know?

Kidney stones date back to 4000 BC and are the most common disease of the urinary tract.



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