Kidney Health® Australia

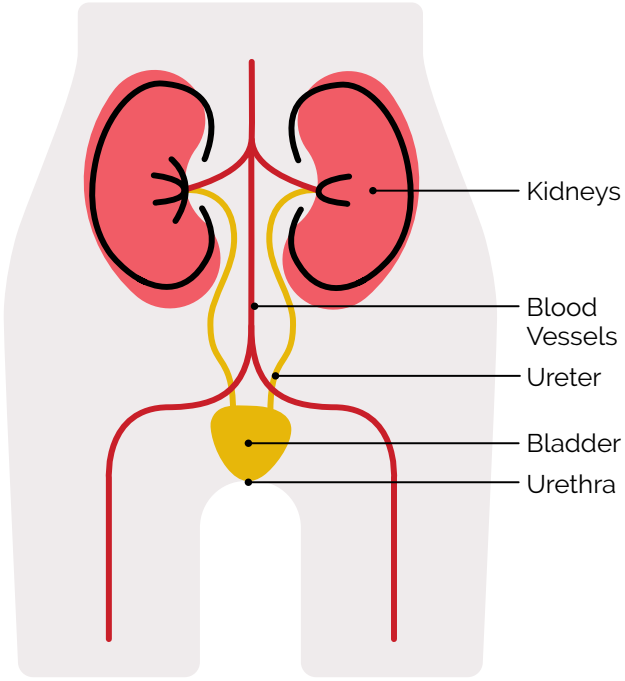
Kidney stones

What are kidney stones?

Your kidneys filter the blood and remove extra fluid and waste products. The extra fluid and waste collect in the bladder before leaving the body as urine (wee).

Kidney stones form when some waste materials clump together and create a solid crystal. Kidney stones can be as small as a grain of sand or as large as a golf ball. They can move throughout your urinary tract - from your kidneys, through the ureters, down through the bladder, and out the urethra.

Kidney stones can block the flow of urine, which can cause damage to your kidneys and sometimes kidney disease. Stones increase your chance of urinary tract infection and can result in germs spreading into your blood stream. If left untreated, kidney stones can lead to acute kidney injury.



Picture of a kidney stone

Types of kidney stones

There are 4 main types of kidney stones.

- **Calcium stones:** Extra calcium in the urine combines with other minerals like oxalate or phosphate. These stones are most common.
- **Uric acid stones:** Uric acid is a waste product from high protein foods. These stones form if uric acid levels are too high or if the urine is too acidic.
- **Struvite stones:** These stones are commonly caused by urinary tract infections. Germs create a waste product that makes the urine less acidic, causing struvite to clump into a stone.
- **Cystine stone:** A rare hereditary condition causes these stones. High levels of the chemical cystine, which makes up proteins in the body, combine to form a stone.

Risk factors for kidney stones

A kidney stone can form when substances such as calcium, oxalate, cystine, or uric acid are at high levels in your urine. However, stones can also form if these are at normal levels. Often, there is no known reason why a stone is formed. Certain conditions can increase your risk for kidney stones.

The **risk of a first kidney stone** being formed includes:

- family history of kidney stones
- male at birth
- older age
- Caucasian ethnicity
- kidney diseases like polycystic kidney disease
- medical conditions like gout or type 2 diabetes
- taking certain medicines used for human immunodeficiency virus (HIV), cancer, or seizures
- living in a hotter climate.

Kidney stones vary in size:

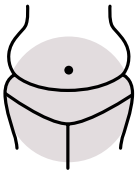
Small stones (<5mm) are smaller than a grain of rice.

Medium stones (6-20mm) are as big as a marble.

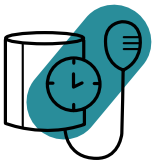
Large stones (>20mm) can be the size of a golf ball.

About 30-50% of people with a first kidney stone will get a second one in five years.

Risk factors for another occurrence of a stone include:



Obesity



High blood pressure

Not drinking enough water

High salt diet

Acidic urine

Certain medicines

What problems do kidney stones cause?

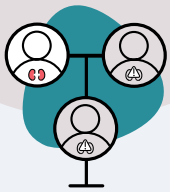
If the stone is small, you may not feel it. Severe pain is usually the first sign of a larger kidney stone. The pain usually begins when a stone moves into your urinary tract. This causes a sharp pain in your back, just below your ribs. It can spread around to the front of your body and sometimes towards your groin.

Other signs include:

- **fever, sweating or shivers**
- **nausea and vomiting**
- **blood in the urine**
- **cloudy or bad smelling urine if you have an infection**
- **'gravel' in your urine**
- **an urgent need to urinate (pass wee).**

Rare inherited conditions can sometimes cause recurrent stones.

You may need genetic testing if you have many episodes of kidney stones.



How does your doctor detect kidney stones?

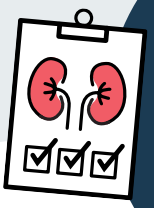
Some tests for kidney stones are:

Imaging tests:
an ultrasound or CT scan to see stones in the ureter or kidney.

Stone analysis:
an x-ray diffraction or infrared spectroscopy test can help identify the type of kidney stone.

Blood tests:
to review mineral levels like calcium or uric acid.

Urine test:
to identify infectious causes.



Your doctor may ask you to collect and filter your urine for 48 hours after experiencing pain from kidney stones.

How are kidney stones treated?

Small stones will usually pass out of your body (in your urine) on their own. Your doctor will prescribe pain medicines to help with the symptoms of passing the stone. Staying hydrated and drinking enough water can help you to pass a kidney stone.

Treatment often depends on the size rather than the type of kidney stone.

Your doctor may recommend one of the following:

- **Medical expulsive therapy:** Medicines help open the ureter, making it easier to pass the stone through your urine.
- **Oral Chemolysis:** Medicines that change the pH of your urine and breakup certain types of stones
- **Ureteroscopy:** A tube with a camera on the end is inserted into the urethra (tube) and up to the kidney. This procedure helps your doctor find the kidney stone and remove it or break it up using a laser.
- **Extracorporeal Shock-Wave Lithotripsy (SWL):** Shock waves break up the kidney stone into smaller pieces, allowing them to pass in the urine.
- **Percutaneous Nephrolithotomy (PCNL):** A small tube is inserted through a cut on your back. This procedure is used if the stone is too large or hard to remove by other treatments.
- **Surgery:** If no other methods are suitable, your stone may need to be removed using traditional surgery.

It is important to remove kidney stones from your body to prevent damage to your kidneys.

How are kidney stones prevented?

If you are at risk for kidney stones or have had a kidney stone, your doctor may recommend you to:

- **Drink enough water**. You may need to drink enough water to pass 2.5 liters of urine per day.
- Avoid drinks with a lot of **phosphoric acid**, like soft drink and beer. Choose water instead.
- **Limit salt** in your diet. Aim for less than 5 grams per day.
- Ask your doctor if the **medicines** you are taking cause kidney stones. Do not stop taking your medicines without talking to your doctor.
- Eat a **healthy diet** with two serves of fruit and five serves of vegetables per day.
- Get the right amount of **calcium in your diet**. Your doctor or an Accredited Practicing Dietician will tell you if you need to eat a certain amount of calcium.

Medicines

Your doctor may prescribe **certain medicine to reduce the formation or break up certain types of stones**. Some medicines that may reduce your chance of forming another stone include:

- **Thiazide diuretics** reduce calcium in the urine to prevent certain types of calcium stones.
- **Potassium citrate** or citric juices are used to reduce the acidity of the urine and prevent or dissolve cystine stones, uric acid stones or certain calcium stones.
- **Allopurinol** decreases the amount of uric acid in the body and may prevent uric acid stones.
- **Antibiotics** treat infections that cause struvite stones.

These medicines are used to stop the formation of certain types of kidney stones. Your doctor will decide if you need medicines to prevent kidney stones.

Things to remember:

- ✓ **Untreated kidney stones can cause serious problems like infection, kidney damage, or even kidney failure.**
- ✓ **Staying hydrated is key to preventing and treating kidney stones. Drinking enough water helps prevent stones from forming and helps small stones pass naturally.**
- ✓ **Stone type and size affect treatment, which ranges from medicines to surgery.**

What does that word mean?

Accredited Practising Dietitian (ADP) – A person who is professionally qualified to give practical diet and nutrition advice.

Acute kidney injury – A loss of kidney function that happens quickly which may or may not be permanent.

Antibiotics – A medication used to treat and prevent a variety of bacterial infections and disease.

Calcium – The most common mineral in your body. Calcium is essential for healthy bones and teeth. It is also important for regulating heart function, blood clotting, and muscle functioning, such as contraction and relaxation.

Computed tomography (CT) scan – An imaging procedure that uses special x-ray equipment to create a series of detailed pictures or scans of areas inside your body.

Cystine – Made from proteins found in a wide range of foods including meat, eggs, and dairy foods.

Diuretic – Any substance that increases the production of urine.

Oxalate – Naturally present in many foods including leafy green vegetables.

Ultrasound scan – An imaging procedure that uses sound waves to show structures and functions inside your body.

Ureter – The tube that connects the kidneys to the bladder.

Uric acid – Made in your body as it breaks down proteins called purines which are sent to your kidneys to filter and pass out of your body as urine. If your kidneys are not working properly, uric acid can cause problems as it builds up in your body.

Urinary Tract Infection (UTI) – Is a bacterial infection that can affect the urethra, bladder or kidneys. It may cause pain when urinating and wanting to urinate more frequently. Treatment with antibiotics may be needed.