

the stones into crystals small enough to be passed in the urine. The shock waves do not hurt, although some people feel some discomfort at the time of the procedure and shortly afterwards.

#### **Ureteroscopic stone removal**

If a stone is lodged in the ureter, a flexible narrow instrument called a cystoscope can be passed up through the urethra and bladder. The stone is "caught" and removed, or shattered into tiny pieces with a shock wave. This procedure is usually done under a general anaesthetic.

#### **Percutaneous nephrolithotomy (PCNL)**

If ESWL doesn't work or a stone is particularly large, it may be surgically removed under general anaesthetic. The surgeon makes a small cut in the back and uses a telescopic instrument called a nephroscope to pull the stone out or break it up with shock waves.

#### **Parathyroid surgery**

A small benign tumour in the parathyroid glands (in the neck) can be the cause of the chemical imbalance resulting in kidney stones. If this is the case, the tumour can be surgically removed.

## **Prevention**

Knowing the exact cause and type of stone enables people to make changes that can help prevent further stones.

To help prevent any type of stone, fluid intake should be two to three litres per day - water is best.

People who get calcium stones should cut down on foods that have high levels of calcium (dairy products and leafy green vegetables), and oxalate (chocolate, tea, rhubarb, cooked spinach and asparagus). It's important to discuss dietary changes with a doctor - not everyone finds them helpful.

People who get uric acid stones should eat less meat, fish and poultry. Also to help prevent uric acid stones, medicine may be prescribed to control the level of uric acid in the urine.

People who get struvite or "infection" stones need to keep the urine free of bacteria that can cause infection. This may mean taking long-term antibiotics.

## **Further information**

### **National Kidney Federation (UK)**

☎ 0845 6010209  
[www.kidney.org.uk](http://www.kidney.org.uk)

# Kidney stones

Kidney stones are hard, stone-like masses that can form in one or both kidneys. Kidney stones are fairly common, with about one percent of people in Western countries likely to get them. They are often painless when in the kidney but can cause severe pain as they travel from the kidneys to the bladder. They can also cause bleeding or block the flow of urine.

## **What are kidney stones?**

Most people have two kidneys (see illustration over), which "clean" the blood. They filter out water and waste products, making urine.

Kidney stones are formed out of crystals found in the urine. In most cases, the crystals are too tiny to be noticed, and pass harmlessly out of the body. However, they can build up inside the kidney and form much larger stones.

If a stone becomes large enough to block the flow of urine out of the kidney, it can cause pressure, pain and infection. If a stone moves out of the kidney with the flow of urine, it can cause severe pain as it moves through the ureters - the tubes that carry urine from the kidney to the bladder. If a

stone gets stuck, an infection can occur. Depending on its size and position, an untreated kidney stone could cause permanent damage to the kidneys.

Depending on where they are located, kidney stones are also known as renal calculi, urinary calculi, urinary tract stone disease, nephrolithiasis, urolithiasis, and ureterolithiasis.

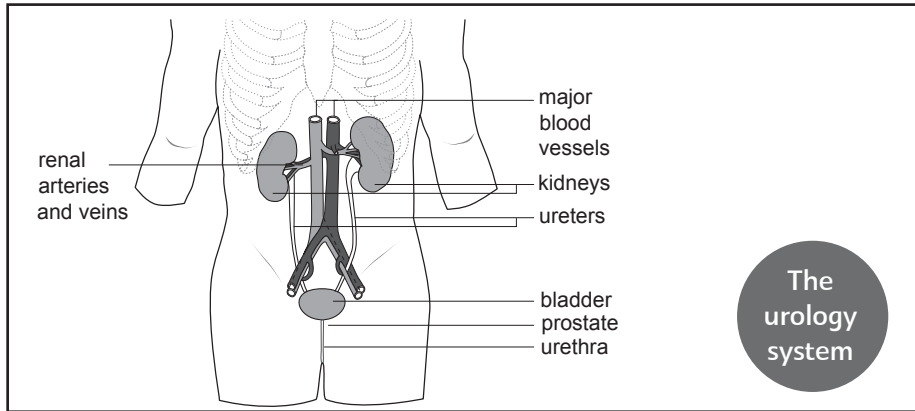
## **What causes kidney stones?**

Kidney stones form when the salts and minerals that are normally found in the urine become out of balance. Different kinds of kidney stones are formed from salts in the urine.

### **Calcium stones**

These are the most common type of kidney stones. They are made of calcium

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and oxalate, which are chemicals found naturally in certain foods (see 'Prevention', below for examples of these foods). A diet with a high content of calcium and oxalate can increase the concentration of these chemicals in the urine and make it more likely for stones to form. Other factors include:

- excess vitamin D,
- overactive parathyroid glands,
- medical conditions such as cancer, some kidney diseases, or a disease called sarcoidosis.

#### Uric acid stones

Excess amounts of uric acid can be caused by eating a lot of meat. Conditions such as gout and treatments such as chemotherapy can also increase the risk of getting uric acid stones.

#### Struvite stones (infection stones)

These are caused by too much ammonia in the urine. Ammonia is a chemical produced by the bacteria that cause urinary tract infections. This kind of stone is most often found in women.

#### Cystine stones

These are caused by a hereditary disorder called cystinuria, which affects about one per cent of men and women.

#### Who gets kidney stones?

Some people are more likely to get kidney stones than others. Men are more prone than women, and people who have previously had a kidney stone have a 60% chance of getting another stone within seven years.

Other factors include:

- a family history of kidney stones,
- being aged between 20 and 40,
- taking certain medicines such as diuretics (water tablets), antacids and thyroid medications,
- having only one kidney,
- eating a diet high in protein but very low in fibre,
- becoming dehydrated by not drinking enough fluids or living or working in a hot place,

- having poor mobility (eg, being confined to bed),
- having an ileostomy, eg, for Crohn's disease.

#### The symptoms

Many kidney stones don't move and are too small to cause symptoms. These are often referred to as "silent" stones.

If a kidney stone causes a blockage, or moves down the ureter, it may cause some of the following symptoms:

- pain or aching in the back on one or both sides,
- spasms of intense pain (anywhere between the bottom of the ribs and the groin),
- bloody, cloudy or smelly urine,
- nausea and vomiting,
- a frequent urge to urinate,
- a burning sensation during urination,
- fever and chills.

These can also be symptoms of a urinary tract infection, or cystitis, which is much more common in young women than kidney stones. Anyone who has one or more of these symptoms should seek medical advice.

#### How kidney stones are diagnosed

Doctors can usually diagnose kidney stones by asking about symptoms and doing a physical examination. Further tests may be done to confirm the diagnosis, reveal the size, location and identity of the stone. These include:

- Blood tests: to identify excess amounts of certain chemicals related to the formation of stones.
- Urine analysis: patients are asked to give a urine sample for testing, and may be asked to collect urine over 24 hours to analyse it for the chemicals that cause stones.
- X-rays: stones that contain calcium show up white on the X-ray.
- Intravenous urogram (IVU): an X-ray involving an injection of special dye to show up stones that can't be seen with X-rays alone.
- Ultrasound scan: this uses high frequency sound waves to produce an image of the internal organs.

#### Treatment

Treatment depends on the type and cause of the stone. Most stones can be treated without surgery. Drinking lots of water (two and a half to three litres per day) and staying physically active are often enough to move a stone out of the body.

However, if there is infection, blockage, or a risk of kidney damage, a stone should always be removed. Any infection is treated with antibiotics first. Stones that are too large to pass can be removed in several ways:

#### Extracorporeal shock wave lithotripsy (ESWL)

This is the most common method and does not involve a surgical operation. Instead, shock waves are used to break