



Kidney stones

Kidney stones are hard pieces of material like “pebbles” that can form in one or both of your kidneys. Sometimes these stones can stop urine from leaving the kidneys and cause pain.

What do the kidneys do?

- The kidneys are important for getting rid of waste that the body does not need.
- Usually, urine carries this waste through the kidney drainage system (calyx, renal pelvis and ureter). (See diagram: *Anatomy of the urinary tract*)

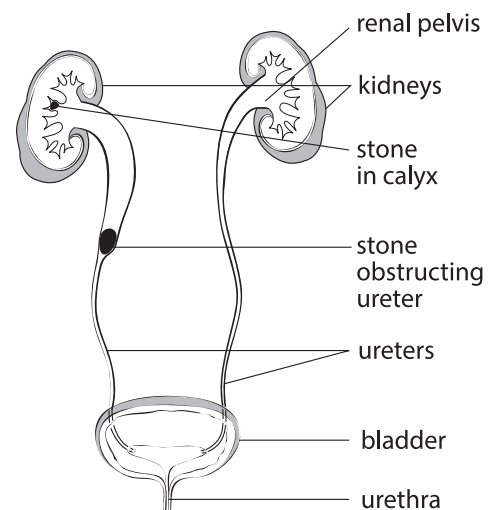
What is a kidney stone?

- When the urine holds too much waste and does not have enough liquid, materials (such as calcium, oxalate, and uric acid) can stick together to make a solid ball, called a kidney stone.
- Some kidney stones are the size of a grain of sand and may pass out of the body in the urine without you knowing it.
- Other stones can be as large as a bean.
- When the stone (or stones) is large, it can get stuck somewhere along the kidney drainage system and stop your urine from draining out of the body. (See diagram: *Anatomy of the urinary tract*)
- You can feel pain when this happens.
- If the kidney stone cannot leave the body with the urine, it can grow larger.

Who gets kidney stones?

- About 10% of Canadians have a kidney stone, men more often than women.
- Children rarely have them.
- In adults, it doesn't seem that forming kidney stones is inherited even if several family members have had them.
- On the other hand, a child who forms a kidney stone is more likely to come from a family with a history of kidney stones.
- Very seldom are kidney stones a sign of kidney disease or of kidneys that are not working properly.

Anatomy of the urinary tract



Why do people get kidney stones?

- A kidney stone can form when there is more waste in the urine than the urine can dissolve.
- Too much waste in the urine can happen when:
 - there is not enough fluid in the urine to water down the waste or
 - there is more waste in the urine than it can handle easily.
- Too little fluid in the urine may come from:
 - Not drinking enough liquids
 - Losing too much fluid through regular, heavy sweating or constant diarrhea
- Too much waste in the urine may come from:
 - Eating too much of certain foods in your diet (See section: *How do my eating and drinking habits affect having kidney stones?*)
 - Your body itself producing too much waste
 - Changes in how your bowels or kidneys are working.

How long does it take to form a kidney stone?

- Most kidney stones take many months or years to grow to a size that causes symptoms.
- The most common symptom is pain because the stone is blocking the kidney drainage system.
- Although kidney stones may form quickly:
 - They do not usually cause symptoms as soon as they are formed.
 - It may be some time before you feel symptoms so that it may be impossible to know how quickly your stone or stones have formed.
- About 50% of people who form stones will end up with another kidney stone within 10 years; 75% will have another stone within 20 years.

Are there different kinds of kidney stones?

- Most kidney stones contain **calcium** (usually calcium oxalate or calcium phosphate). (See section on calcium: *How do my eating or drinking habits affect having kidney stones?*)
- About 10% of kidney stones are made up of **uric acid**.
 - Uric acid is a by-product of the body breaking down meat, poultry, and fish in your diet
 - People who have gout pass more uric acid in their urine than others.
- **Struvite stones** form because of certain bacterial infections of the urine.

How are kidney stones diagnosed?

- **Simple x-rays.** Many kidney stones will show up on a simple x-ray (except for uric acid stones, which need more tests).
- An **ultrasound or a CT scan** is often very useful for identifying the size and location of all types of kidney stones.
- **Urine and blood tests** will also help check how well your kidneys are working and may help find a cause for forming a kidney stone.
- How often you might have any of the tests depends on:
 - The seriousness of your stone disease
 - How many stones you produced in the past
 - The age at which you formed your first kidney stone.

How are kidney stones treated?

- Sometimes treatment for kidney stones is to relieve pain or to remove a stone that is blocking the drainage system.

- Many stones do not need specific treatment and will pass out of the body by themselves.
- Medications may be given to help the stone pass down the ureter on its own.
- Sometimes, shock waves are needed to break up a large stone into smaller pieces that can pass more easily.
- A stone trapped in a ureter can often be removed with tools passed through the urethra. (See diagram: *Anatomy of the urinary tract*)
- Larger stones may be removed with surgery through a small incision.
- It is important to know that your local hospital may not be equipped to offer all these different kinds of treatment.
- Your urologist will recommend treatment based on your specific circumstances.

How do my eating or drinking habits affect forming kidney stones?

Fluids

- The best way to help prevent kidney stones is to drink lots of water (up to 3L) every day so that
 - You don't become dehydrated.
 - You can produce more urine (recommended 2.5 L each day)
- Actually, you will benefit with any kind of increase in your fluid intake.
- Although water is best (try to make it half of your fluid intake), tea and coffee also count as fluids.
- To reduce the risk of possibly forming another kidney stone, there is some scientific proof that:
 - Grapefruit, apple, and orange juices can help
- Drink more fluids if you feel that you are sweating a lot (with your job or through sports) or you have diarrhea.
- Certain fluids like iced tea, cocoa, and cranberry juice, may contain substances that are also found in many kidney stones.

Calcium

- It is **NOT** a good idea to avoid calcium in your diet as a way to prevent forming kidney stones.
- You should try to consume 1000 – 1200 mg of calcium per day.
- Dietary calcium is needed to avoid bone problems, especially in older people.

- Your choices for dietary calcium can include:
 - dairy products (milk, yogurt, cheese)
 - calcium-fortified beverages made of almond and soy
 - dark-green leafy vegetables
 - dried peas and beans
 - fish with bones
 - juices and cereals that contain calcium
- If calcium supplements are required, you should take them at mealtimes.

Oxalate

- Many stones contain material called oxalate.
- If your stones contain calcium oxalate, try to avoid eating a lot of foods high in oxalate.
- High levels of oxalate are found in spinach, rhubarb, certain berries (cranberry, strawberry, blackberry), chocolate, nuts, beet greens, squash, cola, cocoa, and tea.
- Sometimes calcium supplements can be given to decrease the amount of oxalate you will absorb from your diet.

Meat, Fish, Poultry

- If you eat a lot of meat, fish, and poultry, your risk of forming stones is higher.
- These foods most often affect people who form stones that contain uric acid.
- They can also affect those who form stones with calcium.
- If you repeatedly form calcium or uric acid stones you should moderate the amount of animal protein in your diet.
 - A daily limit of 250 grams (eight ounces) of animal protein is reasonable.

Salt

- People who form stones need to
 - Read labels that list sodium levels
 - Limit the amount of salt that they eat to 1500 mg of sodium per day.
- A diet high in fiber, fruits and vegetables may decrease your risk of forming stones

Do I have to keep eating and drinking this way?

- Yes. Changes to your diet need to be a permanent part of your lifestyle.
- It is important that you make any eating changes a little bit at a time.
- Start small by drinking more fluids, then maybe eat less salt.
- When these two changes become a habit, add more changes to your diet particularly if you are still forming stones.
- Your doctor can help you decide which dietary changes would be best for your situation.

Bottom Line

- Some people who form kidney stones need to be checked regularly.
- It may be enough to have a simple annual x-ray (without injection of “dye”) or an ultrasound of the kidneys.
- At these check-ups, you and your doctor can review any changes to your diet, medication, and health.
- People who keep forming stones, children and people with kidney problems may need to have check-ups more often.

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