

Uric Acid and Kidney Stones

Information for Patients

Uric acid stones are one of the more common types of kidney stones. Other types of kidney stones include calcium oxalate, calcium phosphate and struvite.

Uric acid is a chemical created when the body breaks down substances called purines. It is normal for purines to be found in the body and they are also found in many foods. Uric acid does not have any specific function and therefore is excreted by the kidneys as a waste product.

High concentrations of uric acid in the urine (*hyperuricosuria*) can lead to kidney stones. Uric acid kidney stones account for about 10% of all kidney stones. High concentrations of uric acid in the blood (*hyperuricemia*) can lead to gout – a condition in which painful crystals develop in the joints (especially the big toe). About 1 in 4 people who have uric acid kidney stones also have hyperuricemia.

Conversely, about 1 in 4 people with gout develop uric acid kidney stones. Therefore, not everyone with gout develops uric acid kidney stones and, conversely, not everyone with uric acid kidney stones has gout.

A high concentration of uric acid in the urine is not only a risk factor for uric acid stones but it is also a risk factor for the development of other types of stones (e.g. calcium oxalate stones). Uric acid crystals can form very quickly under the right circumstances. Other types of calcium-based crystals can then form on top of the uric acid crystal. It is for this reason that people with other stone types are advised to limit their consumption of animal protein.

Formation of uric acid stones is promoted by:

1. Hyperuricosuria
2. Acidic urine (i.e. low pH)
3. Low urine volume

The main factor is hyperuricosuria (high concentrations of uric acid in the urine). Therefore, one of the most important ways to prevent uric acid stones is to reduce uric acid secretion by limiting purine intake. Alkalinizing the urine (raising its pH) is another effective strategy which can actually dissolve uric acid stones. Unlike calcium oxalate stones, citrate and calcium intake do not play a major role in uric acid stone formation. However, since uric acid stones may promote formation of calcium oxalate stones, the general advice applicable to those other stone types may be helpful if you have uric acid stones.

There are several important differences between uric acid stones and other types of stone. Uric acid stones are *radiolucent* – invisible on a plain X-ray. Therefore, either a CT scan or an ultrasound is necessary to detect them. In addition, uric acid stones are one of the few stone types that may be dissolved. This only works if the stones are not acutely obstructing the urinary tract since flow of urine around the stones is required. Uric acid stones that are acutely obstructing the urinary tract (e.g. causing symptoms) are treated the same way as other types of kidney stones. Lastly, medications are commonly used to prevent and dissolve of uric acid stones – whereas they are not commonly used for other stone types.

General Advice for Preventing Stones*

1. **Aim for a urinary volume of 2-3 L/day.** This amounts to about 8-10 glasses. Increase fluid intake in hot/humid weather or with major physical activity.
2. **Limit animal protein to < 200 g/day (4-6 ounces).**
3. **Limit salt/sodium to < 6 g/day.** Limit table salt, soy sauce, pickled vegetables. Processed and canned food as well as food in restaurants are often high in salt.
4. **Increase your intake of citrate** (esp. lemon and lime juices). Adding lemon juice to your drinking water is a quick way to increase citrate intake.
5. **Do NOT reduce your dairy/calcium intake** – aim for 1200 mg per day

* This advice is applicable to any type of stone composition

AVOID foods high in purine		Low purine foods which are OK	
Beans and peas	Seafood: Anchovies*,	Carbonated soft drinks	Vegetables
Broth*, bouillon*, consommé*	Sardines*, Herring*, Mackerel, Crab,	Tea	Bread & Cereals
Game meats*: goose, duck partridge	Mussels*, Scallops*, Shrimps, Fish Roe	Coffee	Pastas
Organ meats*: liver, kidney, brain, heart,	Vegetables: Asparagus, Cauliflower, Spinach	Cocoa/Chocolate	Rice
Sweetbreads	Mushrooms	Milk	Dairy products
Red meats	Alcohol (esp. beer)*	Eggs	Sweets
		Fruit juices	Nuts
		Fruit	Peanut butter

* Foods very high in purines should be avoided whenever possible

Medication	Comments
Oral alkalinization	These medications raise urinary pH to prevent crystal formation. It is helpful if your urinary pH is consistently acidic. Stones can be dissolved at a rate of about 1 cm every 1-2 months. Examples are Potassium citrate 20 mEq plus Sodium bicarbonate 10 mEq twice daily.
Allopurinol	Allopurinol reduces the production of uric acid and is helpful if the urinary section of uric acid is high or if there is an elevated level of blood uric acid (or gout). Typical dosing: 300-600 mg daily divided into 2 doses.

Your physician will discuss if these medications are applicable to your case and any potential side-effects to be aware of.