

Kidney stones: Prevention and treatment

Some people have equated the pain of passing a kidney stone to that of childbirth. That is an intimidating thought, but kidney stones can be prevented. The Hoffman Center stresses the importance of dietary modification, which should not be overlooked when treating kidney stones.

The Hoffman Center offers a **Stone Risk Profile** test for patients with painful kidney stone symptoms. It is a urine test that can tell us exactly which type of stone one is more prone to get. Based on this information, we formulate a prevention and treatment program.

Regardless what stone one may have, we recommend **drinking enough fluid** to excrete more than three liters of urine daily. This will prevent the stone particles from becoming supersaturated in the urine, a phenomenon that directly precedes stone formation. Drinking more than 3 liters of fluid daily will decrease the concentration of the stone particles in the urine as well as increase the urine flow rate. One should drink at night as well as during the day. So go ahead, imbibe for prevention.

What should I drink, you may ask? Stay clear of **soft drinks** as most of them, especially colas, contain phosphoric acid, a stone inducer. One study demonstrated that those who drank more than one liter per week of soft drinks that contain phosphoric acid have a 15 percent higher rate of recurrence of kidney stones at three years than those drinking other beverages. **Grapefruit juice** is another culprit and may actually enhance the risk of developing stones. Filtered water may therefore be your best bet.

The following is a stone by stone analysis of prevention and treatment techniques of the different types of kidney stones.

Calcium oxalate stones

This is the most common kidney stone that people present to the Hoffman Center with. Much can be done to prevent them. The major inhibitor of calcium stones is **citrate**. Citrate supplementation can be done effectively with **potassium-magnesium-citrate**. Citrate supplementation also will make the urine more basic and therefore help decrease the potential to form stones. Citrate is present in **citrus fruits**. Four ounces of **lemon juice** mixed with 2 liters of water has been shown to increase urinary citrate levels. So feel free to indulge in healthy lemonade all year-round, but go easy on the added sugar.

A major promoter of calcium stones is increased urinary **oxalate**. Much can be done to address this. First, a **low-oxalate diet** is important. Foods and beverages high in oxalate include: beer, chocolate milk, hot cocoa, tea, nuts, sesame and sesame butter or tahini, soy nut butter, strawberries and other berries, lemon peel, lime peel and orange peel, purple or concord grapes, red currants, rhubarb, wheat germ and bran, beets and beet greens, dandelion, escarole, parsley, Swiss chard, watercress or spinach, and many others. The Hoffman Center will guide you through this daunting dietary minefield and help to arrange for a healthy low oxalate diet.

Also, there must be enough dietary calcium in the diet. Yes, we actually encourage patients to have an adequate supply of calcium in their diets even if they have calcium kidney stones! One needs calcium to bind to the oxalate in order to prevent stones. If dietary calcium is low, then more oxalate is available to be excreted through the urinary tract to form calcium oxalate stones. So a seeming paradox

actually makes sense.

Can I continue taking my vitamin C? Being that **vitamin C** is metabolized to oxalate, some prior studies have demonstrated a link between vitamin C supplementation and calcium oxalate stone formation. The largest study of this sort, part of the Nurses' Health Study, entitled "Intake of Vitamins B6 and C and the Risk of Kidney Stones in Women," which analyzed more than 85,000 women, found no increased risk of stone formation with vitamin C intake. So, yes, our patients can continue their moderate dose **vitamin C** supplementation. Moreover, B6 was found to be beneficial because it reduced urine output of oxalate which contributes to stones, and promotes urinary output of citrate, a stone-preventive.

Although you do not have to restrict your **vitamin C**, you do have to cut out the salt. A **low sodium diet** can help prevent calcium kidney stones. We help our patients to implement a low salt diet in the setting of kidney stones.

Calcium phosphate stones

Calcium phosphate stones do not occur as commonly as calcium oxalate stones. Therapy for calcium phosphate stones is similar to that of calcium oxalate stones. The one exception is with regard to high oxalate in the urine, which patients with calcium phosphate stones don't have, and therefore do not have to address. In addition, in contradistinction to calcium oxalate stones, these stones thrive not in acidic, but in basic conditions. Treatment is therefore **acidification of the urine**. This can be achieved through **cranberry extract**. A diet rich in whole grains has been shown to acidify urine, and contains little of the phosphorous plentiful in animal protein. Additionally, the bran in grains binds excess calcium before it concentrates in the kidneys. We prescribe our calcium phosphate stone patients a diet rich in **whole unrefined grains**, assuming they are not sensitive to gluten.

Uric acid stones

These stones are formed of uric acid, which is a byproduct of protein metabolism. People at risk for the development of uric acid stones are those with gout, those who have undergone chemotherapy, and those who have a purine-rich diet. A high purine diet includes foods like red meats, especially organ meats, and legumes and is responsible for enhanced uric acid formation and excretion.

In order to address uric acid kidney stones, first and foremost we encourage our patients to adhere to a **low-purine diet**. We work closely with our patients in incorporating healthy low-purine meals into their daily routine. Second, as gout has been associated with **insulin resistance**, we will address this via restriction of refined carbohydrates and an intelligent supplement program. Since acidic urine is a risk factor for uric acid stone formation, we will help to incorporate **potassium-magnesium-citrate** as part of the treatment plan in order to make the urine more basic.

Struvite stones

Struvite stones can form in the setting of infection. An enzyme called urease is produced by certain bacteria in the urinary tract. This enzyme helps to make the ammonium needed for this type of stone production. These stones can grow rapidly forming "staghorn-calculi."

Unlike all other stones (except calcium phosphate), these stones thrive in basic conditions and treatment is therefore acidification of the urine as described under calcium phosphate stones. Ultimately, **antibiotics** are used in order to address the

infection.

Cystine stones

Cystine stones are uncommon and are due to a genetic predisposition to the formation of these types of stones. Cystinuria can be diagnosed by a combination of family history since this is a genetic disease, by identification of the cystine crystals (which have a hexagonal shape) in the urine, and by measurement of urinary cystine excretion.

Even though one may have a genetic predisposition to these stones, it can still be addressed. It is best to treat this type of stone by increasing fluid intake as outlined above. Like many of the other stones, cystine is more soluble in a basic solution. We can help you to incorporate **citrate** as part of your supplement regimen in order to make the urine more basic. Also, **decreasing salt intake** can help to reduce cystine excretion. Usually dietary intake of less than 50 meq of sodium should be the goal.

As described above, the team at the Hoffman Center can effectively guide you through the process of prevention and treatment of kidney stones offering a unique nutritional perspective.