

Dietary Oxalate & Stone Disease



If you have been diagnosed with calcium-oxalate kidney stones, modifying your diet to follow a reduced oxalate diet may reduce the risk of kidney stone recurrence.

Oxalate, or oxalic acid, is a compound found naturally in many plant foods, but is not present in animal foods. Oxalate can also be produced in our bodies from extra vitamin C, normally from large doses (greater than 2000 milligrams of vitamin C per day) found in supplements¹.

Recommendations for oxalate intake are generally based on the total oxalate content of food. However, the critical factor in stone formation is the *bioavailability* (how easily absorbed it is) of oxalate in food, which does not necessarily correspond with oxalate content². For example, certain foods such as Swiss chard, parsley and collards have high oxalate content but the bioavailability is low.

Six foods have been documented to increase urinary oxalate:

- Nuts (peanuts and pecans)
- Wheat bran
- Spinach
- Rhubarb
- Beets (root and greens)
- Chocolate (dark)

You may not need to eliminate the six foods listed above from your diet completely, but they should be limited. Many other foods, however, have never been analyzed for oxalate, and bioavailability studies are limited at this time. Until more is known about oxalate bioavailability and content, intake of foods known to contain moderate to high levels of oxalate should be used in moderation (see table on next page).

The purpose of limiting dietary sources of oxalate is to avoid supersaturation (excess concentration) of the urine with calcium oxalate; therefore, small amounts of oxalate-rich foods less often are not as harmful as a single large amount. Maintaining an adequate fluid intake is also an essential part of reducing the risk of kidney stone formation³. Foods containing oxalate are difficult to completely avoid. If eaten, they are probably less harmful when accompanied by calcium, e.g. a glass of milk. Also make sure you increase your fluid intake to balance the extra oxalate by adding an 8 oz (250 ml) glass of water before and after eating.

High Oxalate Foods (use in moderation)

Food Group	Foods containing > 10 mg oxalate per ½ cup (125 ml) serving
Beverages	Black tea, draft beer; chocolate beverage mixes; cocoa; instant coffee; soy milk; juices containing berries high in oxalates
Breads and Cereals	Grits (white corn); wheat germ; whole-wheat flour and bread; graham crackers and graham flour; stone ground flour
Desserts	Fruitcake; Fig Newtons; marmalade; desserts containing fruits listed below
Fruits	Berries (strawberries, blackberries, blueberries, gooseberries, black and red raspberries); Concord grapes; red currants; Damson plums; lemon, lime, and orange peels; tangerines; kiwi
Legumes, Nuts and Seeds	Beans (wax or legume); baked beans with tomato sauce; peanut butter; tofu; garbanzo beans; sesame seeds; sunflower seeds
Vegetables	Dark leafy greens (Swiss chard, endive, escarole, kale, parsley, turnip greens); eggplant; leeks; summer squash; okra; parsnips; green peppers; pumpkin; sweet potatoes; rutabagas; canned tomato sauce; watercress; yams
Miscellaneous	Soy and tofu products, cinnamon (> 1 ½ tsp); black pepper (> 1 tsp per day); soy sauce; vitamin C intake in excess of RDA values, such as supplements.

Source: Borghi R, Meschi T, Maggiore U, Prati B. Dietary therapy in idiopathic nephrolithiasis. *Nutrition Reviews* 2006; 64(7): 301-312.

Eating Well with Canada's Food Guide ⁴ recommends consuming a diet rich in whole grains, meat alternatives such as beans, and fruits and vegetables, particularly the brightly coloured, antioxidant-rich leafy greens and berries. But how does this recommendation translate to a reduced oxalate diet? Unfortunately, some healthy foods, such as vegetables and fruits, contain oxalate. For kidney stone formers it is recommended to choose lower oxalate foods when possible, and focus on moderation and small portion sizes when eating foods higher in oxalate. Your urinary oxalate can be monitored by your doctor to assess the effectiveness of any diet changes that you make.

1. Taylor EN, Curhan, GC. Role of nutrition in the formation of calcium-containing kidney stones. *Nephron Physiology* 2004; 98:55-63.
2. Massey LK, Roman-Smith H and Sutton RA. Effect of dietary oxalate and calcium on urinary oxalate and risk of formation of calcium oxalate kidney stones. *J Am Diet Assoc* 1993; 93(8):901-906.
3. Diet Information. Litholink: your kidney stone prevention resource; 2007. Source: <http://www.litholink.com/gateway.aspx?page=DietInformation>
4. Health Canada. Eating Well with Canada's Food Guide; 2007. Source: http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/index_e.html



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