DAYTON CHILDREN'S
The Children's Medical Center of Dayton

**Diet and Oxalate**
Edited by the Nephrology Department, 07/14/05.

This leaflet aims to explain about Oxalate content of different foods and its relation with kidney stones. This is provided for your information when your child comes to Dayton's Children's for treatment.

Approximately 1 in every 1,000 adults is hospitalized annually in the United States for kidney stones (renal calculi). Although kidney stones can be composed of different substances, more than 75% of the kidney stones in patients in the United States are made of calcium oxalate. A hereditary condition can increase the risk of forming calcium oxalate stones. Intestinal resection, parathyroidism, and other more rare conditions also may cause renal calculi, and dietary factors can increase or reduce the risk of forming kidney stones. All further mention of kidney stones in this section refers *only* to calcium oxalate stones. The information provided here does not apply to other forms of kidney stones.

**Why do people follow this diet?**

A low-oxalate diet is often prescribed for people who have increased levels of oxalic acid in their urine or who have a history of forming kidney stones. A treatment program including a low-oxalate diet and plenty of fluids reduces the risk of stone formation. A low oxalate diet is not always effective in reducing urinary oxalic acid levels because most oxalate found in urine is made in the body and does not come from the diet. People with a predisposition to stones are also encouraged to drink plenty of fluids (3 to 4 quarts [liters] per day).

**What are the symptoms?**

In combination with calcium, the oxalic acid crystallizes to form kidney stones—small pebbles that form in either the kidney or the bladder. If these stones, calcium-oxalate, are small enough, they will pass out of the body without being noticed. However if too large, they can cause severe pain, obstruction of the flow of urine, and sometimes infection in the urinary tract.

**What do I need to avoid?**

Scientists once thought that the greater the oxalate level in a food, the more likely it was to increase the risk of forming a kidney stone. However, researchers have discovered that consumption of only certain oxalate-containing foods is likely to significantly increase urinary oxalate. The foods reported by at least one group of researchers to cause a significant increase in urinary oxalate include spinach, rhubarb, beets, nuts, chocolate, wheat bran, strawberries, peanuts, almonds, and tea. Not every study has found tea to significantly increase urinary oxalate. There remains no universal consensus on which oxalate-containing foods belong on this list. Nonetheless, there is a growing awareness that the important issue for people with a history of kidney stone formation is to avoid *certain* high-oxalate foods—those that are most responsible for increasing urinary levels of oxalate.
To avoid oxalate ask about ingredients at restaurants and others' homes, and read food labels. The following list is not complete. Consult with a healthcare professional before making any significant changes to your diet.

**The Oxalate Content of Various Foods**

Evidence is now emerging that the absorption of dietary oxalate makes a major contribution to urinary oxalate excretion, particularly in stone formers. The factors that influence this absorption are known to include the oxalate content of the foods eaten, the concentrations of ions in these foods that bind to oxalate and limit its absorption such as calcium and magnesium, the presence of bacteria that can degrade oxalate, the transit time of food through the intestinal tract, the inheritance of certain genes, and quite possibly several other as yet unidentified


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factors. The way that all these factors interact is not precisely known at the moment but is under investigation in several laboratories throughout the world. While clear-cut recommendations cannot be given at the moment on how to decrease the intestinal absorption of oxalate, it would seem prudent for stone formers to limit their oxalate intake and consume calcium to bind whatever oxalate is ingested. A daily intake of 800 - 1200 mg of calcium per day for an adult, is currently recommended by physicians who specialize in stone prevention.

Accurate information on the oxalate content of foods is much harder to come by due to the difficulties in measuring it. There is little dispute, however, that some foods such as spinach, rhubarb, peanuts, strawberries, wheat bran and chocolate contain large amounts of oxalate and should be avoided. Scientists have developed sensitive techniques to accurately measure oxalate in foods. The size of servings normally eaten should be borne in mind, noting that 100 grams is about 3.5 ounces. A large baked potato weighing 200 grams could contain over 50 mg of oxalate, for instance. Foods providing over 20 mg oxalate/100 g should probably be eaten in moderation.

## The Oxalate Content of Various Foods

| Food | Mg of Oxalate/100g | Mg of Oxalate/serving (serving size in parentheses) |
|---|---|---|
| Spinach | 645 | 645 (100 g) |
| Fibre One Cereal | 142 | 43 (30 g) |
| Bran Flakes | 141 | 42 (30 g) |
| Green Beans (steamed) | 33 | 33 (100 g) |
| Potato (raw) | 27.1 | 27.1 (100 g) |
| Snack bar (Butterfinger) | 53.5 | 24 (45 g) |
| Peanut Butter | 95.8 | 19.2 (20 g) |
| Tea (brewed) | 7.5 | 18.8 (250 g) |
| Celery | 61.2 | 18.4 (30 g) |
| Chocolate (American) | 42.5 | 13 (30 g) |
| Ravioli | 6.5 | 13 (200 g) |
| White Bread | 14.3 | 8.0 (56 g) |
| Carrots (raw) | 5.7 | 5.7 (100 g) |
| Potato Chips | 9.4 | 3.0 (30 g) |
| White Rice (steamed) | 2.1 | 2.1 (100 g) |
| Broccoli (steamed) | 1.8 | 1.8 (100 g) |
| Strawberry jelly | 5.3 | 1.1 (20 g) |
| Corn flakes | 1.9 | 0.6 (30 g) |


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| Mustard | 12.1 | 0.6 (5 g) |
| Apple (raw) | 0.5 | 0.5 (100 g) |
| Peaches (canned) | 0.3 | 0.3 (100 g) |
| Grape jelly | 1.5 | 0.3 (20 g) |

## Oxalate-Rich Food Items

| FOOD ITEM | SERVING (oz) | CONTENT(mg) |
|---|---|---|
| Beet greens, cooked | 1/2 cup | 916 |
| Pursiane, leaves, cooked | 1/2 cup | 910 |
| Rhubarb, stewed, no sugar | 1/2 cup | 860 |
| Spinach, cooked | 1/2 cup | 750 |
| Beets, cooked | 1/2 cup | 675 |
| Chard, Swiss, leaves cooked | 1/2 cup | 660 |
| Rhubarb, canned | 1/2 cup | 600 |
| Spinach, frozen | 1/2 cup | 600 |
| Beets, pickled | 1/2 cup | 500 |
| Poke greens, cooked | 1/2 cup | 476 |
| Endive, raw | 20 long leaves | 273 |
| Cocoa, dry | 1/3 cup | 254 |
| Dandelion greens, cooked | 1/2 cup | 246 |
| Okra, cooked | 8-9 pods | 146 |
| Potatoes, sweet, cooked | 1/2 cup | 141 |
| Kale, cooked | 1/2 cup | 125 |
| Peanuts, raw | 1/3 cup (1-3/4 oz.) | 113 |
| Turnip greens, cooked | 1/2 cup | 110 |
| Chocolate, unsweetened | 1 ounce | 91 |
| Parsnips, diced, cooked | 1/2 cup | 81 |
| Collard greens, cooked | 1/2 cup | 74 |
| Pecans, halves, raw | 1/3 cup (1-1/4 oz) | 74 |
| Tea, leaves (4 mm. infusion) | 1 level tsp in 7 oz water | 72 |
| Wheat germ, toasted | 1/4 cup | 67 |
| Gooseberries | 1/2 cup | 66 |
| Potato, Idaho white, baked | 1 medium | 64 |
| Carrots, cooked | 1/2 cup | 45 |


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| Apple, raw with skin | 1 medium | 41 |
| Brussels sprouts, cooked | 6-8 medium | 37 |
| Strawberries, raw | 1/2 cup | 35 |
| Celery, raw | 2 stalks | 34 |
| Milk chocolate bar | 1 bar (1.02 oz) | 34 |
| Raspberries, black, raw | 1/2 cup | 33 |
| Orange, edible portion | 1 medium | 24 |
| Green beans, cooked | 1/2 cup | 23 |
| Chives, raw, chopped | 1 tablespoon | 19 |
| Leeks, raw | 1/2 medium | 15 |
| Blackberries, raw | 1/2 cup | 13 |
| Concord grapes | 1/2 cup | 13 |
| Blueberries, raw | 1/2 cup | 11 |
| Currants, red | 1/2 cup | 11 |
| Apricots, raw | 2 medium | 10 |
| Raspberries, red, raw | 1/2 cup | 10 |
| Broccoli, cooked | 1 large stalk | 6 |
| Cranberry juice | 1/2 cup (4 oz) | 6 |

These foods are **high in oxalate** (greater than 10 mg per serving):

- Beans in tomato sauce
- Beer
- Beets
- Blackberries
- Black and red raspberries
- Blueberries
- Celery
- Chard
- Chocolate
- Cocoa
- Coffee powder (Nescafe)
- Collards
- Concord grapes
- Crackers made from soy flour
- Currants
- Dandelion greens
- Eggplant
- Escarole
- Fruit cake
- Fruit salad (canned)
- Green bell pepper
- Grits (white corn)
- Juices containing berries
- Kale
- Leeks
- Lemon and lime peel
- Nuts (especially peanuts and pecans)
- Okra
- Ovaltine
- Parsley
- Pokeweed
- Rhubarb
- Rutabagas
- Spinach
- Strawberries
- Summer squash
- Sweet potatoes
- Tea
- Tofu
- Tomato soup
- Wheat germ


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These foods are **moderately high** in oxalate (2–10 mg per serving):

- Apple
- Apricots
- Asparagus
- Bottled beer (12 oz [360 ml] limit/day)
- Broccoli
- Carrots
- Chicken noodle soup (dried)
- Coffee (8 oz [240 ml])
- Cola beverage (12 oz [360 ml] limit per day)
- Corn
- Cornbread
- Cucumber
- Lettuce
- Lima beans
- Marmalade
- Oranges
- Orange juice (4 oz [120 ml])
- Parsnips
- Peaches
- Pears
- Peas (canned)
- Pepper (greater than 1 tsp [2 grams] per day)
- Pineapple
- Plums
- Prunes
- Sardines
- Soy products (most)
- Sponge cake
- Tomatoes
- Tomato juice (4 oz [120 ml])
- Turnip
- Watercress

**Best bets**

These foods are **low in oxalate** (0–2 mg per serving); eat as desired:

- Apple juice
- Avocado
- Bacon
- Bananas
- Beef (lean)
- Bing cherries
- Brussels sprouts
- Cabbage
- Cauliflower
- Cheese
- Eggs
- Grapefruit
- Green grapes
- Jellies
- Lamb (lean)
- Lemonade or limeaid (without peel)
- Melons
- Milk
- Mushrooms
- Pork (lean)
- Poultry
- Preserves
- Nectarines
- Noodles
- Oatmeal
- Oils
- Onions
- Peas (fresh)
- Plums
- Radishes
- Rice
- Salad dressing
- Seafood
- Spaghetti
- White bread
- Wine
- Yogurt

**Are there any groups or books?**

The following are some useful resources to help you learn more about dietary prevention and treatment of kidney stones.

- *The Kidney Stones Handbook: A Patient's Guide to Hope, Cure and Prevention* by Gail Savitz, Stephen W. Leslie, Gail Golomb. Roseville, CA: Four Geez Press, 2000.


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- Kidney Stones in Adults: National Kidney and Urologic Diseases Information Clearinghouse
  www.niddk.nih.gov/health/kidney/pubs/stonadul/stonadul.htm

You can seek more information from our Family Resource Center located on the 2nd floor of the Taggart Pavilion or from the following web sites: http://www.nlm.nih.gov/medlineplus
http://www.niddk.nih.gov/

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