



**INE** INSTITUTE OF  
NUTRITIONAL  
ENDOCRINOLOGY

## Food Principles: Oxalates

Dr. Ritamarie Loscalzo

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**“If diet is *Wrong*,  
medicine is of no use.  
If diet is *Correct*,  
medicine is of no need.”**

*~ Ancient Ayurveda Proverb*

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## “Another Broccoli Related Death!”

**-Dr. Hibbert, The Simpsons**



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## What Are Oxalates?

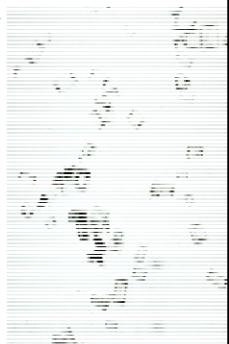
- Molecule with a negative charge found in plant foods
- Come from food and are made by the body (40/60 or more)
- Oxalates and Oxalic Acid are the same thing



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## What Do Oxalates Do?

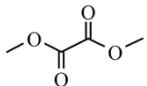
- Oxalates are excreted in the urine or may be stored in the tissues of the body
- Oxalates bind to minerals, particularly calcium, magnesium, and potassium
- Bound to minerals in the gut, many oxalates are excreted in the stool before being absorbed
- Oxalates can reduce the quantity and quality of bone formation/density when in high concentrations



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## Oxalic Acid is an Anti-Nutrient that Inhibits Mineral Absorption

- Spinach: Calcium availability is poor due to oxalates
- Oxalate levels are so high they bind to calcium in the food making it unavailable
- Oxalates in spinach can bind to the calcium and minerals from other sources in the diet (1, 2)
- Raw spinach oxalate level - 1000 mg/3 oz



1. Speirs, Mary. "The utilization of the calcium in various greens." *The Journal of nutrition* 17.8 (1939): 557-584.
2. Peterson, Catherine A., J. A. Eurell, and J. W. Erdman Jr. "Bone composition and histology of young growing rats fed diets of varied calcium bioavailability: spinach, nonfat dry milk, or calcium carbonate added to casein." *The Journal of nutrition* 122.1 (1992): 137.



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## Oxalic Acid

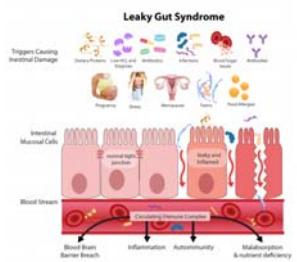
- Can bind to calcium, forming crystals with sharp edges which can cause inflammation and pain
- Can disrupt other minerals, impair mitochondrial function, and create oxidative stress
- Can deplete glutathione



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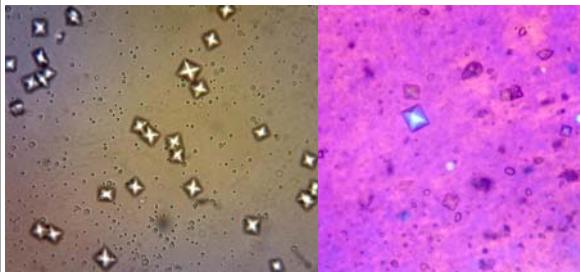
## Who is Affected?

- 3-fold greater plasma oxalate levels in people with conditions on the autistic spectrum and 2.5 fold in urine oxalate levels
- Those with compromised digestive barriers



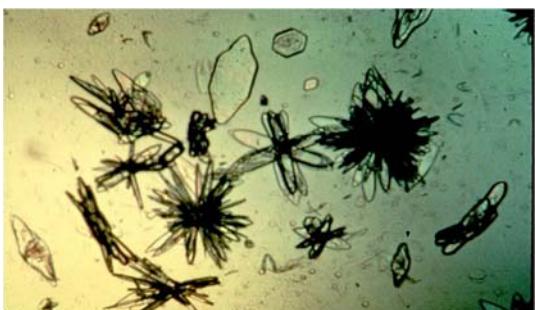
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# Calcium Oxalate Crystals



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### Uric Acid Crystals (for comparison)



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## High Oxalate Signs/Symptoms

- Headaches
- Vulvar pain (Vulvodynia)
- Feeling of having a UTI or burning urine
- Joint pain
- Muscle pain
- Kidney stone formation
- Bladder pain/burning
- Poor bone health
- Poorly formed or "sandy" stool
- Eye pain



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## Hyperoxaluria Type 1 and 2

- Body is lacking in enzymes to break down oxalates to some degree
- Type 1 usually has stronger symptoms and is often noticeable earlier in life
- Clinical diagnosis of these disorders is rare



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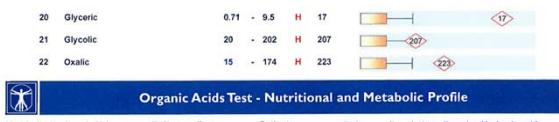
## Organic Acid Test

- Great Plains Lab
- Spot oxalate tests are less accurate
- Genova test doesn't have oxalates



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# Interpreting the OAT



- Glyceric = type 2
- Glycolic = type 1
- Oxalic = measurement of oxalic acid

## Oxalate Degrading Enzymes

Metabolic Markers in Urine	Reference Range (nmol/mol creatinine)	Patient	Reference Population - Females Under Age 13
20 Glyceric	0.71 - 9.5	H 17	
21 Glycolic	20 - 202	H 207	
22 Oxalic	15 - 174	H 223	

**Organic Acids Test - Nutritional and Metabolic Profile**

- Serine-Pyruvate Aminotransferase
- Alanine-Glyoxylate Aminotransferase
- Glyoxylate Reductase (Hydroxypyruvate Reductase)
- D-Glycerate Dehydrogenase

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## Most At Risk

- Children grabbing their heads, joints, or genitals and/or poking at their eyes
- Those with **leaky gut**
- Those with a history of **upper GI surgery**
- Popeye (ha ha!)
- Those with **low gallbladder function** or gallbladders removed
- Those with **mineral imbalances**, known methylation or sulfation issues, and fat deficiencies
- Those with conditions on the autistic spectrum
- Those with impaired Krebs cycle
- Those with a **history of IBD, IBS, interstitial cystitis, headaches, high histamine, or thyroid insufficiency**

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## Oxalates and Sulphates

- High oxalates can lead to poor sulphation/low sulphate
- Low sulphates slow detoxification
- Low sulphates can overwhelm methylation cycles
- Low sulphates can let oxalates into cells, affecting the mitochondria

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## Oxalates and Phenols

- Low sulphates can cause phenol reactions
- Salicylates (Aspirin) = similar reactions to phenols
- Phenols = petroleum
- High phenol foods =  
Natural/artificial color/flavor, tomatoes, apples, peanuts, bananas, honey, oranges, cocoa, coffee, grapes/wine, colorful berries
- Also high phenol =  
Castoreum, sodium benzoate, petroleum based preservatives, BHT, fragrance, phenoxyethanol, mineral oil, PEG (6, 7, 40 etc.)



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## Oxalate Producing Organisms

- Aspergillus
- Candida
- Carbohydrate malabsorption feeds fungi
- LPS (lipopolysaccharides) are produced by gram-negative dysbiotic flora
- Toll Like Receptors in the kidneys can become desensitized to oxalates by LPS



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## Oxalates and the Kidneys

- Kidneys protect themselves with a mucosal lining
- Toll Like Receptors in kidneys signal when to produce a more protective barrier
- Toll Like Receptors can become desensitized to oxalates by LPS (lipopolysaccharides)
- LPS are produced by gram-negative dysbiotic flora
- LPS can get into the body through a weak digestive barrier (leaky gut)



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# High Oxalate Foods

- Nuts, especially almonds and peanuts
- Beans, most
- Beets
- Figs
- Rhubarb
- Swiss chard, field greens, spinach
- Buckwheat
- Amaranth
- Soy
- Sweet potatoes
- Chocolate
- Citrus peel
- Kiwi and starfruit
- Tea
- Blackberries
- Raspberries
- Gooseberries



# Sneaky Oxalate Foods

- Turmeric  
(curcumin okay)
- Black pepper
- Horsetail
- Stinging nettle
- Herbal tinctures (of high oxalate herbs)
- Dandelion greens
- Chicory
- Figs
- Tamarillo
- Curry leaf
- Moringa
- Aronia (chokeberry)
- Purslane



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## Safe Food Alternatives

- ☐ Flour: coconut, water chestnut, garbanzo bean
- ☐ Seeds: pumpkin and sunflower
- ☐ Blueberries
- ☐ Dinosaur/lacinato kale
- ☐ Oils
- ☐ Squash
- ☐ Basil
- ☐ Cilantro
- ☐ Cranberries
- ☐ White pepper
- ☐ Cherries, peaches, plums



## Medications, Supplements, Chemicals

- Miralax (Constipation)
- Antifreeze (Cars)
- Lexapro (SSRI)
- Naftidrofuryl (Reynauds and peripheral neuropathy, dementia)



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## Band-aids and Relief

- Calcium or Magnesium Citrate with meals
  - (powder, liquid, or chewable = best)
- B6 (pyridoxine)
- Magnesium
- B1 (thiamin)
- B7 (biotin)
- Gravel root, Chanca Piedra, Hydrangea root (decocctions)
- High antioxidant diet
- Acetyl-L-Glutathione, liposomal or transdermal glutathione





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## Long-Term Solutions

- Better fat absorption
- Digestive bacteria balancing including Oxalobacter formigenes, Bifidobacterium (all), Lactobacillus plantarum
- Healing tight junctions in the gut
- Liver / gallbladder (bile) support
- Adequate mineral, amino acid, and vitamin intake
- Reducing oxalate intake for a time to give the liver a chance to detoxify stored oxalates



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## Myths and Mix-ups: 1

- Oxalates can inhibit LDH (lactate dehydrogenase), which may or may not have an effect on the growth of cancer cells
- Oxalates from anti-cancer medications have been found to be neurotoxic
- Oxalates are poisonous; one would have to eat at least 11 pounds of the highest oxalate foods (like turmeric or rhubarb) to get to this level
- The body can make oxalates from ascorbic acid (vitamin C), although studies have not shown this to extend to levels excreted in urine
- High oxalates can lead to high histamine by triggering its release, just like anything irritating can cause histamine release
- No, cooking foods does not reduce oxalates
- Boiling vegetables and dumping the water will reduce oxalates and nutrients



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## Myths and Mix-ups: 2

- Essential oils are ok even if the plants may not be (e.g. black pepper, turmeric, herbs)
- Curcumin is okay, turmeric is high oxalate
- Green juices can be high oxalate
- Think in ***oxalates per meal***



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# Helping Your Clients

- Eliminating one food at a time
- Supporting children and families
- Facebook recipe groups
- Lists/charts/handouts
- Eating out



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## How to Remove Oxalates from the Diet

- Cut out one oxalate food at a time (several days between)
- If your client feels worse they may be dumping oxalates (detoxifying rapidly)
- This is art/science; everyone is different



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## The Real Problem

- Oxalate LOAD
- Too many coming in, not enough going out
- Oxalates are absorbed in higher amounts when there is fat malabsorption, leaky gut, and dysbiosis
- The body can detoxify oxalates via citric acid (endogenous)
- The body can detoxify oxalates through these enzymes:
  - Serine-Pyruvate Aminotransferase
  - Alanine-Glyoxylate Aminotransferase
  - Glyoxylate Reductase (Hydroxypyruvate Reductase)
  - D-Glycerate Dehydrogenase



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## Vitamin/Mineral Interactions

- B6 is depleted by high oxalates
- B6 is required for oxalate metabolism
- Calcium is depleted by high oxalates
- Calcium can bind to oxalates in the gut
- Cholesterol and taurine (cysteine, B6, C) help us produce bile and absorb less oxalic acid
- Magnesium, manganese, potassium, iron, zinc



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- Pros:**
  - Can support those with mitochondrial dysfunction
  - Has positive implications for many disorders
  - Gets people out of physical pain
  - Can have dramatic effects with children
  - Can address yeast overgrowth for some people that diet can't
- Cons:**
  - Must remove oxalates SLOWLY over time
  - Reactions can seem confusing - often worse before better
  - Best to include supplements for support along with diet changes
  - Adds another level of restriction
  - May not be a long-term solution for most

# Address the Following

- Cellular metabolism (Krebs/citric acid cycle)
- Bile production and liver health
- Leaky gut
- Dysbiosis and fungal overgrowths
- Nutrient deficiencies and imbalances
- Oxalate load
- Endogenous antioxidant production



# Low Oxalate Diet Resources

- Food chart: <http://www.drritamarie.com/go/LowOxalateRecipes>
- Facebook: Trying Low Oxalates
- WHFoods: <http://www.drritamarie.com/go/WHFoodsOxalates>
- Rotating greens:  
<http://www.drritamarie.com/go/LowOxalateGreens>
- Julie Matthews: *Nourishing Hope for Autism* (book)
- Phenols: <http://www.drritamarie.com/go/Phenols>

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