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Micronutrients: Vitamin C

Dr. Ritamarie Loscalzo

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“To date, NO infectious diseases have been found in which Vitamin C administration is dangerous or inappropriate”

Thomas E. Levy, MD, JD in *Curing the Incurable: Vitamin C, Infectious Diseases and Toxins*

Vitamin C in Action

- ✓ A potent reducing agent - it readily donates electrons to recipient molecules
- ✓ 2 main actions are related to this oxidation-reduction (redox) potential

➤ **Antioxidant**

- Protects proteins, lipids, carbohydrates, and nucleic acids (DNA and RNA) from free radical damage
- Redox recycling of other important antioxidants, i.e. it regenerates vitamin E from its oxidized form

➤ **Cofactor**

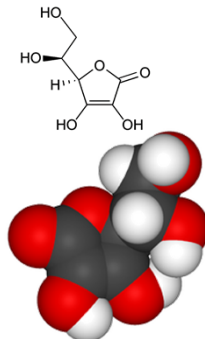
- Biosynthesis of collagen
- Synthesis of carnitine
- Catecholamine production



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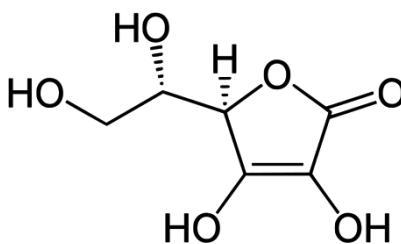
Main Functions of Vitamin C

- ✓ Improves immune system
- ✓ Combats infection
- ✓ Antihistamine
- ✓ Reduces inflammation
- ✓ Participates in making adrenaline
- ✓ Increases iron uptake
- ✓ Heals connective tissue
- ✓ Antioxidant
- ✓ Aids in wound healing
- ✓ Cardiovascular health
- ✓ Cancer prevention and reversal
- ✓ **Transport of fat into cells for ATP**

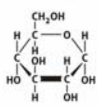


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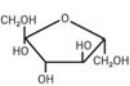
Vitamin C Structure



GLUCOSE MOLECULE



Fructose



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Therapeutic Uses of IV Vitamin C

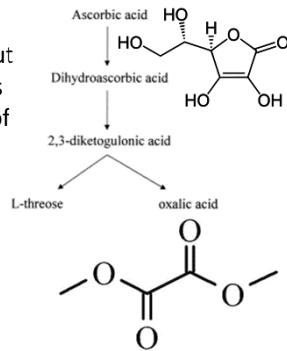
- ✓ Infection – bacterial and viral
 - Hepatitis
 - Lyme
 - Bacterial
- ✓ Arthritis
- ✓ Injury repair
- ✓ Post surgical repair
- ✓ Cancer



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Vitamin C and Oxalates

- ✓ Vitamin C can be converted to oxalates but the conversion system is saturated at low levels of vitamin C
- ✓ Oxalate formed when greater than 4 g per day are consumed



<http://www.drRitamarie.com/go/LowOxalateInfo>

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VERY HIGH OXALATE (over 50mg per serving)

The following foods may contain very large amounts of oxalate in the range of 50 - 520mg oxalate per serving size listed.

Vegetables	Serving size	Soybeans and soy products	Serving size
Beetroot - boiled or pickled	½ cup (50g)	Soy milk	½ cup
Beet greens (Mangold)	1 oz (30g)	Soy burger	1 item (67g)
Leeks	½ cup (62g)	Textured vegetable/soy protein	1 oz
Okra	½ cup (100g)	Soy Flour	1 oz
Poke weed	1 oz (30g)	Soy nuts	½ oz
Spinach	1 oz (30g)	Soy tofu	3 oz
Sweet potatoes	½ cup (120g)	Soy yogurt	½ cup
Swiss chard (boiled)	1 oz (30g)	Soy breakfast links	1 item (45g)
Swiss chard (raw)	½ cup (9g)		
Fruits	Serving size	Legumes, Nuts and Seeds	Serving size
Elderberry, raw	3.5 oz (100g)	Almonds (slices)	½ cup (14g)
Figs, dried	3.5 oz (100g)	Hazel nut (chopped)	½ cup (28g)
Green gooseberries	½ cup (75g)	Lentils, dried beans (cooked)	½ cup (85g)
Rhubarb, raw, canned or stewed	½ cup (120g)	Refried beans (cooked)	½ cup (42g)
Star fruit (Carambola)	1 oz (30g)	Peanuts	½ cup (36g)
Grains and Starches	Serving size	Peanut butter	½ T (8g)
Amaranth*	1 oz (30g)	Pecans (and other nuts)	½ cup (28g)
Buckwheat, dry	2 oz (60g)	Pistachio	½ cup (56g)
Wheat bran, dry	1 oz (30g)	Sesame seeds (and Tahini)	1 teaspoon (~2.5g)



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Vitamin C RDA

Table 1. Recommended Dietary Allowance (RDA) for Vitamin C

Life Stage	Age	Males (mg/day)	Females (mg/day)
Infants	0-6 months	40 (AI)	40 (AI)
Infants	7-12 months	50 (AI)	50 (AI)
Children	1-3 years	15	15
Children	4-8 years	25	25
Children	9-13 years	45	45
Adolescents	14-18 years	75	65
Adults	19 years and older	90	75
Smokers	19 years and older	125	110
Pregnancy	18 years and younger	-	80
Pregnancy	19 years and older	-	85
Breast-feeding	18 years and younger	-	115
Breast-feeding	19 years and older	-	120



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Vitamin C Deficiency

✓ **Severe – scurvy:** Subcutaneous bleeding, poor wound closure, bruising easily, hair and tooth loss, and joint pain and swelling due to weakening of blood vessels, connective tissue, and bone, which all contain collagen



✓ **Early symptoms of scurvy:** Fatigue which may result from diminished levels of carnitine, needed to derive energy from fat, or from decreased synthesis of the catecholamine norepinephrine



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Vitamin C Excess



✓ **Diarrhea:** When vitamin C intake exceeds need or threshold to absorb orally, the excess is excreted in feces (causes water to be pulled into intestines)

✓ **Oxalate build-up:** In sensitive individuals, excess vitamin C can be converted to oxalate and build up of oxalate can lead to inflammation, joint pain, vulvodynia, and theoretically kidney stones.

➤ Taking vitamin B6 with large vitamin C doses can decrease risk of oxalate formation



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Signs of Imbalance

- Bruise easily
- Hemorrhoids
- Joint injuries
- Muscle weakness
- Puffy, bleeding, red gums
- Varicose veins
- Weakened immune system
- Mucus membranes raw and bleeding
- Spongy and bleeding gums are spongy

LABS:

- Hematocrit –
- Alkaline Phosphatase +
- RBC +
- Hemoglobin –
- Hematocrit –
- MCV +
- MCH +
- MCHC +

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Vitamin C Assessment

- ✓ Blood test
- ✓ Urine test: Strips
<http://www.drRitamarie.com/go/VitaChekCUrine>
- ✓ White blood cell: Spectra cell
- ✓ Organic acids test
- ✓ NutrEval
- ✓ Vitamin C calibration aka flush



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Therapeutic Uses of Vitamin C

- ✓ Vitamin C flush and oral supplementation – buffered
- ✓ IV vitamin C
- ✓ Intramuscular
- ✓ Liposomal



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INE: Micronutrients - Vitamins: Vitamin C

World's Healthiest Foods ranked as quality sources of vitamin C						
Food	Serving Size	Cals	Amount (mg)	DRI/DV (%)	Nutrient Density	World's Healthiest Foods Rating
Papaya	1 medium	118.7	168.08	224.11	34.0	excellent
Bell Peppers	1 cup	28.5	117.48	156.64	98.9	excellent
Broccoli	1 cup	54.6	101.24	134.99	44.5	excellent
Brussels Sprouts	1 cup	56.2	96.72	128.96	41.3	excellent
Strawberries	1 cup	46.1	84.67	112.89	44.1	excellent
Pineapple	1 cup	82.5	78.87	105.16	22.9	excellent
Oranges	1 medium	61.6	69.69	92.92	27.2	excellent
Kiwifruit	1 2 inches	42.1	63.96	85.28	36.5	excellent
Cantaloupe	1 cup	54.4	58.72	78.29	25.9	excellent
Cauliflower	1 cup	28.5	54.93	73.24	46.2	excellent
Kale	1 cup	36.4	53.30	71.07	35.1	excellent
Cabbage	1 cup	43.5	51.60	68.80	28.5	excellent
Bok Choy	1 cup	20.4	44.20	58.93	52.0	excellent

Top 12 Vitamin C Herbs and Spices						
Food Name	Vitamin C (mg)	Calories (mg)	Protein (mg)	Sugar (mg)	Fat (mg)	
Dried Coriander Leaf Spices	566.7	279	21.93	7.27	4.78	
Fresh Thyme	160.1	101	5.56	0	1.68	
Dried Parsley Spices	125	292	26.63	7.27	5.48	
Fresh Dill Weed	85	43	3.46	0	1.12	
Saffron Spices	80.8	310	11.43	0	5.85	
Ground Cloves Spices	80.8	323	5.98	2.38	20.07	
Red Or Cayenne Pepper Spices	76.4	318	12.01	10.34	17.27	
Dried Rosemary Spices	61.2	331	4.88	0	15.22	
Dried Marjoram Spices	51.4	271	12.66	4.09	7.04	
Dried Tarragon Spices	50	295	22.77	0	7.24	
Dried Dill Weed Spices	50	253	19.96	0	4.36	
Dried Thyme Spices	50	276	9.11	1.71	7.43	

Rosehips



Camu Camu



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Amla



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Acerola Cherry



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Vitamin C Action Plan

- ✓ Eat vitamin C rich foods daily
- ✓ Supplement with vitamin C: 1000 mg three times a day in cases with allergies, low immune function, or high stress, supplement
- ✓ Determine needs with vitamin C flush (calibration)
- ✓ Add vitamin C rich herbs and spices to meals



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