



VITAMIN C

- Date:** September 14, 2007
- Proper name(s):** Vitamin C (Sweetman 2007; IOM 2003; O’Neil et al. 2001)
- Common name(s):** Ascorbic acid, vitamin C (Sweetman 2007; IOM 2003; O’Neil et al. 2001)
- Source material(s):**
- ▶ Ascorbic acid/Vitamin C (Sweetman 2007; IOM 2003; O’Neil et al. 2001)
 - ▶ Ascorbyl palmitate (Sweetman 2007; IOM 2003)
 - ▶ Calcium ascorbate (Sweetman 2007; IOM 2003; O’Neil et al. 2001)
 - ▶ Magnesium ascorbate (Sweetman 2007)
 - ▶ Niacinamide ascorbate/Nicotinamide ascorbate (IOM 2003; O’Neil et al. 2001)
 - ▶ Potassium ascorbate (Sweetman 2007)
 - ▶ Sodium ascorbate (Sweetman 2007; IOM 2003; O’Neil et al. 2001)

Note: The slash (/) indicates that the terms are synonyms. Either term may be selected by the applicant.

Route(s) of administration: Oral

Dosage form(s): Those pharmaceutical dosage forms suited to oral administration, including but not limited to chewable tablets, caplets, capsules, strips, lozenges, powders or liquids where the dose is measured in drops, teaspoons or tablespoons, are acceptable. This monograph is not intended to include food-like dosage forms such as bars, chewing gums or beverages.

Use(s) or Purpose(s): Statement(s) to the effect of:

General: A factor in the maintenance of good health (IOM 2006; IOM 2000).

Specific:

- ▶ Helps the body to metabolize fats (IOM 2006; Shils et al. 2006; Groff and Gropper 2000; IOM 2000).
- ▶ Helps the body to metabolize proteins (Shils et al. 2006; Groff and Gropper 2000; IOM 2000).
- ▶ Helps in the development and maintenance of bones, cartilage, teeth and gums (Shils et al. 2006; Groff and Gropper 2000; IOM 2000).
- ▶ Helps in connective tissue formation (IOM 2006; Shils et al. 2006; Groff and Gropper 2000; IOM 2000).
- ▶ Helps in wound healing (MacKay and Miller 2003; Groff and Gropper 2000; IOM 2000).
- ▶ An antioxidant (IOM 2006; Shils et al. 2006; Groff and Gropper 2000; IOM 2000) for the maintenance of good health.

Dose-specific: For products providing daily doses of vitamin C at or above the Recommended Dietary Allowance (RDA) (adjusted for the life stage groups), the following use or purpose is acceptable:
Helps to prevent vitamin C deficiency (IOM 2006; Shils et al. 2006; Groff and Gropper 2000; IOM 2000).
[Note: Vitamin C deficiency is rare in North America (IOM 2006; Shils et al. 2006; Groff and Gropper 2000; IOM 2000).]

See Appendix 1 for definitions and Table 2 in Appendix 2 for RDA values.

Dose(s):

Table 1: Dose information for vitamin C presented as dose per day

Life stage group	Vitamin C (mg/day)		
	Minimum ¹	Maximum ²	
Children	1-3 y	2.2	400
	4-8 y	2.2	650
Adolescents	9-13 y	2.2	1,200
	14-18 y	6.0	1,800
Adults ³	≥ 19 y	6.0	2,000

¹Based on approximately 5% of the highest RDA (IOM 2006). See Appendix 1 for definitions and Table 2 in Appendix 2 for RDA values.

²Maximum dose based on the Tolerable Upper Intake Level (UL) which applies to total vitamin C intake from food and supplements (IOM 2006).

³Includes pregnant and breastfeeding women.

Duration of use: No statement required.

Risk information: Statement(s) to the effect of:

Caution(s) and warning(s): No statement required.

Contraindication(s): No statement required.

Known adverse reaction(s): No statement required.

Non-medicinal ingredients: Must be chosen from the current NHPD *List of Acceptable Non-medicinal Ingredients* and must meet the limitations outlined in the list.

Specifications: Must comply with the minimum specifications outlined in the current NHPD *Compendium of Monographs*.

References:

Groff J, Gropper S. *Advanced Nutrition and Human Metabolism*, 3rd edition. Belmont (CA): Wadsworth/Thomson Learning; 2000.

IOM 2006: Institute of Medicine. Otten JJ, Pitzel Hellwig J, Meyers LD, editors. *Institute of Medicine. Dietary Reference Intakes: The Essential Guide to Nutrient Requirements*. Washington (DC): National Academies Press; 2006.

IOM 2003: Institute of Medicine. Committee on Food Chemicals Codex, Food and Nutrition Board, Institute of Medicine. *Food Chemicals Codex*, 5th edition. Washington (DC): National Academies Press; 2003.

IOM 2000: Institute of Medicine. Food and Nutrition Board, Institute of Medicine. *Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium and Carotenoids. A Report of the Panel on Dietary Antioxidants and Related Compounds, Subcommittees on Upper Reference Levels of Nutrients and Interpretation and Uses of Dietary Reference Intakes, and the Standing Committee on the Scientific Evaluation of Dietary Reference Intakes*. Washington (DC): National Academies Press; 2000.

MacKay D, Miller AL. Nutritional support for wound healing. *Alternative Medicine Review* 2003;8(4):359-377.

O'Neil MJ, Smith A, Heckelman PE, Budavari S, editors. The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals, 13th edition. Whitehouse Station(NJ): Merck and Co., Inc.; 2001.

Shils ME, Olson JA, Shike M, Ross AC, editors. Modern Nutrition in Health and Disease, 10th edition. Philadelphia (PA): Lippincott Williams and Wilkins; 2006.

Sweetman SC, editor. Martindale: The Complete Drug Reference, 35th edition. London (UK): Pharmaceutical Press; 2007.

Appendix 1: Definitions

Recommended Dietary Allowances (RDA): The average daily dietary nutrient intake level sufficient to meet the nutrient requirements of nearly all (97-98%) healthy individuals in a particular life stage and gender group (IOM 2006).

Tolerable Upper Intake Level (UL): The highest average daily nutrient intake level that is likely to pose no risk of adverse health effects to almost all individuals in the general population. As intake increases above the UL, the potential risk of adverse effects may increase (IOM 2006).

Appendix 2: RDA Values

The RDA values for vitamin C are provided below. For the purpose of this monograph, these values are intended to:

- ▶ provide targets for setting appropriate supplement dosage levels;
- ▶ provide the minimum dose for the use of the dose-specific use or purpose: “Helps to prevent vitamin C deficiency”;
- ▶ facilitate the optional labelling of % RDA values.

Table 2: Recommended Dietary Allowance for vitamin C based on life stage group (IOM 2006)

Life stage group		Vitamin C (mg/day)
Children	1-3 y	15
	4-8 y	25
Adolescent males	9-13 y	45
	14-18 y	75
Adult males	≥ 19 y	90
Adolescent females	9-13 y	45
	14-18 y	65
Adult females	≥ 19 y	75
Pregnancy	14-18 y	80
	19-50 y	85
Breastfeeding	14-18 y	115
	19-50 y	120