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EDITORIAL

Antioxidative Role of Synthetic and Natural Ascorbic Acid (Vitamin C) in Metabolic Pathways of a Biological System

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INTRODUCTION

The properties of a substance are determined by the structure of its component molecules. Ascorbic acid occurs abundantly in fresh fruit, especially blackcurrants, citrus fruit and strawberries, and in most fresh vegetables; good sources are broccoli and peppers. It is destroyed by heat and is not well stored in the body[3]. Ascorbic acid is a good reducing agent and facilitates many metabolic reaction and repair processes. In pharmaceutical preparations and fruit juices, ascorbic acid is readily separated from other compounds by TLC on silica gel and quantitated directly by absorption at 254nm. Serum and plasma may be deproteinized with twice the volume of methanol or ethanol[1].

Various ascorbic acid compounds in plant extracts and foods have been separated on cellulose layers and detected by spraying with 2,5-dichlorophenol indophenol. Heulandite, a natural zeolite (particle size 45µm) has successfully been employed as an adsorbent and ascorbic acid and other hydrophilic vitamins have separated within 5cm by ascending chromatography in dimethylformamide. HPTLC and OPLC methods have been developed to improve the separation of ascorbic acid from other water-soluble vitamins, with some success[2].

Vitamin C is an essential water-soluble micronutrient in humans and is obtained through the diet primarily from fruits and vegetables. In vivo, it acts as a cofactor for numerous biosynthetic enzymes required for the synthesis of amino acid-derived macromolecules, neurotransmitters and neuropeptide hormones and for various hydroxylases involved in the regulation of gene transcription and epigenetics. Vitamin C is concentrated from the plasma into the body's organs and is found in particularly high concentrations in the pituitary and adrenal glands and in the corpus luteum although skeletal muscle, brain, and liver comprise the largest body pools[5].

Most animals can synthesize vitamin C from glucose in the liver. However, humans and a small selection of animal species have lost the ability to synthesize vitamin C due to mutations in the gene encoding L-gulono-γ-lactone oxidase, the terminal enzyme in the vitamin C biosynthetic pathway. Therefore, an adequate and regular dietary intake is essential to prevent hypovitaminosis C and the potentially fatal deficiency disease[4].

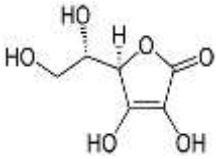
Vitam antioxidant, protecting against damage by reactive molecules called free radicals. The vitamin also helps in stimulating the immune system. It has been shown in animal trials that vitamin C has some ant carcinogenic activity[2].

Artificial chemical synthesis: Vitamin C is produced from glucose by two main routes. The Reichstein process developed in the 1930s uses a single pre-fermentation followed by a purely chemical route. The more modern Two-Step fermentation process was originally developed in China in the 1960s, uses additional fermentation to replace part of the later chemical stages. Both processes yield approximately 60% vitamin C from glucose feed.

In 1934, the Swiss pharmaceutical company Hoffmann-La Roche was the first to mass produce synthetic vitamin C, under the brand name of Redoxon. Main producers today are BASF/ Takeda, Roche, Merck and the China Pharmaceutical Group Ltd of the People's Republic of China[6].

Synthetic form of all vitamins do not behave like natural vitamins because of their three dimensional structure. When these vitamins are manufactured on large scale different chemicals and processes are used in all over the world. Coal tar, petroleum byproducts, acetone, acetylene, and volatile acids are typical ingredients of these vitamins. The results are not what we naturally find in food. Our bodies don't recognize these compounds; treat them as toxins, and waste time and energy in removing them. Seek out whole-food vitamins as often as possible and only pick up multivitamins that contain no synthetics, relying on whole-food plant sources[7].

Vitamin C has the chemical formula C6H8O6 and a molecular mass of 176.14 grams per mol. Vitamin C is purely the L-enantiomer of ascorbate; the opposite D-enantiomer has no physiological significance. Both forms are mirror images of the same molecular structure.



Daily requirement: A healthy person on a balanced western diet should be able to get all the vitamin C needed to prevent the symptoms of scurvy from their daily diet. People who smoke, those under stress and women in pregnancy have a slightly higher requirement[3]. The amount of vitamin C needed to avoid deficiency symptoms and maintain health has been set by variously national agencies as follows:-

- 40 milligrams per day: India National Institute of Nutrition, Hyderabad
- 45 milligrams per day or 300 milligrams per week: the World Health Organization
- 80 milligrams per day: the European Commission Council on nutrition labeling
- 90 mg/day (males) and 75 mg/day (females): Health Canada 2007
- 90 mg/day (males) and 75 mg/day (females): United States National Academy of Sciences. 100 milligrams per day: Japan National Institute of Health and Nutrition
- 110mg/day (males) and 95 mg/day (females): European Food Safety Authority

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