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Alternative Strategies in Chemical Antineoplastic Therapies

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Chemotherapeutic agentsused in treatment of cancer cause numerous systemic toxicity. A lot of research in this regard is focused on nutraceutical agents as a therapeutic factors. In particular high dose of vitamin C is one of therapy patients with prostate cancer described by Nina Mikirova and Ronald Hunninghake from Riordan Clinic, USA (Functional Foods in Health and Disease 2017; 7: 511-528).

The active form of vitamin C is ascorbate acid (Figure.1). The main function of ascorbate is as a reducing agent in several different reactions. Vitamin C has a well-documented role as a coenzyme in hydroxylation reactions, for example, hydroxylation of prolyl and lysyl residues of collagen. Vitamin C is, therefore for the maintenance of normal connective tissue, as well as for wound healing. Vitamin C also facilitates the absorption of dietary iron from the intestine. A deficiency of ascorbic acid results in scurvy, a disease characterized by sore and spongy gums, loose teeth, fragile blood vessels, swollen joints, and anemia. Many of the deficiency symptoms can be explained by a deficiency in the hydroxylation of collagen, resulting in defective connective tissue. Vitamin C is known as antioxidant. Consumption of diets rich in these compounds is associated with a decreased incidence of some chronic diseases, such as coronary heart disease and certain cancers [1,2].

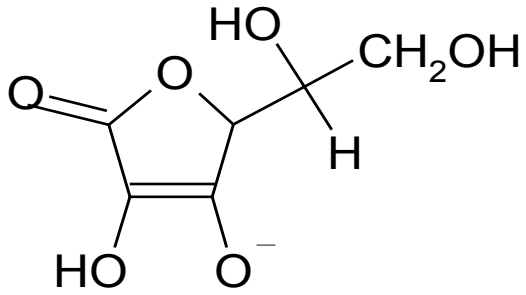

Figure1: The active form of vitamin C

The typical human diet contains ascorbate and dehydroascorbic acid (DHA). Absorption occurs in the enterocytes of the small intestine. Ascorbate is accumulated in cells by Na+-dependent vitamin C transporters (SVCT), DHA is absorbed through a Na+-independent glucose transporters (GLUTs).

Since the 1950s, ascorbate has been proposed to have biological effectsits exact biochemical function in disease like tumour is unknown [3]. Intravenous high dose vitamin C is a commonly used in supplemental therapy, many studies demonstrated a good safety profile and potentially important anti-tumour activity of high dose vitamin C (typically 10g/day) when recommended dietary allowance is 75-125mg/day [4-6]. Cancer patients are deficient in vitamin C so we use vitamin C therapy. Ascorbate readily oxidizes to produce H2O2, pharmacological ascorbate has been proposed as a prodrug for the delivery of H2O2 to tumours [7]. It is highly possible that ascorbate, is oxidized in the extracellular environment, and then taken up by tumour as well as stromal cells [8].

As the PSA concentration varies depending upon tumour differentiation, tumour volume, and the degree of disease concentration of PSA is thought to be an important prognostic parameter. Some reports suggest that PSA doubling time can be used to predict the aggressiveness of the disease and may be useful in identifying patients at risk for progression after prostatectomy or radiation therapy. There is correlation between the frequency of vitamin C and the serum prostate specific antigen velocity (PSAV) with PSAV decreasing as vitamin C frequency increases.However vitamin C may be associated with decrease serum alkaline phosphatase (ALP) concentration which elevated level is associated with survival. Consequently the alternative findings using the other markers of cancer are needed to see anti-tumour action of vitamin C.

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