



Metastatic and Cytotoxic Effects of Ascorbigen and Iso-Ascorbigen in Human Cancer Cells (2002)

Roomi MW, Bogale A, Netke SP, Ivanov V, Niedzwiecki A, Rath M.

Presented at: American College of Nutrition, 43rd Annual Meeting
San Antonio, Texas, Oct. 3-6, 2002

Published in: J. Am. Coll. Nut. 21: 54, 2002

Abstract

Introduction:

Diets rich in cruciferous vegetables such as cabbage, broccoli and brussel sprouts have been shown to prevent certain types of cancer. This discovery led to the isolation of ascorbigen (Ascorb) in cabbage as a major indole-containing compound—a structure fusing indole 3-carbinol (I3C) with ascorbic acid (AA). Iso-ascorbigen (iso-Ascorb) is a synthetic analogue in which AA is replaced by iso-ascorbic acid (iso-AA). Very little is known about the effect of these two compounds as antineoplastic agents. In the present study, we examined the metastatic, antiproliferative and cytotoxic activities of Ascorb and iso-Ascorb in human skin cancer (Melanoma), liver cancer (HepG2) and colon cancer (HCT 116) in vitro. For comparative purposes, AA, iso-AA, and I3C were also used. Cytotoxicity or proliferation was determined by MTT assay, and the metastatic potential of these cancer cell lines was determined by the levels of secretion of matrix metalloproteinases (MMPs). Excessive MMP activity is associated with malignancy and is increased in patients suffering from cancer. Ascorbigen was toxic to melanoma, HepG2 and colon cancer cell lines and its toxicity increased with increasing concentrations from 100 to 1000 μ M. Increasing concentration of ascorbigen had a significant negative impact on cellular secretion of MMPs. Comparatively, iso-ascorbigen was found to be less toxic. AA and iso-AA were not toxic to any of these cell lines at similar concentrations; no change in MMPs was observed. However, I3C was toxic to these cancer cell lines with increasing concentration up to 1000 μ M. In addition, the MMP secretion decreased with increasing concentration. It is probable that Ascorb and iso-Ascorb are transformed into I3C, AA and iso-AA by these cells, which in turn cause toxicity. These results suggest that Ascorb and iso-Ascorb are toxic to human cancer cells of differing origin.

Comment:

Diets high in cruciferous vegetables such as cabbage have been associated with prevention of certain types of cancers. In this study, ascorbigen, a major indole-containing compound in cabbage, was found to be toxic to human melanoma, liver, and colon cancer cell lines. In addition, it was found to inhibit cellular MMP expression, a measure of metastasis potential.