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## **A unique immuno-stimulant steroidal sapogenin acid from the roots of *Asparagus racemosus*.**

[Sharma P](#), [Chauhan PS](#), [Dutt P](#), [Amina M](#), [Suri KA](#), [Gupta BD](#), [Suri OP](#), [Dhar KL](#), [Sharma D](#), [Gupta V](#), [Satti NK](#).

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### **Abstract**

A new steroidal sapogenin molecule 1 having unique characteristics, 21-nor and unusual C19 carboxylic acid has been isolated from the roots of *Asparagus racemosus*. On the basis of chemical evidence, extensive spectroscopic analysis including two dimensional (2D) NMR and X-ray studies of single crystal, the structure of 1 was determined as (1S,2R,3S,8S,9S,10S,13S,14S,16S,17R,22R,25R)-21-nor-18 $\beta$ ,27 $\alpha$ -dimethyl-1 $\beta$ ,2 $\beta$ ,3 $\beta$ -trihydroxy-25-spirost-4-en-19 $\beta$ -oic acid. 1 crystallizes in monoclinic space group P2(1) with a=9.295(2), b=11.238(2), c=11.376(2) $\text{\AA}$ ;  $\beta$ =91.993(4) $^\circ$ , Z=2, D(cal)=1.344Mg/m(3). The structure was solved by direct methods and refined by full-matrix least-squares procedure to a final R-value of 0.0561 for 4064 observed reflections. 1 was tested against the type of immune responses generated during treatment in normal and immune-suppressed animals and detailed biological activity evaluation suggests it to be a potent immunostimulator.

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# Cellular antioxidant activity of common vegetables.

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## Abstract

The measurement of antioxidant activity using biologically relevant assays is important to screen fruits, vegetables, natural products, and dietary supplements for potential health benefits. The cellular antioxidant activity (CAA) assay quantifies antioxidant activity using a cell culture model and was developed to meet the need for a more biologically representative method than the popular chemistry antioxidant capacity measures. The objective of the study was to determine the CAA, total phenolic contents, and oxygen radical absorbance capacity (ORAC) values of 27 vegetables commonly consumed in the United States. Beets, broccoli, and red pepper had the highest CAA values, whereas cucumber had the lowest. CAA values were significantly correlated to total phenolic content. Potatoes were found to be the largest contributors of vegetable phenolics and CAA to the American diet. Increased fruit and vegetable consumption is an effective strategy to increase antioxidant intake and decrease oxidative stress and may lead to reduced risk of developing chronic diseases, such as cancer and cardiovascular disease.

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## **Drinking water with red beetroot food color antagonizes esophageal carcinogenesis in N-nitrosomethylbenzylamine-treated rats.**

[Lechner JF](#), [Wang LS](#), [Rocha CM](#), [Larue B](#), [Henry C](#), [McIntyre CM](#), [Riedl KM](#), [Schwartz SJ](#), [Stoner GD](#).

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### **Abstract**

This study was undertaken to determine if the oral consumption of red beetroot food color would result in an inhibition of N-nitrosomethylbenzylamine (NMBA)-induced tumors in the rat esophagus. Rats were treated with NMBA and given either regular water ad libitum or water containing 78 microg/mL commercial red beetroot dye, E162. The number of NMBA-induced esophageal papillomas was reduced by 45% ( $P < .001$ ) in animals that received the food color compared to controls. The treatment also resulted in reduced rates of cell proliferation in both precancerous esophageal lesions and in papillomas of NMBA-treated rats, as measured by immunohistochemical staining of Ki-67 in esophageal tissue specimens. The effects of beetroot food color on angiogenesis (microvessel density by CD34 immunostaining), inflammation (by CD45 immunostaining), and apoptosis (by terminal deoxynucleotidyl transferase dUTP nick end-labeling staining) in esophageal tissue specimens were also determined. Compared to rats treated with NMBA only, the levels of angiogenesis and inflammation in the beetroot color-consuming animals were reduced, and the apoptotic rate was increased. Thus, the mechanism(s) of chemoprevention by the active constituents of red beetroot color include reducing cell proliferation, angiogenesis, and inflammation and stimulating apoptosis. Importantly, consumption of the dye in the drinking water for a period of 35 weeks did not appear to induce any overt toxicity. Based on the fact that red beetroot color contains betanins, which have strong antioxidant activity, it is postulated that these effects are mediated through inhibition of oxygen radical-induced signal transduction. However, the sum of constituents of E162 has not been determined, and other components with other mechanisms may also be involved in antagonizing cancer development.

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# **Immunostimulatory in Vitro and in Vivo Effects of a Water-Soluble Extract from Kale.**

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## **Abstract**

The water-soluble fraction of kale (*Brassica oleracea* L. var. *acephala* DC.) had immunoglobulin (Ig) production stimulating activity in human hybridoma HB4C5 cells and human peripheral blood lymphocytes. The biochemical and physical properties of the main active substance in kale were found to be a heat-stable protein with a molecular weight higher than 50 kDa. The Ig production-stimulating factors were assumed to act on the translational and/or secreting processes of Igs. This Ig production-stimulating effect was also observed in lymphocytes from the mesenteric lymph node and Peyer's patches of mice that had been administered with the kale extract for 14 d. The partially purified kale extract was analyzed by LS-ESI-MS/MS, the result indicating ribulose-1,5-bisphosphate carboxylase/oxygenase (rubisco) as an active substance. Rubisco from spinach indeed exhibited Ig production-stimulating activity in HB4C5 cells. These findings provide another beneficial aspect of kale as a health-promoting foodstuff.

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# **Assessment of the anti-genotoxic, anti-proliferative, and anti-metastatic potential of crude watercress extract in human colon cancer cells.**

[Boyd LA](#), [McCann MJ](#), [Hashim Y](#), [Bennett RN](#), [Gill CI](#), [Rowland IR](#).

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## **Abstract**

Although it is known to be a rich source of the putative anti-cancer chemicals isothiocyanates, watercress has not been extensively studied for its cancer preventing properties. The aim of this study was to investigate the potential chemoprotective effects of crude watercress extract toward three important stages in the carcinogenic process, namely initiation, proliferation, and metastasis (invasion) using established in vitro models. HT29 cells were used to investigate the protective effects of the extract on DNA damage and the cell cycle. The extract was not genotoxic but inhibited DNA damage induced by two of the three genotoxins used, namely hydrogen peroxide and fecal water, indicating the potential to inhibit initiation. It also caused an accumulation of cells in the S phase of the cell cycle indicating (possible) cell cycle delay at this stage. The extract was shown to significantly inhibit invasion of HT115 cells through matrigel. Component analysis was also carried out in an attempt to determine the major phytochemicals present in both watercress leaves and the crude extract. In conclusion, the watercress extract proved to be significantly protective against the three stages of the carcinogenesis process investigated.

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# **Increased green and yellow vegetable intake and lowered cancer deaths in an elderly population.**

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## **Abstract**

In a prospective cohort study of 1271 Massachusetts residents 66 years of age or older, we examined the association between consumption of carotene-containing vegetables and subsequent five year mortality. Dietary information was obtained by food frequency questionnaire in 1976. The relative risk of cancer mortality was examined within quintiles of green and yellow vegetable score (calculated from intake of carrots or squash, tomatoes, salads or leafy vegetables, dried fruits, fresh strawberries or fresh melon, and broccoli or brussel sprouts). After controlling for age and smoking behavior, those in the highest quintile of intake of these carotene-containing vegetables had a risk of cancer mortality which was 0.3 (95% confidence limits 0.10-0.96) that of those in the lowest quintile. The trend of decreased cancer risk with increasing intake of carotene containing vegetables was significant ( $p = .026$ ). This relationship is consistent with the hypothesis that carotene may act as an inhibitor of carcinogenesis.

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# **Berry fruits for cancer prevention: current status and future prospects.**

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## **Abstract**

Overwhelming evidence suggests that edible small and soft-fleshed berry fruits may have beneficial effects against several types of human cancers. The anticancer potential of berries has been related, at least in part, to a multitude of bioactive phytochemicals that these colorful fruits contain, including polyphenols (flavonoids, proanthocyanidins, ellagitannins, gallotannins, phenolic acids), stilbenoids, lignans, and triterpenoids. Studies show that the anticancer effects of berry bioactives are partially mediated through their abilities to counteract, reduce, and also repair damage resulting from oxidative stress and inflammation. In addition, berry bioactives also regulate carcinogen and xenobiotic metabolizing enzymes, various transcription and growth factors, inflammatory cytokines, and subcellular signaling pathways of cancer cell proliferation, apoptosis, and tumor angiogenesis. Berry phytochemicals may also potentially sensitize tumor cells to chemotherapeutic agents by inhibiting pathways that lead to treatment resistance, and berry fruit consumption may provide protection from therapy-associated toxicities. Although a wide variety of berry fruits are consumed worldwide, this paper focuses on those commonly consumed in North America, namely, blackberries, black raspberries, blueberries, cranberries, red raspberries, and strawberries. In addition, a large body of studies on singly purified berry bioactives is available, but this paper focuses on studies of "whole berries" per se, that is, as berry extracts and purified fractions, juices, and freeze-dried powders. Potential mechanisms of anticancer action and bioavailability of berry phenolics, as well as gaps in knowledge and recommendations for future berry research, are also briefly discussed.

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