

Selenium and Cancer Prevention

Dear Dr. Hurley:

I would like to accept the invitation given to your readers to comment on "Selenium Compounds and the Prevention of Cancer: Research Needs and Public Health" (1). Although I am such a firm believer in the protection selenium provides against certain cancers that I have been taking daily selenium yeast supplements (100–400 µg) for 4 years, I am perplexed by the selection of cancers to be studied in related double-blind clinical trials, namely those of the liver, skin and esophagus.

In 1986, I published details of in excess of 13,000 correlations between the distributions of 219 environmental variables and mortality from 66 specific cancers or groups of cancers in the United States (2). Results clearly indicated fairly strong positive correlations ($r > 0.4$, $P < 0.001$) between reduced mortality from many specific cancers in both white and nonwhite males and females and high levels of selenium in both soils and fodder crops. In white men, for example, elevated soil selenium correlated positively with reduced mortality from cancer of the tongue, floor of the mouth, oral mesopharynx, esophagus, large intestine, rectum and bladder. At slightly lower levels of significance high selenium in soils was also linked with lowered death rates from cancer of the buccal cavity, lung and pharynx. In addition to many similar apparent associations in both white and nonwhite women, mortality from cancers of the breast and ovary was also strongly negatively correlated with high levels of soil selenium. This element, therefore, appears linked to reduced death rates from cancers of the digestive and respiratory tracts and the female reproductive system. If this suggestion is correct one might logically anticipate that selenium supplements (especially if given together with calcium and vitamin E) would reduce the incidence of cancer of the esophagus.

However, the other two cancers (liver and skin) selected for double-blind testing with selenium (1) demonstrate very poor spatial associations with the distribution of this element. In the U.S., mortality from cancer of the liver is generally highest where soils are particularly enriched in magnesium, calcium, phosphorus and potassium, whereas the death rate from nonmelanoma

skin cancer is greatest where soils are very depleted in these elements.

Mortality distribution patterns in the United States and elsewhere (2) tend to suggest that cancers (with the exception of the lymphomas and leukemias) are most common in populations exposed to both industrial carcinogens and dietary bulk and trace element imbalances. The organ at risk seems to vary with the imbalance involved. Calcium, for example, appears protective against cancers of the mouth and esophagus, while simultaneously promoting cancer of the liver.

In conclusion, I would like to suggest to the medical profession that women who have recently undergone mastectomies would be ideal participants in trials to test the effectiveness of selenium as a cancer chemopreventative. This is because epidemiological and clinical evidence both suggest that selenium is protective against breast cancer in white and nonwhite (Black and Oriental) women (2, 3), whereas adjuvant chemotherapy with multiple agents (4) only increases their 3-year survival rate by 4% ($\pm 3.5\%$).

Sincerely,

Harold D. Foster
Department of Geography
University of Victoria
Victoria, B.C.
Canada V8W 2Y2

LITERATURE CITED

1. CLARK, L. C. & COMBS, G. F., JR. (1986) Selenium compounds in the prevention of cancer: research needs and public health implications. *J. Nutr.* 116: 170–173.
2. FOSTER, H. D. (1986) *Reducing Cancer Mortality: A Geographical Perspective*, Western Geographical Series, vol. 23, University of Victoria, Victoria, B.C.
3. SCHRAUZER, G. N., MOLENAAR, T., MEAD, S., KUEHN, K., YAMAMOTO, H. & ARAKI, E. (1986) Selenium in the blood of Japanese and American women with and without breast cancer and fibrocystic disease. *Jpn. J. Cancer Res.* 76: 374–377.
4. HIMEL, H. N., LIBERATI, A., GELBER, R. D. & CHALMERS, T. C. (1986) Adjuvant chemotherapy for breast cancer: a pooled estimate based on published randomized control trials. *J. Am. Med. Assoc.* 256: 1148–1159.