

## Longitude Position in a Time Zone and Cancer Risk—Letter

William B. Grant



The recent article by Gu and colleagues reported that the relative risk of all-cancer incidence increased with respect to a 20° shift to the west (an index of sleep disturbance) by 3% (95% confidence interval, 2%-4%) for women and 4% (3%-5%) for men (1). For men, 5 of 20 types of cancer had significant increases with respect to latitude, while for women, 7 of 22 did, not counting subheadings. However, only one type of cancer, chronic lymphocytic leukemia, had increased risk for both males and females. Thus, the findings for individual cancers seem rather random.

Several geographical ecologic studies have found significant inverse correlations between solar UVB doses and cancer incidence or mortality rates in the United States and other midlatitude countries (2). In one study, other cancer risk-modifying factors included in the analysis were alcohol consumption, Hispanic heritage fraction, lung cancer mortality rate as an index of smoking, poverty, and urban/rural residence (3). The only confounding factors included in the analysis in ref. 1 were cigarette smoking, latitude, poverty, and state.

Solar UVB doses in the United States are lower along the west coast than inland in both California and Washington (4). As a

result, skin cancer mortality rates are lower along the coast of California compared with inland while internal cancer mortality rates are higher along the coast but lower inland (5). This finding suggests that the results in ref. 1 were strongly influenced by the data from California and Washington.

The data I used in these ecological studies was the cancer mortality rate data from the National Cancer Institute (6). The geographical variations in the period 1950-54 showed highest all-cancer mortality rates in the northeast, lowest in the southwest, which was significantly inversely correlated with summertime UVB doses. However, after about 1990, the distributions shifted due to reduced sun exposure, use of sunscreen, changing rates of other risk factors such as diet, obesity, and smoking, and better survival after cancer diagnosis. However, there is no apparent correlation with longitude within time zones in any period.

Thus, the analysis presented in ref. 1 should be revised. The simplest revision would be to rerun the analysis without including data from California and Washington and use data only for non-Hispanic whites. The better revision would be to include county-level summertime UVB doses in the analysis as well as values for some of the other cancer risk-modifying factors.

**Disclosure of Potential Conflict of Interest**

W.B. Grant reports receiving a commercial research grant from Bio-Tech Pharmacal.

Received November 30, 2017; revised March 26, 2018; accepted June 8, 2018; published first September 1, 2018.

Sunlight, Nutrition, and Health Research Center, San Francisco, California.

**Corresponding Author:** William B. Grant, Sunlight, Nutrition, and Health Research Center, P.O. Box 641603, San Francisco, CA 94164-1603. Phone: 415-409-1980; E-mail: wbgrant@infionline.net

**doi:** 10.1158/1055-9965.EPI-17-1125

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