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CANCER MORTALITY AND AIR FORCE BASES

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ABSTRACT

Nationally, counties with an Air Force Base were found to have significantly higher incidences of cancer mortality during 1950-1969 compared to counties without an Air Force Base.

INTRODUCTION

Evidence has accumulated indicating that prolonged, repeated exposure to weak non-ionizing electromagnetic radiation can be mutagenic and teratogenic (1). Zaret (2) reported, "...a sudden increased incidence of cancer" in North Karelia, Finland, which followed the installation of long range early warning radar along the neighboring Soviet border and he suggested that "...non-ionizing radiation as an atmospheric pollutant may be carcinogenic". Becker (3) reported cancer clusters "... within the boundaries of a microwave corridor", and Zaret (4) responded with a call for the investigation of a possible link between non-ionizing radiation and cancer.

Radar has been in operation at military air bases since World War II, and areas surrounding these bases have been exposed to daily radar transmissions for over thirty years. If radar exposure is related to cancer, one might expect to find a detectable increase in deaths due to cancer in areas surrounding air bases. We therefore examined the hypothesis that cancer mortality is associated, in part, with the possibility of chronic exposure to radar.

METHOD OF ANALYSIS

The location of 92 active Air Force bases that were in operation before and during the period 1950-1969 was ascertained (5). Air Force bases (AFB) were chosen because, when compared to the other Services, they tended to be more evenly dispersed throughout the continental United States. Also, there were relatively fewer Army and Navy air bases in continuous operation during the time period under consideration. Data on civilian air bases for this time period, particularly with regard to the use of radar, was not accessible.

The population of each county in which an AFB was located was determined, using the 1960 census (6). In each instance, the control county (non-AFB) was the one from the same state that was nearest in population - sometimes larger, sometimes smaller.

The mean population for the AFB counties was 237,684 (standard deviation, 254,683); for non-AFB counties it was 209,893 (242,128). These two distributions do not differ significantly.

It should be noted that many counties in both groups had other air bases. Also, the counties varied considerably in geographic and economic characteristics. These factors would tend to bias the data against the hypothesis. Despite this confounding, the design demands that the presence of an AFB produce sufficient electromagnetic effect that it would be relatable to a higher cancer mortality in that county. No attempt was made to assess the possible role of other carcinogens.

A rating of cancer-mortality incidence for both AFB and non-AFB counties was obtained from the Atlas of Cancer Mortality for US Counties 1950-1969 (7). This data is age adjusted and presented by color codes in the following five categories:

Significantly high, in highest decile	4
Significantly high, not in highest decile	3
In highest decile, not significant	2
Not significantly different from US	1
Significantly lower than US	0

We have added the scale to the right simply as index numbers. The data is presented in the Atlas by county for both males and females. Therefore, for each county there is a rating, for both males and females; they are tabulated separately (Table 1).

For an analysis of the data the following assumptions were made:

a. Categories 4 and 3 can be combined as significant incidence; categories 1 and 0 as non-significant incidence.

b. Category 2 can be deleted.

c. Since there was an effort to match counties by population, the proper statistical analysis is a test

TABLE 1

Classification of Cancer Mortality 1950–1969 by Air Force Base Counties and Non-Air Force Base Counties with Sex Differentiated.

	MALES		FEMALES		INDEX
COUNTIES	AFB	non-AFB	AFB	non-AFB	
	21	12	13	7	4
	2	1	4	2	3
	5	6	0	3	2
	16	21	33	34	1
	48	52	42	46	0
TOTAL	92	92	92	92	

for correlated proportions comparing AFB with non-AFB counties.

If the assumptions hold, it is possible to classify the data in pairs in terms or presence or absence of significant mortality by AFB and non-AFB counties (Table 2).

An analysis of this data for correlated proportions, corrected for continuity, one-tailed test yields z: male, 1.75, ($P = 0.04$); female, 2.02, ($P = 0.02$).

The analysis indicates that counties with an AFB, when compared to population-matched counties without an AFB, have a significantly higher incidence of cancer mortality for the period, 1950–1969.

DISCUSSION

It is possible that susceptibility to carcinogens involves a change in the body's electromagnetic balance that renders the

TABLE 2

Frequency of Significant (+) and Non-Significant (-) Mortality Incidence by Sex for AFB and non-AFB Counties.

Incidence	Male	Female
AFB (+) and Non-AFB (+)	9	7
AFB (-) and Non-AFB (-)	57	70
AFB (+) and Non-AFB (-)	12	10
AFB (-) and Non-AFB (+)	4	2
Total	82	89

individual vulnerable. Chronic low intensity microwave exposure to peak pulse patterns characteristic of radar could influence immunocompetence and account for the high cancer mortality in areas near air bases.

Meecham and Shaw (8) found a 20% higher mortality rate for residents 2-3 miles from the touchdown point at Los Angeles International Airport, when compared to a similar neighborhood 8-9 miles from the landing strip. Increased mortality to other diseases, including cancer, was reported as consistent with "...a higher incidence of birth defects and nervous breakdowns among people residing near airport runways (Japan and Great Britain)". In this study, a significantly higher incidence of cancer mortality was found in air base counties. Meecham and Shaw attributed their findings to the effect of noise emanating from the airports. Both their results and ours may be due to noise or to the electromagnetic environment near airports or to some as yet unknown factor. The present data though consistent with the

thesis that the correlation is based on the presence of radar cannot confirm this proposition. Additional studies are needed to clarify the nature of the relationship between cancer mortality and air bases.

BIBLIOGRAPHY

1. Office of Telecommunications Policy: Program for Control of Electromagnetic Pollution for the Environment: The Assessment of Biological Hazards of Non-Ionizing Electromagnetic Radiation. Executive Office of the President, 4th Report, Appendix D: 8-27, June 1976.

2. Zaret, M.: Electronic Smog as a Potentiating Factor in Cardiovascular Disease. Med. Res. Eng. 12: 13, 1976.

3. Becker, R.: Microwave Radiation. N.Y. J. Med. 77:2172, 1977.

4. Zaret, M.: Potential Hazards of Hertzian Radiation and Tumors. N.Y. J. Med. 77:146, 1977.

5. Air Force and Space Digest. Washington, September 1969.

6. County and City Data Book. US Bureau of Census, Library of Congress, No. 52-4576, Washington 1967.

7. Atlas of Cancer Mortality for US Counties, 1950-1969, DHEW Publication Number NIH 75-780, Washington.

8. Meecham, W. and Shaw, N.: Effects of Jet Noise on Mortality Rate. British J. Audiology 13: 77-90, 1979.