A MECHANISM FOR SELECTING COMMUNITIES AT HIGH RISK FOR CANCER

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In 1971 Dr. Fred Burbank completed an investigation of geographic patterns of cancer mortality in the United States with the state as the smallest unit (1). Subsequent to this publication our Branch became involved in a study of residential exposure to low-level radiation on the western slopes of Colorado (2). In order to investigate this exposure, we had to break down a rather large data base which included almost six million deaths reported during the time span 1950 through 1967. This investigation served as a taking off point for the subsequent development of systems of programs to analyze cancer mortality data for individual counties in the United States which was then followed by the development of programs to provide maps of the spatial distributions of major sites of malignancy (3). The basic data which we utilized were selected items from all death certificates reported to the National Center for Health Statistics from 1950 through 1969 listing cancer as the underlying cause of death. Each death was ascribed to the county of usual residence given on the certificates. In early 1974, we published a book of tables which gave the number of deaths and rates for 35 anatomic sites of malignancy for the counties which comprise the contiguous United States (4).

At that point in time, we had been investigating the spatial distribution of cancer mortality. This process utilized students part time who sat and prepared maps by hand in order to answer a basic question with regard to the patterns of cancer mortality across the United States. We were of the opinion that subdividing the country into its counties would provide much needed information with regard to the identification of high-risk communities where analytical epidemiologic studies might detect specific carcinogenic hazards. The procedure which we followed was to investigate the distribution of several cancer sites for which we had information concerning causal associations. We selected cancer of the stomach and also melanoma of the skin. Cancer of the stomach is known to have a very strong association with ethnicity and, specifically, rates are exceptionally high among persons of Scandinavian descent. Melanoma has a very strong positive association with exposure to sunlight. When maps of these malignancies were shown to our Chief, he became quite excited about the potential of pursuing systematically the distribution of major sites of malignancy. We developed an inhouse mapping capability, and presented in June of 1975 our first atlas for the white population of the United States at the county and SEA level. For individual counties or state economic areas, we calculated age-adjusted mortality rates, and compared them to rates of the total United States. I would like now to present the distribution of several major sites of malignancy, and discuss the follow-up efforts that were instituted as a result of investigating their spatial distribution.

Figure 1 presents the distribution of lung cancer among white males in the United States. There are excessive rates of lung cancer among males along the Gulf Coast from Texas to Florida with the heaviest concentration in Louisiana. We have completed an investigation of lung cancer in the coastal counties of Georgia in collaboration with the Center for Disease Control (5). This investigation detected a summary relative risk estimate of 1.6 associated with employment in area shipyards during World War II. This relative risk estimate was adjusted for smoking, other occupations, age, race and county of residence.

Figure 2 presents the distribution of bladder cancer among white males, and shows the distribution to be dominated by excessive mortality in New Jersey. Of the 21 counties in New Jersey, 18 have bladder cancer rates in the highest decile of male rates for all U.S. counties. In fact, the rate for Salem County which is 16.1 for 100,000 white male population ranks highest among all American counties with a white population of at least 10,000. We recently undertook a very large study of newly diagnosed bladder cancer in the United States, which included New Jersey and 9 component members of a network of population-based cancer registries throughout the United States. These include Connecticut, Atlanta, New Orleans, Detroit, Iowa, Utah, New Mexico, San Francisco, and Seattle. Results of this study will be available in the near future.

Figure 3 presents the distribution of colon cancer. Mortality rates are excessive in the northeastern United States and also urban areas into the Midwest. This pattern is true for both whites and nonwhites in the United States and, since this is the case, a cluster of high rates in rural areas aroused our suspicion. Such a cluster was found for both sexes among whites in several southeastern Nebraska counties. We are pursuing this local excess through a case-control study of newly diagnosed colon cancer patients with emphasis given to dietary histories.

The figures which I have included were published in 1975 (6). This atlas presented for the first time the spatial distribution of mortality from major types of malignancy at the county level in the United States. At that time we stated that perhaps the greatest value of these maps would be to designate high-risk communities for analytical epidemiologic studies which might detect specific carcinogenic hazards. This presentation has focused on the development of the capability to assess the magnitude of cancer mortality at the county level in the United States, the development of an inhouse automated cartographic approach and the status of several field investigations which have followed the publication of this atlas and its companion (7).

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CANCER MORTALITY, 1950-69, BY COUNTY
TRACHEA, BRONCHUS & LUNG
WHITE MALES

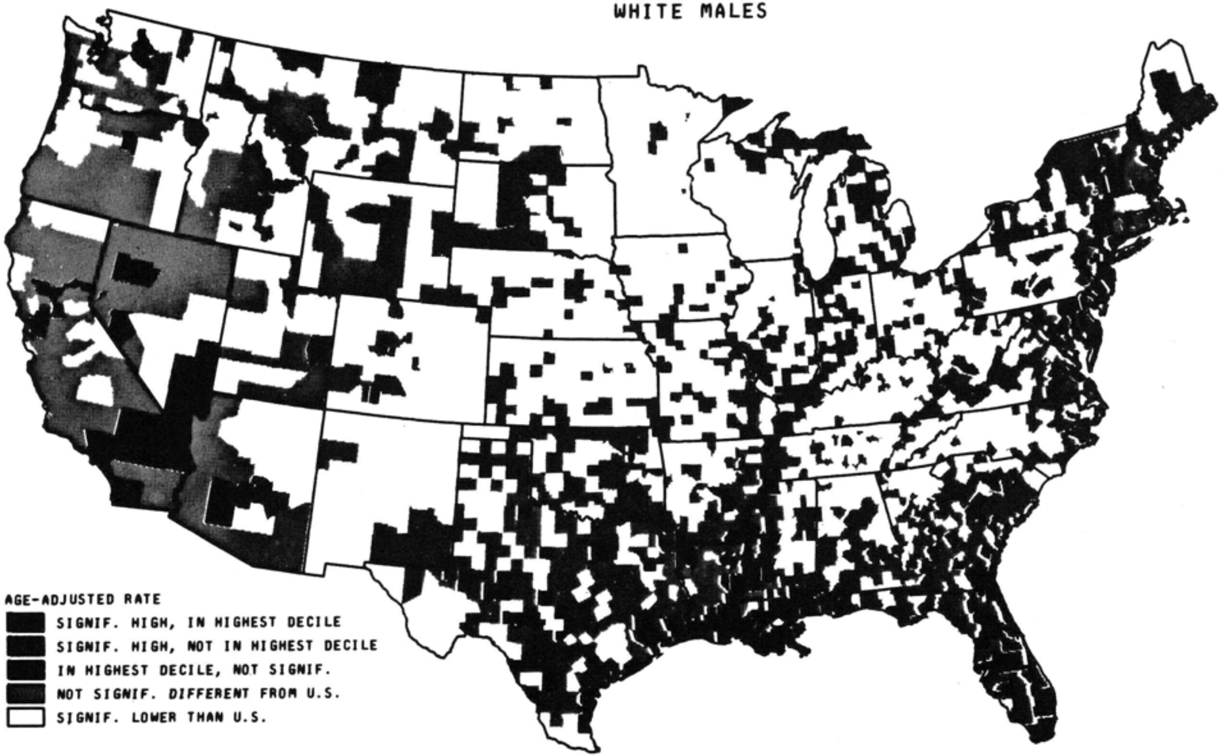

Figure 1

CANCER MORTALITY, 1950-69, BY COUNTY
BLADDER
WHITE MALES

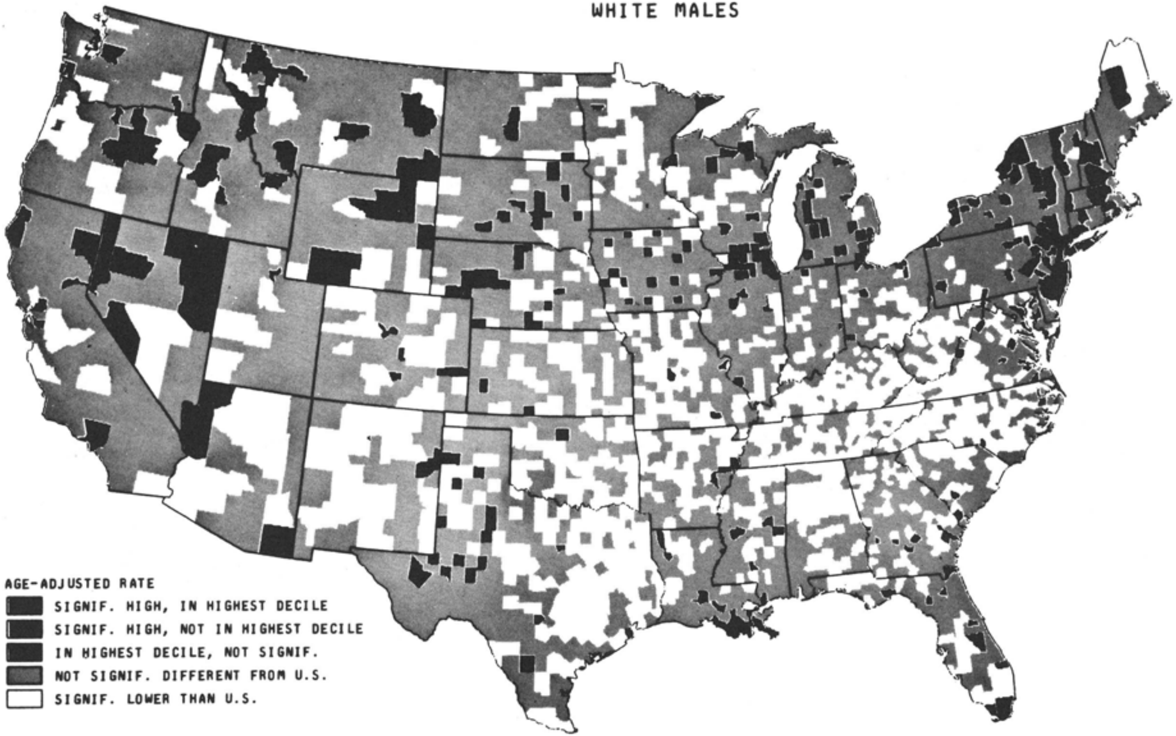

Figure 2

CANCER MORTALITY, 1950-69, BY COUNTY
LARGE INTESTINE, EXCEPT RECTUM
WHITE MALES

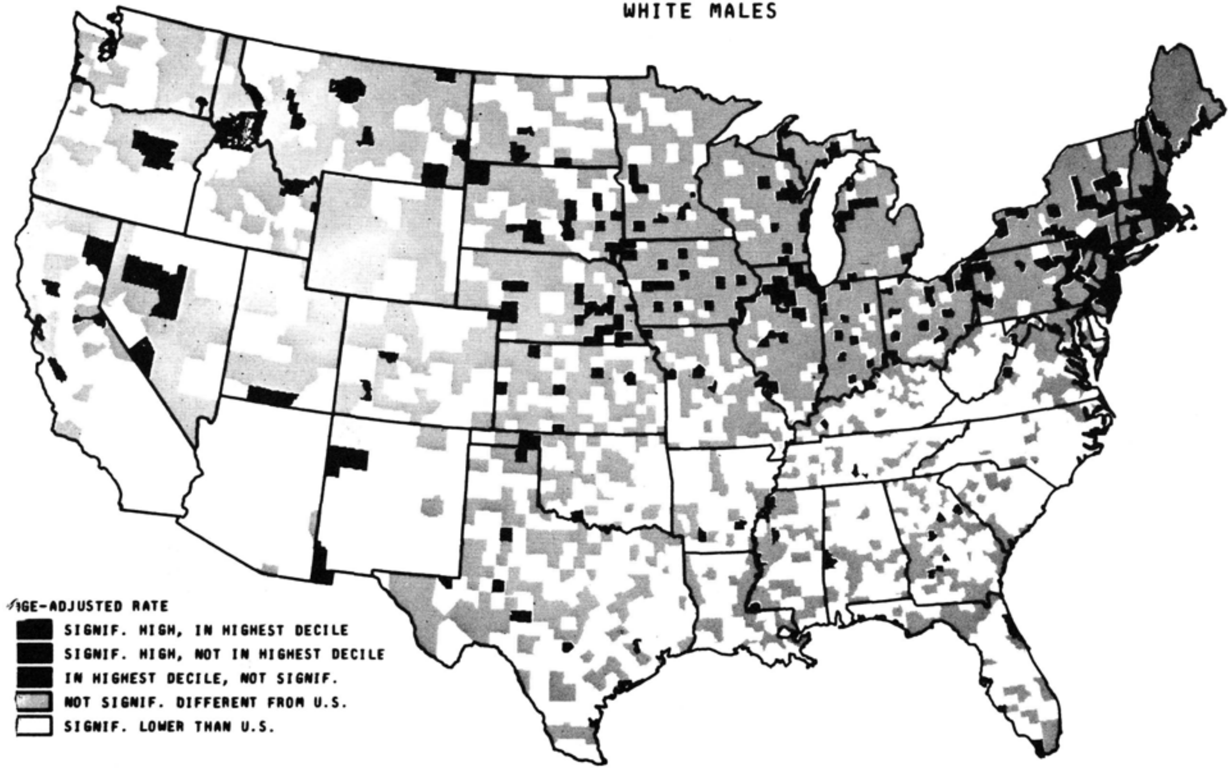

Figure 3