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Air pollution in relation to U.S. cancer mortality rates: an ecological study; likely role of carbonaceous aerosols and polycyclic aromatic hydrocarbons.

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Author information

Abstract

BACKGROUND: There are large geographical variations of cancer mortality rates in the United States. In a series of ecological studies in the U.S., a number of risk-modifying factors including alcohol, diet, ethnic background, poverty, smoking, solar ultraviolet-B (UVB), and urban/rural residence have been linked to many types of cancer. Air pollution also plays a role in cancer risk.

MATERIALS AND METHODS: Cancer mortality rates averaged by state for two periods, 1950-1969 and 1970-1994, were used in multiple-linear regression analyses with respect to many of the risk-modifying factors mentioned with the addition of an air pollution index in the form of a map of acid deposition in 1985. This index is correlated with emissions from coal-fired power plants. In addition, lung cancer mortality rates for five-year periods from 1970-74 to 1990-94 were used in multiple linear regression analyses including air pollution and cigarette smoking.

RESULTS: The air pollution index correlated with respiratory, digestive tract, urogenital, female, blood and skin cancer. Air pollution was estimated to account for 5% of male cancer deaths and 3% of female cancer deaths between 1970-1994. Solar UVB was inversely correlated with all these types of cancer except the respiratory, skin and cervical cancer. Cigarette smoking was directly linked to lung cancer but not to other types of cancer in this study.

CONCLUSION: Combustion of coal, diesel fuel and wood is the likely source of air pollution that affects cancer risk on a large scale, through production of black carbon aerosols with adsorbed polycyclic aromatic hydrocarbons.

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