The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today.

Doll R, Peto R.

Evidence that the various common types of cancer are largely avoidable diseases is reviewed. Life-style and other environmental factors are divided into a dozen categories, and for each category the evidence relating those particular factors to cancer onset rates is summarized. Where possible, an estimate is made of the percentage of current U.S. cancer mortality that might have been caused or avoided by that category of factors. These estimates are based chiefly on evidence from epidemiology, as the available evidence from animal and other laboratory studies cannot provide reliable human risk assessments. By far the largest reliably known percentage is the 30% of current U.S. cancer deaths that are due to tobacco, although it is possible that some nutritional factor(s) may eventually be found to be of comparable importance. The percentage of U.S. cancer deaths that are due to tobacco is still increasing, and must be expected to continue to increase for some years yet due to the delayed effects of the adoption of cigarettes in earlier decades. Trends in mortality and in onset rates for many separate types of cancer are studied in detail in appendixes to this paper. Biases in the available data on registration of new cases produce apparent trends in cancer incidence which are spurious. Biases also produce spurious trends in cancer incidence which are spurious. Biases also produce spurious trends in cancer death certification rates, especially among old people. In (and before) middle age, where the biases are smaller, there appear to be a few real increases and a few real decreases in mortality from some particular types of cancer, but there is no evidence of any generalized increase other than that due to tobacco. Moderate increases or decreases due to some new agent(s) or habit(s) might of course be overlooked in such large-scale analyses. But, such analyses do suggest that, apart from cancer of the respiratory tract, the types of cancer that are currently common are not peculiarly modern diseases and are likely to depend chiefly on some long-established factor(s). (A prospective study utilizing both questionnaires and stored blood and other biological materials might help elucidate these factors.) The proportion of current U.S. cancer deaths attributed to occupational factors is provisionally estimated as 4% (lung cancer being the major contributor to this). This is far smaller than has recently been suggested by various U.S. Government agencies. The matter could be resolved directly by a "case-control" study of lung cancer two or three times larger than the recently completed U.S. National Bladder Cancer Study but similar to it in methodology and unit costs; there are also other reasons for such a study. A fuller summary of conclusions and recommendations comprises the final section of this report.