

Darlington is one of the centres contributing data to a study of mammographically-detected breast cancer in Hodgkin's patients treated with mantle radiotherapy. Professor Anthony Swerdlow of the Royal Marsden Hospital is coordinating this research, and we are grateful to him for contributing this article which he has written specifically for this Journal.

Cancer Epidemiology

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As a cancer epidemiologist, although I am not based in Darlington or Durham, I conduct studies that include your area, and hence Dr. Henderson asked if I would write a piece for the *Journal*. Cancer epidemiologists are a fairly rare species, although I hope not an endangered one. Primarily we seek to find the causes of cancer and hence ways to prevent it, by examination of its distribution and determinants in human populations. This has been the method by which almost all known causes of cancer in man have been demonstrated. From Bernardino Ramazzini's observation more than three hundred years ago that nuns suffered breast cancer more often than other women (which later has been explained by the protective effects of parity compared with nulliparity), to the 19th century discovery by Härtig & Hesse of the extraordinarily high mortality from lung cancer in the miners of Schneeberg & Joachimstal (later shown to be due to radioactivity from uranium in the mines), through to the discoveries of the last century that smoking raises the risk of lung cancer and asbestos raises the risk of pleural cancer, the observation and comparison of cancer risks in groups of people who differ in their behaviours or environments (or comparison of the environments and behaviours of people who have, and have not, developed cancer) has proved to be an extraordinarily potent method to find the causes of cancer and hence preventive measures.

Since one cannot ethically conduct deliberate experiments to determine whether agents cause cancer in people, epidemiologists rely on what have been termed "natural experiments", i.e. we observe the effects of exposures to individuals who are exposed, or not exposed, to potential causal agents as a result of their choices of lifestyle and their environments (and their genetics), rather than conducting an experiment ('trial') in which the exposures are chosen and randomised by a researcher. The great majority of the known causes of cancer have been established as causal in this way¹, and many of the key epidemiological discoveries were made in this country: for instance, the finding by Case et al in 1954^{2,3} of raised risk of bladder cancer in men who worked in the manufacture of certain chemicals in the dyestuff industry, and by Doll & Hill⁴ of raised risk of lung cancer in British doctors who smoked compared with those who did not. Frequently the epidemiological documentation of risk followed an astute clinical observation – for instance the finding by Acheson et al⁵ (after clinical observations by Hadfield and Macbeth) of a greatly raised risk of nasal cancer in woodworkers in High Wycombe, and the demonstration by Doll et al⁶ of a raised risk of cancer of the nasal sinuses in a South Wales nickel refinery, following a report by Bridge in 1933 of nine cases there.

Modern observational epidemiological studies

generally require the collection of data from many hundreds or thousands of patients, and for cancer this often requires studies that cover a large part of or the whole of the country. As a consequence, several of our studies at the ICR are national, and have included Darlington and Durham as well as other areas.

We are, for instance, currently conducting a case-control study of the causation of breast cancer in men that includes your area, and a study of the effect of supra-diaphragmatic radiotherapy for Hodgkin's disease in young women on their risk of breast cancer, as well

as a large cohort (follow-up) study nationally that now includes over 100,000 women, which is investigating the causes of breast cancer in women. Several of the readers of this Journal will therefore have helped us at some point with these studies, and it is a great pleasure to be able to thank you in this article for your help towards our research. The results of epidemiology tend to take much longer than those of clinical medicine to become apparent, but I hope that they are of value nonetheless.

References

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