

## Investigation into Alleged Radiation Induced Diseases from Sellafield Nuclear Power Station along the Irish Coastline

Sidney Lowry, Belfast

An independent committee of inquiry was set up in 1985 by Mr. Chris Patten, MP, then Under Secretary for State in Northern Ireland. The task of the Committee was to assemble and analyse epidemiological data on the patterns of disease which have a possible association with radiation. The Committee was appointed against a background of public concern about alleged health hazards associated with the discharge of radioactive waste from the Sellafield Nuclear reprocessing plant at Sellafield, Cumbria, into the Irish Sea.

The Committee met regularly over a period of four years before producing its final report. Many people were interviewed ranging from professional groups, public bodies, private individuals and Members of Parliament. Data was collected and analysed from a variety of sources. The study concentrated primarily on the distribution of Down syndrome in the province and the incidence and mortality of various types of leukaemia. The pattern of disease along the coastline was compared with inland areas. Overall the findings were „relatively reassuring“. A number of recommendations were made some of which are now in place.

### Practical Constraints

Despite the breadth of the remit, a number of practical constraints had to be accepted. The first of these related to the choice of epidemiological data to analyse. The Committee selected leukaemia and Down Syndrome as appropriate examples for

study and undertook to investigate their distribution throughout Northern Ireland. The lack of routinely collected data in a form facilitating the analyses, particularly in respect of leukaemia, contributed substantially to the time taken to produce this report. Leukaemia incidence data had to be collected from a variety of sources none of which was individually complete. The Committee feels bound to comment on the poor quality of the databases examined and especially on the state of the Northern Ireland Cancer Register. Had it been up to an acceptable standard it would have enabled the Committee to report earlier.

There are no population data directly linking radiation and disease in Northern Ireland. Although some monitoring of radiation levels was carried out during the study period it was not detailed enough to be correlated reliably with epidemiological data collected by the Committee. Consequently the analytical approach taken by the Committee was necessarily indirect.

Even the population data available for analysis were not ideal. Electoral wards were found to be the smallest practicable area for the leukaemia study. However wards vary in size and population and accurate ward population figures were available for 2 years only of the period studied, the census years 1971 and 1981. In the Down Syndrome study the necessary population data was only available at district council level.

The problems encountered by the Committee are, however, common to retrospective studies and the Committee is satisfied that the limitations they imposed did not invalidate the work undertaken.

### **Work Undertaken**

The studies carried out on leukaemia and Down Syndrome were primarily descriptive and comparative.

The leukaemia study comprised two distinct parts - a study of mortality from leukaemia and a study of the incidence of the disease. Two groups of leukaemia - acute leukaemia and all forms of leukaemia associated with radiation - were examined in each study. Leukaemia mortality between 1968 and 1976 and between 1977 and 1985 and the incidence of leukaemia between 1977 and 1985 were analysed by age, sex and electoral ward. These analyses covered the only periods for which reliable records were available.

The Committee also compared the pattern of these diseases along the coast of Northern Ireland with the pattern inland to test the hypothesis that radioactive pollution in the Irish Sea had affected the health of the population living near the coast. Particular emphasis was placed on investigating rates amongst children.

In addition, the incidence of leukaemia was investigated for evidence of clustering.

To view its findings in a wider context the Committee compared leukaemia rates in Northern Ireland with rates elsewhere in the United Kingdom.

The prevalence of Down Syndrome in each District Council was examined and the prevalence along the coast was compared with the prevalence inland.

### **Results**

All the Committee's findings are set out in tables. The visual presentation of the statistical information - especially that relating to leukaemia - was considered by the Committee to be important. Selected aspects of the results of the statistical analyses of leukaemia have, therefore, been depicted on the maps.

The results of the leukaemia study indicate that most of the geographical distribution of

leukaemia can be explained in terms of the variation in the age and sex structure of individual electoral wards. The numbers of deaths observed in over 96 % of the wards, and incident cases observed in over 98 % of the wards, were as expected having regard to the age-sex composition of their population.

A small number of electoral wards with higher than expected rates were detected. These wards were randomly distributed and were rarely contiguous. They were not concentrated on the coast. The Committee found no assignable cause for their existence from the recorded details of the individuals involved. In any event the numbers involved were less than expected by chance having regard to the age-sex population profiles on the wards concerned.

No evidence was detected on generally higher rates of mortality from leukaemia or incidence of the disease on the coast than inland. This also held true amongst children aged 0 to 14 years.

Using conventional statistical methods of analysis no evidence was found of clustering of the incidence of leukaemia. A modification of the conventional method, developed for the study, did produce evidence of a slight tendency for leukaemia cases to cluster but the number of cases involved was very small. None of the wards where this tendency was noted contained an excess of cases. The Committee stresses the innovative nature of the statistical method used and the need to treat these findings with caution. Furthermore, it does not regard the phenomenon as a cause for concern.

Leukaemia mortality and incidence rates in Northern Ireland were similar to those elsewhere in the United Kingdom. The overall Northern Ireland mortality rate was intermediate between the rate in Scotland and the rate in England and Wales. The incidence rate in Northern Ireland was lower than the rate in many other regions.

The prevalence of Down Syndrome was found to be as expected in each district council area given the population structure of the area and having regard to maternal age. The Committee found no significant difference between the prevalence on the coast and inland.

### Conclusions

The Committee believes, that, overall the picture which has emerged is relatively reassuring. Whilst the Committee concentrated on seeking to detect adverse effects due to direct irradiation from radioactive nuclides in the Irish Sea it also searched for a discernible pattern associated with radiation. Examination of the results of the leukaemia study and the Down Syndrome study failed to reveal any discernible pattern either in geographical distribution or in time.

To the Committee the clearest elaboration of the hypothesis, that radioactive pollution in the Irish Sea had affected the health of the population of Northern Ireland, involved the assumption that rates of leukaemia mortality and incidence, especially of acute leukaemia in children, and the prevalence of Down Syndrome would be significantly higher on the coast of Northern Ireland than inland. The Committee assembled and analysed the available epidemiological data relating to leukaemia and Down Syndrome to test the hypothesis but found no supporting evidence in any of the comparison it carried out.

During the period studied either:

- (a) there were no public health consequences from this pollution; or
- (b) there were no measurable consequences; or
- (c) there were some consequences which were measurable but which manifested in ways not examined by the Committee.

The Committee concluded that the data examined did not obviously implicate ra-

dioactive pollution in the Irish Sea as an underlying factor in determining the patterns in Northern Ireland of the conditions studied.

Sidney Lowry was the chairman of the committee.

The investigation is described in a report: Investigation into patterns of disease with possible association with radiation in Northern Ireland. Her Majesty's Stationary Office, Belfast, 1989.