Childhood leukaemia rates 'higher near nuclear plants'
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RATES of leukaemia are higher in children and young people living near nuclear plants, a review of several studies has concluded.

Death rates for children aged nine and under were up to 24 per cent higher, depending on how near they lived to nuclear facilities, the report said.

Researchers reviewed 17 different studies, including seven from the UK, carried out between 1984 and 1999, to compile the statistics.

The other studies came from Canada, France, Germany, the United States, Japan and Spain.

Figures from the report, published in the European Journal of Cancer Care, showed leukaemia rates were elevated by 14 per cent to 21 per cent in children aged up to nine, and by 7 per cent to 10 per cent in those aged up to 25.

Death rates from leukaemia for children and young people aged up to 25 were between 2 per cent and 18 per cent higher.

The report's lead author, Dr Peter Baker, from the Medical University of South Carolina in the US, said the cause of the higher rates was unclear.

"It is important to note that there are still many questions to be answered, not least about why these rates increase. It is clear further research is needed," he said.
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Tritium releases and leukaemia clusters
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Between 1989 and 1991 six children and one young adult developed leukaemia in the community `Elbmarsch' in Lower Saxony (northern part of Germany). Elbmarsch is located near to a nuclear power station (`Krümmel') and since then Germany has had its `Sellafield', a leukaemia cluster next to a nuclear power station. Between 1994 and 1996 four more cases of childhood leukaemia were reported from the area although not all of them from the same community. Leukaemia clusters are reported in the literature quite often, although their occurrence is still not understood. The definition of a `cluster' varies considerably and some of the observed clusters can be explained by statistical variation only. For example, several other clusters of childhood leukaemia were reported in Lower Saxony according to data from the national childhood cancer registry in Germany, but none of the other clusters were noted by the public, the scientific community or

politicians. However, major research efforts were initiated to investigate the causes of this `Krümmel' cluster. A commission of experts was formed by the regional government to `try to establish proof that the leukaemia cases are caused by radioactive releases from the nuclear power station or from a nearby nuclear research facility.'

The commission has been working for nearly ten years and has not yet published its final report; however, several investigations have been recommended by the commission and funded by the regional government. The investigations included studies to search for extra radiation releases in the environment, investigations on chromosomal aberrations of persons living in the area and a large case-control study of leukaemia and lymphoma. No extra radiation release was found even by a very critical `green' research group (`Ökoinstitut') and no differences in chromosome aberration rates were seen between `exposed' and non-exposed persons. The case-control study is still ongoing. However, its ability to show any relationship between the extremely low environmental radiation exposure and leukaemia or lymphoma is very doubtful. Radiation exposure from the nuclear power plant and the nuclear research facility to individuals living in the area is much lower than background radiation. Therefore, based on the large body of evidence from many epidemiological studies in high and low dose exposed populations [1], radiation exposure has to be considered far too low to account for the observed effect.

However, it seems to remain a major challenge to find explanations for a disease cluster although it is appreciated among most scientists [2] that investigations of such clusters have rarely contributed new insight as to the causes of cancer or other chronic (non-infectious) diseases. The challenge seems to be particularly strong if a potential cause is at hand (the Krümmel plant), and it is also highly motivated by political discussion of the pros and cons of nuclear power plants.

One of the many hypotheses that have been discussed in the course of the ten-year committee work is whether tritium release may play a role as a risk factor. It was argued that an early release of tritium may not have been detected. A large effort was made to search for proof of this hypothesis, but with no success so far. However, this hypothesis led to some concern in areas where tritium release is substantially higher than around Krümmel, such as around the nuclear power plant at the Savannah River Site in South Carolina, USA.

In this issue of the Journal of Radiological Protection Grosche et al [3] make an attempt to assess the impact of tritium releases to the environment by comparing cancer rates at the Savannah River Site, USA, with those around Krümmel. They argue that if the increased number of childhood leukaemia cases near Krümmel is caused by tritium, increased childhood leukaemia rates should be seen in the vicinity of the Savannah River Site in South Carolina where the release of tritium is much higher than around Krümmel. Grosche et al calculated incidence rate ratios for childhood leukaemia for both regions. As is already known, this ratio is increased for Krümmel, but the corresponding analysis for the USA data shows no excess of childhood leukaemia. Between 1991 and 1995, 41 cases of childhood leukaemia were identified in the corresponding region while some 50 cases were expected.

The results of this purely ecological investigation should be interpreted with extreme caution. No data on individual tritium exposure are available (in Germany or in the USA). The average tritium exposure in Germany is of the order of less than 1 microsievert per year, so no epidemiological investigation would have enough power to show an effect. No other risk factors for leukaemia were taken into account. The calculation of the expected number of cases is very crude because the age distribution of the children was not available either for Krümmel or for the Savannah River Site region. The authors over-interpret their results when claiming that their results suggest that tritium does not explain the leukaemia clusters around Krümmel. This was known before from radiobiology and radiation epidemiology research, and can be neither confirmed nor contradicted by the simple ecological comparison.

It remains a major challenge to radiation epidemiologists to investigate the cancer risk after exposure to low level radiation. Such investigations can be done by modelling the risk using data from a highly exposed population (as has been done in the past using mainly data from Hiroshima and Nagasaki). The model-based estimates should be compared with results from well planned epidemiological studies in large populations exposed to low dose radiation for whom reliable exposure data are available (such as workers in the nuclear industry [4]). However, we cannot hope to find valid answers to the question of low dose radiation effects by further investigating clusters with a small number of cases, where no individual exposure information is available and where - as in Krümmel - essentially no radiation exposure was seen.

References

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