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Childhood leukaemia incidence below the age of 5 years near French nuclear power plants

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Abstract

A recent study indicated an excess risk of leukaemia among children under the age of 5 years living in the vicinity of nuclear power plants in Germany. We present herein results about the incidence of childhood leukaemia in the vicinity of nuclear power plants in France for the same age range. These results don't indicate an excess risk of leukaemia in young children living near French nuclear power plants. Results currently available in France do not corroborate the observation of the German study.

MESH Keywords Child, Preschool ; France ; epidemiology ; Humans ; Incidence ; Infant ; Infant, Newborn ; Leukemia, Radiation-Induced ; epidemiology ; Power Plants

Introduction

Kaatsch and colleagues recently published the results of a case-control study of leukaemia incidence among children under the age of 5 years living in the vicinity of nuclear power plants (NPP) in western Germany (Kaatsch et al, 2008). The authors considered 593 leukaemia cases included in the German childhood cancer registry as living at diagnosis near one of the 16 NPPs in western Germany during the period 1980–2003. Their results showed a statistically significant increase in risk for all leukaemias (odds ratio, OR, of 2.19 with a lower 95% confidence limit, CL, of 1.51) and for acute lymphoblastic leukaemia (ALL) (OR of 1.98 with a lower 95% CL of 1.33) within 5 km of a NPP, and a statistically significant decrease in risk with increasing distance from a NPP. These results raised, once again, the question of childhood leukaemia risks around nuclear sites. Many results are already available since the mid 80's, and a review of the epidemiological literature indicates, globally, no excess risk in the vicinity of nuclear facilities among children (age 0–14 years) or children and young adults (age 0–24 years) (IRSN, 2008). Nevertheless, many fewer results are available specifically for the age range 0 to 4 years.

In the United Kingdom, a national study analyzed leukaemia risk near all nuclear facilities (COMARE, 2005). It considered close to 3000 cases diagnosed below age 15 years within a distance of 25 km of 28 nuclear sites over the period 1969–93. It indicated no general excess. In addition, a specific analysis of myeloid leukaemia below age 5 years indicated also no general excess. However, this study provided no direct comparison of results with those from the German study for the 0–4 year age group. An updated analysis, focusing on leukaemia incidence below the age of 5 years near British NPPs is under publication (Bithell, 2008).

In France, we conducted a study of leukaemia risk near nuclear facilities in the framework of a collaborative project between the INSERM and the IRSN (White-Koning et al, 2004). This study considered all cases aged less than 15 years, included in the national registry of childhood leukaemia as being diagnosed between 1990 and 1998 while resident within a distance of 20 km of 29 nuclear sites located all over France. Expected cases were calculated using national incidence rates as a reference. This study included a total of 670 observed cases. It showed no excess of childhood leukaemia generally near nuclear sites, and no decrease of risk with increasing distance from the sites. A similar conclusion was obtained for children below the age of 5 years. However, the published article provided no results that could be directly compared to those obtained by the German study of NPPs.

Additional French results

Results from intermediate analyses performed at the time of the French study of White-Koning et al. (2004), but not included in the final publication, allow a direct comparison with the results of the German study of Kaatsch et al. (2008). The analyses focus on leukaemia incidence among children aged 0 to 4 years living near one of the 19 NPPs in France between 1990 and 1998. The table below presents the distribution of risk according to the distance from the NPPs.

Conclusion

These additional French results provide the basis for a direct comparison with those recently published from Germany. In contrast to what has been observed in Germany, the French results currently available provide no suggestion of an excess leukaemia risk near NPPs in

the specific age range 0 to 4 years old. However, these findings are based on small numbers of cases, so that confidence intervals for observed to expected case ratios are wide. Nevertheless, these results effectively rule out an increased risk of leukaemia in young children living near French NPPs that is greater than two.

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Distribution of observed and expected leukaemia cases below age 5 years, and Standardized Incidence Ratios (SIR) in different 5 km zones of distance from the 19 nuclear power plants in operation in France between 1990 and 1998.

Distance (radius)	Observed cases	Expected cases	SIR	95% Confidence Interval
0–5 km	5	5.2	0.96	[0.31–2.24]
5–10 km	20	15.4	1.30	[0.79–2.01]
10–15 km	18	18.3	0.99	[0.58–1.56]
15–20 km	71	69.3	1.03	[0.80–1.29]
Total	114	108.1	1.05	[0.87–1.27]

Overall, a total of 114 cases were observed within 20 km of a French NPP, against 108.1 cases expected. The results indicated no excess risk in any of the defined 5 km distance zones, or a decreasing trend of risk with increasing distance from the NPPs. In particular, the observed to expected case ratio for young children living within 5 km of a French NPP is 0.96 (95% confidence interval: 0.31 to 2.24).