

# A RISK ASSESSMENT OF CHILDHOOD LEUKAEMIA AND NATURAL RADIOACTIVITY IN FRANCE

**Olivier Laurent\***, Laboratoire d'Epidémiologie, Institut de Radioprotection et de Sûreté Nucléaire

**Jacqueline Clavel**, Equipe Epidémiologie Environnementale des Cancers, Institut National de la Santé et de la Recherche Médicale

**Dominique Laurier**, Laboratoire d'Epidémiologie, Institut de Radioprotection et de Sûreté Nucléaire

**Background and Aims:** Natural radioactivity (NR) is an ubiquitous phenomena and exhibits large geographical variations. Current risk models for radiation-induced leukaemia prediction, which are mainly issued from the epidemiological study of Hiroshima and Nagasaki A-bomb survivors, imply that levels of NR could induce some leukaemia cases. In the framework of an epidemiological research project designed to study the link between childhood leukaemia and NR, we conducted a risk assessment of the proportion of leukaemia cases that could be attributable to NR in France.

**Methods :** National rates of childhood leukaemia over period 1990-2004 were provided by the French registry of childhood malignancies. Mean doses to the red bone marrow that children would receive from radon, cosmic and terrestrial gamma rays in France were estimated. Risk models proposed by the United Scientific Committee for the Effects of Atomic Radiation and by the US National Research Council to predict radiation-induced leukaemia cases were applied.

**Results :** Overall, 6,784 leukaemia cases were registered over the study period. A mean annual dose of 1.25 milliSieverts was estimated for the sum of radon, cosmic and terrestrial gamma rays. The proportion of leukaemia cases that could be attributed to these dose components vary from a few percents to several tenths, according to the risk model used, the age group and the hypotheses for transposition from A-bomb survivors to French children (additive or multiplicative risk transfer).

**Conclusions :** These estimates are issued from a risk assessment approach that rely on many assumptions and hypotheses. They should be interpreted cautiously, as an indication for the magnitude of the expected risk related to NR. Variability and uncertainty analyses will focus on alternate dose scenarios, as well as statistical uncertainty. Refined estimates will allow appreciating the capacity of an ongoing epidemiological study to detect a leukaemia risk related to NR in French children.