

Press release

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Childhood cancer in the vicinity of nuclear power plants: Results of the CANUPIS study

A large nationwide longitudinal study found no evidence of an increased risk of cancer in children born near nuclear power plants in Switzerland. The CANUPIS study was performed by the Institute of Social and Preventive Medicine (ISPM) at the University of Bern (Switzerland) in collaboration with the Swiss Childhood Cancer Registry and the Swiss Paediatric Oncology Group.

Are there any risks to the health of people living close to nuclear power plants? This question has been debated for over 20 years. Cancer in children, who are more sensitive to radiation than adults, has been a particular concern. A case-control study from Germany published in December 2007 showed that the risk of leukaemia in small children living within 5 km of a nuclear power plant was more than double that of children living further away. These findings caused anxiety in the Swiss population and were the subject of a debate in parliament. As a result, the Federal Office of Public Health (FOPH) and the Swiss Cancer League asked the Institute of Social and Preventive Medicine (ISPM) at the University of Bern to perform a comparable study in Switzerland. The CANUPIS study (Childhood Cancer and Nuclear Power Plants in Switzerland, see www.canupis.ch) was conducted from September 2008 to December 2010. The results are published today in the «International Journal of Epidemiology».

No evidence for an increased risk of leukaemia near nuclear power plants

In this study, the investigators compared the risk of leukaemia and other cancers in children born close to nuclear power plants with the risk in children born further away. The study included all children born in Switzerland since 1985: over 1.3 million children aged 0 to 15 years who were followed during the years 1985 to 2009 (over 21 million person-years of observation).

Switzerland was divided into four zones: zone I included the area 0 to 5 km from the nearest nuclear power plant; zone II 5 to 10 km; zone III 10 to 15 km and zone IV the rest of the country beyond 15 km. The risk of childhood cancer was calculated for each zone. The numbers of cancer cases in zones I-III were then compared to the numbers expected based on the risk in zone IV (the reference group).

In children below 5 years of age, who are particularly sensitive to the effects of radiation, there were 573 leukaemia diagnoses during the period 1985 to 2009. The risk in zone I was similar to the risk in zone IV: there were 8 cases compared to expected 6.8 cases (difference: +1.2 case). In zone II there were 12 cases compared to 20.3 expected cases (difference: -8.3 cases) and in zone III the numbers were 31 observed and 28.3 expected cases (difference: +2.7 cases). Expressed differently, the relative risk of leukaemia in children under 5 years of age in zone I was 1.20 compared to zone IV, the reference group of children living more than 15 km from the nearest nuclear power plant (relative risk 1.0). This corresponds to an increase in the risk by 20%. The relative risk of leukaemia for children born in zone II was 0.60, corresponding to a reduction in risk of 40%. In zone III there was a slight increase in the risk, by 10% (relative risk 1.10). A statistically significant increase or reduction in the risk of childhood cancer was not observed in any of the analyses.

«The risk of childhood cancer in the vicinity of Swiss nuclear power plants is similar to that observed in children living further afield,» says Matthias Egger, director of ISPM. He stresses that the slight deviations from the expected risk in the vicinity of nuclear power plants is most likely due to the play of chance. Owing to the small number of cases there is, however, substantial statistical uncertainty, according to Egger. For leukaemia in children below 5 years of age the relative risk of 1.20 is compatible with relative risks ranging from 0.60 to 2.41 («confidence interval» 0.60 to 2.41). «The results are statistically compatible both with a reduction in risk and an increase in risk,» summarizes Matthias Egger.

CANUPIS: a national longitudinal study

There are five nuclear power plants in Switzerland (Beznau I and II, Mühleberg, Gösgen and Leibstadt) which together produce about 40% of Switzerland's electrical power. About 1% of the population lives within 5 km of a nuclear power plant and 10% live within 15 km. In addition to the nuclear power plants there are four research reactors at the Universities of Lausanne and Basel, at the Paul Scherrer Institute (PSI) in Villigen, in Lucens (in operation 1968/69) and an intermediate storage facility in Würenlingen. The CANUPIS study is based on an analysis of the place of residence of all Swiss children as recorded in the censuses 1990 and 2000 and included in the data of the Swiss National Cohort*. These geocoded data made it possible to precisely calculate the distance from the domicile to the nearest nuclear power plant. The places of residence of the children with cancer were obtained from the Swiss Childhood Cancer Registry** and were geocoded in the context of the CANUPIS study.

One of the first studies considering place of residence at birth

«Studies of atomic bomb survivors in Hiroshima and Nagasaki have shown that children are much more sensitive to radiation than adults,» says Claudia Kuehni, Head of the Swiss Childhood Cancer Registry. This is particularly true during intrauterine development and the first years of life. «For this reason we focused on the place of residence at birth,» says the epidemiologist from the University of Bern. «This focus and the fact that we could include all children in Switzerland in a longitudinal study is a unique feature of the CANUPIS approach.»

Results in line with monitoring of radioactivity

The radioactive emissions in the vicinity of Swiss nuclear power plants are regularly monitored and the data are published by the Division for Radiation Protection of the FOPH. The exposure due to emissions from nuclear power plants in the vicinity of these plants is below 0.01 mSv (millisieverts) per year. This corresponds to less than 1/500 of the average total radiation residents in Switzerland are exposed to, mainly from radon gas, cosmic and terrestrial radiation and medical investigations and therapies. The CANUPIS investigators therefore argue that the results of the CANUPIS study are in line with the data from the monitoring of radioactivity by the FOPH.

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The paper can be downloaded from:

<http://ije.oxfordjournals.org/content/early/2011/07/11/ije.dyr115.full> (html version)

<http://ije.oxfordjournals.org/content/early/2011/07/11/ije.dyr115.full.pdf> (pdf version)

***Swiss National Cohort**

The Swiss National Cohort (SNC, www.swissnationalcohort.ch) is a national longitudinal research platform. Associations between the health of the Swiss population, the exact place of residence, environmental exposures and sociodemographic conditions can be examined in this study. The study consists of the anonymous information collected at the 1990 and 2000 censuses, which is linked to data from the mortality files, birth statistics and emigration and immigration data. Combined with the data of the cancer registries the SNC allows longitudinal analyses of important research questions, including the association between environmental exposures at the place of residence and the occurrence of cancer. The Swiss National Cohort is a collaborative project, which involves investigators from the Universities of Basel, Bern, Geneva, Lausanne and Zurich. The data center is located in the Institute of Social and Preventive Medicine (ISPM) at the University of Bern (www.ispm.ch). The Swiss National Cohort is funded by the Swiss National Science Foundation (www.snf.ch).

****Swiss Childhood Cancer Registry**

The Swiss Childhood Cancer Registry (SCCR, www.childhoodcancerregistry.ch) is the national cancer registry for children and adolescents in Switzerland. It was established in 1976 and covers all cases diagnosed up to the age of 20. In addition, the registry documents the therapies and conducts long-term studies on the health and quality of life of cancer survivors. It contributes to the evaluation of the causes of cancer in children and adolescents, the improvement of therapies and prevention of late complications. The SCCR is located in the Institute of Social and Preventive Medicine (ISPM) at the University of Bern (www.ispm.ch). It collaborates closely with the Swiss Paediatric Oncology Group (SPOG, www.spog.ch), which includes all nine paediatric oncology clinics in the country. So far, over 8,000 children with cancer have been registered. The SCCR is funded through different sources.

Additional material

Websites:

www.canupis.ch (website of CANUPIS study)

www.childhoodcancerregistry.ch (website of Swiss Childhood Cancer Registry)

www.swissnationalcohort.ch (website of Swiss National Cohort)

Reports:

1) Kuehni CE. Childhood Cancer in Switzerland. In: Cancer in Switzerland – Situation and Development from 1983 to 2007. Federal Statistical Office (FSO), Neuchâtel 2011.

This chapter provides a brief and accessible summary of childhood cancer in Switzerland. Available in German, French, Italian and English.

Download from:

<http://www.bfs.admin.ch/bfs/portal/en/index/news/publikationen.html?publicationID=4251>

2) Committee on Medical Aspects of Radiation in the Environment (COMARE) (2011). Fourteenth report. Further consideration of the incidence of childhood leukaemia around nuclear power plants in Great Britain. Health Protection Agency, London 2011.

This 142-page report and the corresponding press release summarize the relevant research on nuclear power plants and childhood cancer, with detailed discussion of the studies from Germany and the United Kingdom. Available in English only.

Download from:

http://www.comare.org.uk/press_releases/14thReportPressRelease.htm

http://www.comare.org.uk/press_releases/documents/COMARE14report.pdf

3) Jahresbericht: Umweltradioaktivität und Strahlendosen in der Schweiz: Ergebnisse 2009. Bundesamt für Gesundheit, Abteilung Strahlenschutz, Bern 2010.

This report summarizes the annual exposure of the Swiss population to natural and manmade sources of radioactivity, including emissions from nuclear power plants. Available in German and French only.

Download from:

<http://www.bag.admin.ch/themen/strahlung/00043/00065/02239/>