



## NUCLEAR POWER AND CHILDREN

### A Beyond nuclear fact sheet

beyondnuclear.org

info@beyondnuclear.org

#### EVERY NUCLEAR POWER PLANT RELEASES RADIOACTIVITY

A nuclear reactor does not have to blow up or melt down to release some of its radioactive poisons. During its routine, everyday operation, every nuclear power plant releases radioactivity into the atmosphere and into the river, lake, or ocean that provides its cooling water. No economically feasible technology exists that can filter out all the radioactive liquids, gases and particles that a typical reactor releases --- such as radioactive hydrogen (tritium), and radioactive xenon and krypton that become radioactive cesium and strontium.

The radiation doses experienced by people who live near nuclear power plants and those who live downwind or downstream can, over time, cause health damage.

#### HEALTH RISKS FROM RADIATION

In the National Research Council's 2006 report on the Biological Effects of Ionizing Radiation, the BEIR VII Committee "judges it unlikely that a threshold exists for the induction of cancers but notes that the occurrence of radiation-induced cancers at low doses will be small." (p.10). This does mean, however, that any dose of radiation, no matter how small, carries health risks.

Radiation exposure is strongly linked to cancers like leukemia, and solid cancers like lung, breast, and many others. Exposing children or a fetus in the womb can increase the risk of these diseases in adulthood.

Radiation is also linked to non-cancer effects, including birth defects, cardiovascular ailments, immune and endocrine system disorders, and other major health problems.

#### RADIATION PROTECTION STANDARDS DO NOT ADEQUATELY PROTECT CHILDREN

Federal standards dictate the permissible levels of radiation to which people are allowed to be exposed. But "permissible" does not mean safe. It means "as low as reasonably achievable" — that is, as low as the nuclear industry claims it can afford to achieve.

Radiation is particularly dangerous because it can damage cells in ways that a cell cannot always repair correctly. An unrepaired or improperly repaired cell can lead to a disease, such as cancer, in the future. The threat to cells in children may be higher than in adults because of the rapid and abundant cell divisions during childhood.

National and international radiation protection standards are based on a combination of people who are more susceptible to radiation damage (children and women) and others who are more radiation-resistant (healthy men). Such a process ends up weakening protection for those most vulnerable.

Some radiation health impacts are predicted by using models based on principles of physics or engineering sprinkled with inappropriate health data. Actual health data become available years later and are often discounted in favor of the original models. By discrediting observed health effects, nuclear proponents disallow any new data on the damaging effects of radiation. Science is stifled and increases in diseases like childhood leukemia go unexplained.

#### HARM TO CHILDREN

- According to a National Academy of Sciences report: "A substantial amount of data supports the concept of greater radiation cancer risks after exposure in childhood than after exposure in adult-hood." The report also recognizes childhood leukemia as a 'sentinel indicator' for radiation effects. (Analysis of Cancer Risks in Populations near Nuclear Facilities: Phase I, National Academy of Sciences, 2012)
- Ionizing radiation has been significantly linked to childhood leukemia. [[Risk factors for acute leukemia in children: a review](#). Belson M, Kingsley B, Holmes A. Environ Health Perspect. 2007 Jan;115(1):138-45. Review.]
- In a 2008 study of children under five years of age, living within 5 kilometers of a nuclear power reactor in Germany, the rate of leukemia was more than two times greater than among those living farther away. [[Case-control study on risk factors for leukaemia and brain tumours in children under 5 years in Germany](#). Spix C, Schulze-Rath R, Kaatsch P, Blettner M. Klin Padiatr. 2009 Nov-Dec;221(6):362-8. Epub 2009 Nov 4.]
- A 2012 French study found a doubling of leukemia among children under five years of age living within 5 km. of nuclear power reactors in France. [[Childhood leukemia around French nuclear power plants--the Geocap study, 2002-2007](#). Sermage-Faure C, Laurier D, Goujon-Bellec S, Chartier M, Guyot-Goubin A, Rudant J, Hémon D, Clavel J. Int J Cancer. 2012 Sep 1;131(5):E769-80.]
- Data from 17 research papers covering 136 nuclear sites worldwide showed that childhood leukemia incidence and mortality rates were higher for children under nine years of age living less than 16 km. from a site than for children living farther away. [[Meta-analysis of standardized incidence and mortality](#)

[rates of childhood leukaemia in proximity to nuclear facilities](#). Baker PJ, Hoel DG. Eur J Cancer Care (Engl). 2007 Jul;16(4):355-63.]

- A 1997 study in France found an increase in childhood leukemia caused by radiation exposure from recreational activities on beaches of the English Channel within 35-km of the La Hague nuclear fuel reprocessing facility. [Case-control study of leukaemia among young people near La Hague nuclear reprocessing plant: the environmental hypothesis revisited](#). Pobel D, Viel JF. BMJ. 1997 Jan 11;314(7074):101-6.]
- According to a 1991 study, children of male workers at the Sellafield nuclear fuel reprocessing facility in England were found to have elevated rates of leukemia. [“[Father's occupational exposure to radiation and the raised level of childhood leukemia near the Sellafield nuclear plant](#).” Gardner MJ. Environ Health Perspect. 1991 Aug;94:5-7.]
- Because children are smaller, their organs are closer together. This means that internal radionuclide contamination harms more organs in a child than the same amount of contamination would in an adult. ([UNSCEAR press release, May 31, 2013](#))
- “...both the metabolism and physiology depend on age, which also affects the concentrations of radionuclides in different organs and thus the dose to those organs for a given intake.” (ibid.)
- Children are clearly more radiosensitive than adults for cancers such as leukemia, breast, thyroid, skin and brain. In general, these tissues are more radiosensitive for other health effects as well. (ibid. and UNSCEAR [press briefing video](#) May 31, 2013)
- The effects of childhood exposure may not only occur when you are a child, but may happen when you are an adult, even many decades later. (ibid video)
- Children in Ukraine exposed to chronic, low-dose radiation from Chernobyl have manifested increased airway obstructions. Svendsen ER [137Cesium exposure and spirometry measures in Ukrainian children affected by the Chernobyl nuclear incident](#). Environ Health Perspect. 2010 May;118(5):720-5.

## CHERNOBYL AND FUKUSHIMA

- In April, 1986, one reactor at Chernobyl exploded, releasing massive amounts of radioactivity.
- [Chernobyl research](#) equating body contamination from cesium with disease increases in children. Disease inception can occur with cesium accumulation of only 11 Bq/kg within a child's body. Thirty to 50 Bq/kg, within a child's body is associated with pathologies ranging from female hormone disruption to malformations of heart cells that can impair function.
- The Fukushima catastrophe is causing similar massive releases, burdening Japan, the Pacific Ocean and beyond, with long-term radioactive contamination.
- [Current research](#) in Japan shows that children studied have contamination levels of cesium on par with the levels that appeared to induced disease in Belarus children.
- While normal thyroid [cancer incidence among children](#) aged 10 to 14 is only 1 or 2 in one million, 12 thyroid cancers were diagnosed among a population of 174,000 children aged 18 or younger examined as of June 2013; an additional 15 cases are suspected.
- Researchers in Japan have [found genetic deformities in butterflies](#) whose generations are much shorter than that of humans. This indicates that human generations in Japan should be monitored for subtle changes in health and genetic changes that could make future generations more susceptible to radiation.
- Allowable food contamination levels of cesium in both the US and Japan are higher, in the case of the US, MUCH higher, than the level of contamination associated with these pathologies in children after Chernobyl or than those [recommended by a German physicians' group](#).
- Now “protective” action guidelines (PAGs) from the US Environmental Protection Agency [would allow](#) a cancer incidence rate of 1 in 6 over a 70-year lifetime in the event of an emergency release of radiation.
- Rather than learning from Chernobyl, nuclear proponents (among them many governments) continue to minimize the very real dangers of radiation exposure at the expense of public health, particularly that of children.

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