# Possible Effects of Ionising Radiation on Health

*This leaflet can be viewed at: http://www.tasizewellc.org.uk/index.php/leaflets*
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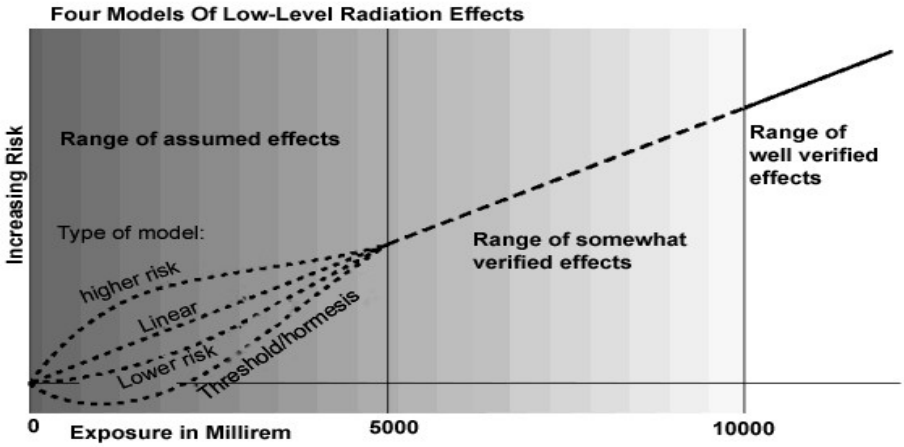
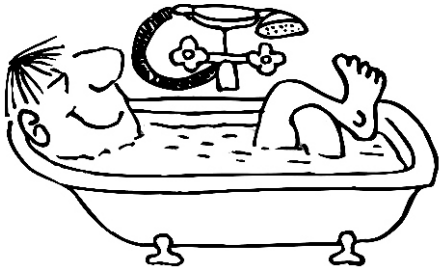
Experts agree that high levels of radiation can kill and that there is no such thing as a safe dose of radiation: even at low levels, the potential for harm exists. The existing guidelines for 'safe' levels are based on the data obtained from the japanese atom bomb explosions of 1945. The fact remains, however, that so-called 'safe' exposure rates over the last 70 years have steadily been revised downwards as we find out more about the harmful effects of radiation exposure. (there are occasional exceptions - after the Fukushima accident in April 2011, the Government in Japan increased the permissible safe level of exposure for school children by 20 fold.[1] Ministers defended the increase in the acceptable safety level as a necessary measure to guarantee the education of thousands of children.[2])

As can be seen from this diagram, although there is clear agreement about the danger of high levels of radiation, experts do not agree on whether very low levels of radiation are beneficial, neutral or harmful. The majority of studies assume a 'linear no-threshold (LNT)' approach to exposure and health – the higher the 'dose', the greater the health impact. [3]




In recent times the way that exposure to radiation is assessed has been criticised. The amount of radiation a person is exposed to has traditionally been calculated by averaging it out over their whole body (Joules per Kilogram mass of tissue [4]). However, radiation is often concentrated in high energy hot particles which if inhaled or ingested do a lot of damage to the surrounding cells.

It is like comparing the amount of heat in a nice hot bath with the heat in a burning cigarette. The hot bath may contain far more heat, but when the heat is concentrated in the end of the cigarette it is far more painful and damaging when applied to the skin.



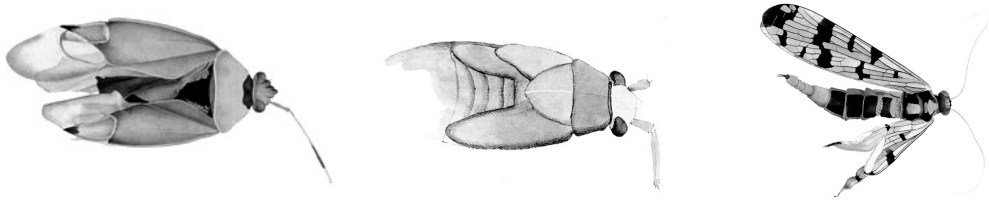
The same amount of heat - but a very different feeling!

The upshot is that "dose" becomes a meaningless measure. Comparisons of external dose received are not comparable to internal dose when considering low dose, short range radiation effects on DNA especially from exposure to high density alpha radiation.

Children are more sensitive to radiation than adults. Generally, when cells, organs or tissues are developing, as they are in children, they are more likely to be affected if radiation interacts with them. Thus age is another factor which has to be taken into consideration when assessing the effects of low level radiation.

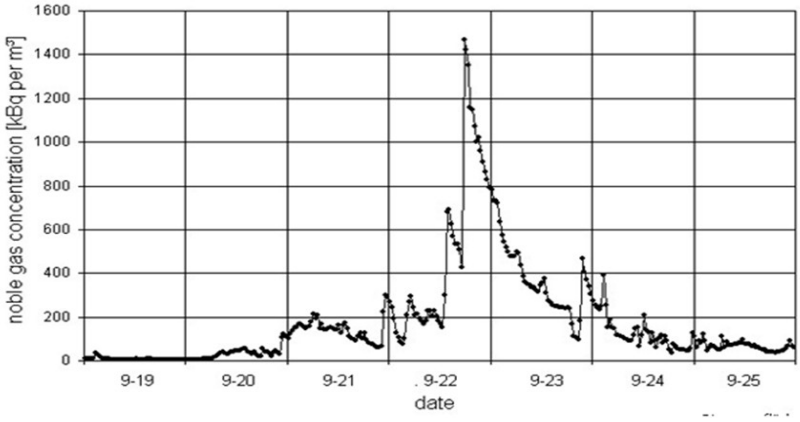
A 2007 study of Swedish children exposed to fallout from Chernobyl while they were foetuses between 8 and 25 weeks gestation has found that the reduction in IQ at very low doses was greater than expected, given a simple Linear No threshold model for radiation damage.[5] Similarly, Dr Alice Stewart showed that foetal damage could be caused by x-rays of pregnant women, a finding which led to the curtailing of the use of x rays during pregnancy and early childhood.[6]

paintings of insects with genetic deformations from the area around chernobyl by Cornelia Hesse- Honegger [7]



In 2002 the German government sanctioned the compiling of a report looking at the level of leukaemia in the under-fives in the 5 kilometre radius of all German nuclear power plants. This study, known as the kikk report (Kinderkrebs in der Umgebung von Kernkraftwerken), was published in 2007. It identified a two-fold increase in the number of leukaemia cases.[8] Similar studies carried out in France and Switzerland echoed these findings.[9] In the UK, the Health Protection Agency's sub-committee, the Committee on Medical Effects of Radiation in the Environment (CoMARE) published its 14th report looking into these worrying findings abroad. Although COMARE also found an increase in childhood leukaemias, it argued they were not statistically significant, a claim hotly contested by COMARE's critics.[10]

Nuclear Power stations are allowed to emit a certain level of radioactive material into the atmosphere. An average of the amount emitted is calculated over the whole year, however, in reality, most emissions from nuclear reactors are not spread evenly across the whole year but happen during short refuelling episodes which occur about once a year and which last a few days or so. In September 2011, Germany released data tracking half-hourly releases of radioactive gases from a power station (Gundremmingen Nuclear plant in Southern Germany) for the very first time anywhere in the world. This is shown in the chart below for 7 days in September 2011. The chart shows that the normal emission concentration during the rest of the year was about 3 kBq/m³, but during refuelling on September 22 this sharply increased to ~700 kBq/m³. In other words, a spike. It shows that Nuclear power stations can emit much larger amounts of radioactive gas during refuelling than during normal power operation. In order to refuel, reactor pressure vessels must be opened up: this releases large volumes of radioactive gases and vapours to the local environment.[11]




Estimates suggest that people living near the Gundremmingen plant will be exposed to doses of radiation up to 500 times higher during the emissions spikes than they are during the rest of the year. The spikes of UK reactors may not be as high as in Germany because the German power stations are inland and cannot release emissions into the sea,but even if UK spikes were only a fraction as high they could still be a risk to health. German physician Reinhold Thiel, warns of the probable health impacts of large emission spikes:

"Especially at risk are unborn children. When reactors are open and releasing gases, pregnant women can incorporate much higher concentrations of radionuclides than at other times, mainly via respiration" [12]

It has long been suspected that children conceived after parental exposure to radiation carry an increased risk of genetic defects. A study published in 2001 on the cleanup workers of Chernobyl showed a surprisingly large number of genetic aberrations in the children of these people, even in cases when the exposure levels to the radiation had been considered low.[13] The study concluded:

"The very fact that much lower doses of radiation than previously generally believed can double the number of genomic changes needs serious attention"

Details of references for 1-13 can be found at: *http://www.tasizewellc.org.uk/index.php/leaflets*