

LEARN ABOUT NUCLEAR WEAPONS

After Hiroshima and Nagasaki – the story of Sadako

A number of studies show that different types of cancer are significantly more common among survivors of the atomic bombs on Hiroshima and Nagasaki, compared to other populations. It is also clear that the risk of leukemia and thyroid cancer increase with an increased dose of radiation, and that especially women exposed at a young age are at risk of falling ill.¹

The story of Sadako, the little girl who was affected by leukemia following the atomic bombing of Hiroshima, has spread around the world. But the story is more than a true fairytale about a single girl – it describes the truth about many, many survivors both in Hiroshima and Nagasaki, and in many other places of the world where nuclear weapons have been tested and dispersed radioactive fallout.

Sadako Sasaki was two years old when the atom bomb fell over Hiroshima, her home city, and her grandmother was one of the first victims. Sadako herself was 2 km away from the site of explosion. All around her, adults and children were ripped out of existence – 80,000-140,000 of them – but she survived without any burns or other visible damage. Nine years later, at the age of eleven, Sadako was chosen to run for her school in the annual stafette. She was overjoyed and proud, and when the day came, she brought her team to victory. Sadako heard little of the cheers then, for a great dizziness had come over her, but she told no-one about it.

The attacks of dizziness continued to plague Sadako and one day, she collapsed in the school yard. She had fallen ill from the atom bomb disease – leukaemia – and was confined to hospital. One day, her best friend Chizuku visited her, bringing a golden paper. From this paper, she folded a lovely crane while she told the legend about the sacred white crane: "They say that it lives for a thousand years. If somebody who is ill folds a thousand paper cranes, she will be cured."

Sadako immediately started folding cranes. Everybody who came to visit her brought paper for the cranes. The hope for survival never left Sadako, but she would only live to complete the 644th crane. Sadako died at the age of twelve. Before the funeral, her classmates folded another 356 cranes and Sadako was laid into her grave accompanied by a thousand paper cranes.

The classmates were shaken by Sadako's death and told other children the tale of Sadako and the cranes. They managed to raise money from pupils in 3,100 Japanese schools and from school children in nine other countries, and with that money they erected a monument to Sadako. In May 1958, the Children's Peace Monument was finished, in the Peace Park of Hiroshima. On the top of a paradise mountain, Sadako stands, in her outstretched hands a golden crane that she presents to the sky. Below the monument you can read this poem:

*This is our call,
this is our prayer;
peace on earth.*

In 1985, pupils at the International School in Hiroshima founded the "Thousand Crane Club." This club encourages school classes or other groups of children to fold a thousand cranes while they speak of Sadako and discuss questions of war and peace. When the cranes are sent to Hiroshima, they will decorate the Peace Monument. The children who send the cranes receive a member certificate from the club headquarters in Hiroshima. This certificate is decorated with the very words that can be read underneath Sadako's statue.

*Here is the address of the "Thousand Crane Club":
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Hiroshima-shi 730 Japan*

Effects of nuclear testing in the Pacific

Pictures of the Pacific Ocean islands seem like the closest thing one can get to heaven on earth. For the people who have lived on these islands during the last 50 years, reality has not equalled the picturesque dream world. For decades both the US and France used the Pacific Ocean islands to test their nuclear weapons. The human beings living in the area became guinea pigs for the effects of radiation on human health and lives. The results were far from beautiful.

Between 1966 and 1996 France conducted a total of 193 nuclear tests at the uninhabited islands of Moruroa and Fangataufa. Of these, 41 tests were done between 1966 and 1974. The Partial Test Ban Treaty put an end to atmospheric nuclear tests, and between 1974 and 1996 France conducted 152 nuclear tests underground.² Most of the earlier nuclear tests in the atmosphere were done from land or from a naval vessel. These bombs detonated at a low altitude, which creates the largest amounts of radioactive fallout. Later nuclear tests were conducted mainly from hot air balloons, bringing the test blow to a higher altitude.

The US conducted both atmospheric and underground nuclear tests at the Marshall Islands, the Christmas Islands, Johnston Atoll in the Pacific and over the South Atlantic.³ In total, 66 nuclear tests were conducted in the Marshall Islands, with a combined yield of 108 megatons, which equals more than 7000 Hiroshima sized bombs.⁴ Another 40 nuclear tests were conducted at the Christmas Islands and Johnston Atoll, as well as three explosions over the South Atlantic.⁵

The nuclear tests conducted in the South Pacific reach a combined fire power of many tens of thousands of Hiroshima bombs. Both the US and France have been very reluctant to discuss their actions, as well as to recognize a connection between the nuclear tests and the deteriorating health situation in the area.

All nuclear explosions create radioactive fallout, but there are cases where something in the nuclear testing had not gone quite as planned, and the consequences have been far worse than expected. The American test Caste Bravo on 31 October 1954 turned into a real disaster. Caste Bravo was the largest nuclear weapon – 15 megatons – ever to be tested by the US, and the largest radiological disaster during American nuclear testing history. The unexpectedly high yield and changed weather conditions resulted in enormous amounts of radioactive fallout spreading to the west, towards inhabited islands.⁶

The inhabitants of the nearby Bikini and Enewetak atolls had been evacuated before the nuclear tests, but the same had not been done in Rongelap and Rongerik. Inhabitants of Rongelap have testified about the radioactive fallout pouring down as a snowstorm, eventually creating a two centimeter thick layer on the ground. The evacuation did not happen until two days later. The Rongelap people were returned to their island in 1957, in spite of the fact that it had been continually dosed with fallout from nuclear tests during their absence. No 'cleanup' of radiation was ever conducted. The Rongelapese exposed to the tests had all the symptoms of severe radiation sickness: nausea, vomiting, diarrhoea, itching and burning of the skin, eyes and mouth. They suffered from skin burns over much of their bodies, and lost much of their hair within two weeks of the Bravo explosion. Thirty one years on, 95% of the population alive between 1948 and 1954 had contracted thyroid cancer and a high proportion of their children suffered from genetic defects.

The US government representative to the Marshall Islands had ruled that Rongelap was still perfectly safe, as long as the people stay away from the northern islands and eat imported tinned food. The Islanders pleas to the US government to be evacuated had always fallen on deaf ears. So at the request of Rongelap's representative to the Marshall Islands parliament, in 1985 Greenpeace agreed to take on the task of evacuating the entire population with their Rainbow Warrior to the safer island of Mejato 180 kilometres away.⁷ Anthropologist Holly Barker, special advisor to the Marshallese government, says the lack of oncologists, chemotherapy and general health care at the Marshall Islands pose a problem to discovering cancer cases in time and providing the needed treatment.⁸

A Japanese fishing boat, the Lucky Dragon, was also exposed to the radioactive fallout. The crew saw the mushroom cloud and the flashing light. Several hours later, white ash began falling on the Lucky Dragon. Several crew members collected bags of it as souvenirs. Before dark that day, everyone on board the fishing boat was ill. The crew of the Lucky Dragon are believed to be among the first people ever accidentally exposed to fallout from a nuclear weapon. All 23 people on board the boat were hospitalized after returning to Japan. One of them died seven months later of kidney failure related to radiation.⁹

Tooth Fairy Project – baby teeth and resistance

A group called the Greater St Louis Citizens Committee for Nuclear Information (CNI), decided from the very beginning not to become part of the debate for or against nuclear testing – even though it was obvious that key persons in the group were against the testing. The greatest problem, according to the CNI, was a total lack of information. Too many – politicians, military officials and other decision makers – were taking decisive positions on the basis of indecisive information, or none.¹⁰

Between 1958 and 1970 the CNI led the St Louis Baby Tooth Study, which collected and studied almost 300,000 baby teeth looking for evidence that human beings were ingesting radioactivity in the fallout from atomic and hydrogen bombs exploded in the atmosphere. Other baby tooth surveys, patterned after the St Louis survey, were undertaken in America and in other countries, showing the same results.

The St Louis study showed that the radioactive isotope strontium-90 was accumulating in the teeth of babies. The strontium was produced during atmospheric nuclear weapons tests, and was widely spread by the winds. Some radioactivity was brought down to Earth, particularly by the rain, and cows ate some of the contaminated grass. Human beings then drank the cows' milk and absorbed the radioactive strontium, which behaves like calcium in the body, into their bones and teeth. To

speak out about the serious adverse health effects of nuclear testing during the Cold War in the 1950s took considerable courage. Mothers worried about their children's health joined the Tooth Fairy campaign en masse, to demand a ban on atmospheric nuclear testing. The public pressure was an important factor leading up to the negotiations of the Partial Test Ban Treaty in 1963, that put an end to nuclear weapons tests in the atmosphere.¹¹

Life after the Chernobyl disaster

In 26 April 1986, the world witnessed the worst nuclear power plant accident to date. Reactor 4 at the Chernobyl nuclear power plant was overheated and exploded. Heavier radioactive particles fell to the ground close to the plant, while lighter particles rose almost a kilometre in the air. The wind blew toward the north-west and brought with it radioactive particles of iodine and cesium. Ukraine, Belarus and the western parts of Russia took the heaviest toll of the radioactive fallout.

Close to 30 firefighters and aid workers died within a few months after the accident as a result of acute radiation sickness from exposure to very high doses of radiation.¹² The number of immediate deaths after the accident was surprisingly low, while the death toll has increased afterwards as a consequence of long-term health effects of radiation. Most significantly, there has been an increase in thyroid cancer among children in Belarus, Ukraine and parts of Russia, that were most severely affected by radioactive fallout. Many studies also show an increase in cardiovascular disease among aid workers. It is, however, difficult to tell whether this is an effect of radiation or if caused by other factors, e.g. psychological stress.

The International Atomic Energy Agency (IAEA), the World Health Organisation (WHO) and the UN Development Programme (UNDP) have all conducted extensive research on the long term health effects of the Chernobyl disaster. The studies were published in 2006. These reports show more than 4000 cases of thyroid cancer in Belarus, Ukraine and the four most contaminated regions of Russia. It is believed that the larger share of these cases are caused by the radiation – and in particular the dispersal of radioactive iodine – from the accident.¹³

The thyroid gland is found under the larynx. The thyroid gland produces important iodine containing hormones that regulate the metabolism of the body. Around nuclear power plants in Sweden, iodine pills have been distributed to be taken in the event of an accident, to block the absorption of radioactive iodine. In the area around Chernobyl, the salt used was not iodized, which is likely to have had an impact on the increased occurrence of thyroid cancer. Lacking ordinary iodine, the thyroid gland absorbed the radioactive iodine instead.

In April 2006, Greenpeace International launched a report on the long-term health effects of the Chernobyl disaster. The report challenges the estimates by the IAEA, the WHO and the UNDP that 4000-9000 deaths have already occurred or will occur as a result of the accident. The Greenpeace report is based on data published in Russian in Belarus, Ukraine and Russia, but previously not available in English. According to this data, 270 000 cases of cancer are estimated as a result of the accident, out of which 93 000 fatal cases. The Greenpeace report also states that 60 000 people have died in Russia during the last 15 years as an immediate effect of the Chernobyl accidents, while the number of deaths in Belarus and Ukraine add another 140 000.¹⁴

Opinions differ, as we can see, and it is impossible in this context to account for and analyse the extensive discussions taking place on the health effects of the Chernobyl disaster. A report to an international conference in 2007, co-organised by the British Royal Society of Medicine and the

International Physicians for the Prevention of Nuclear War (IPPNW), Dr Ian Fairlie went over the fundamental problematic issues.

It is not possible to find evidence about how much cancer rates increased among the rescue- and aid workers after the Chernobyl accident, except for thyroid cancer and possibly leukemia. Besides, estimates of radiation doses and the amount of external and internal radiation are highly uncertain. Estimates of the cases of cancer possibly caused by the Chernobyl accident in the fallout areas of Belarus, Ukraine, western Russia as well as Europe and the rest of the world are based on the assumption that the increased cancer risk is proportional to the radiation dose. However, there is disagreement among scientists over this method of assumption. The difference in estimated cases of cancer depends on the difficulty in assessing radiation doses in such a large population and area, as well as the proportions of external and internal radiation.

Assuming a linear connection between radiation dose and number of cancer cases, and based on available – however insufficient – information on radiation doses, Fairlie estimates the number of cancer cases worldwide caused by the Chernobyl disaster to 22 000. This is an estimate much lower than that of Greenpeace, but far higher than those of the IAEA; WHO and UNDP.

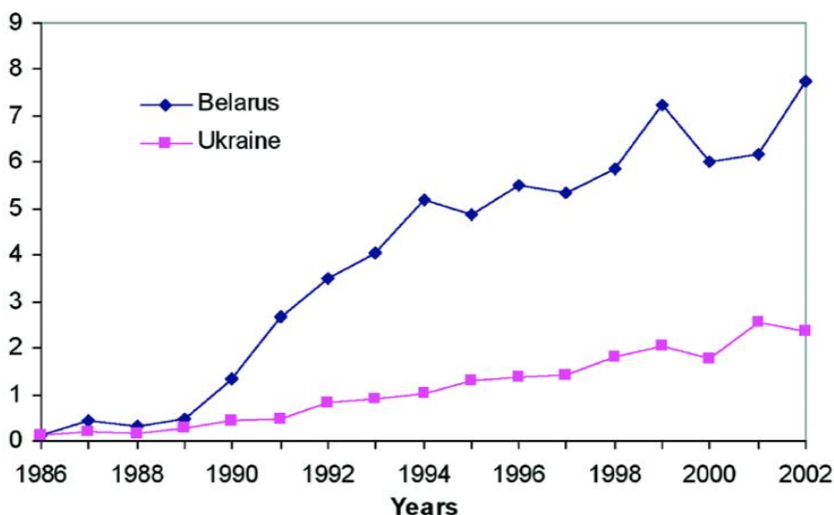


Table: The frequency of thyroid cancer among children in Belarus and Ukraine between 1986-2000.
Source: Jacob et al 2005

If you are interested in reading more, all reports can be downloaded for free:

Greenpeace International "The Chernobyl Catastrophe - Consequences on Human Health"

<http://www.greenpeace.org/international/press/reports/chernobylhealthreport>

World Health Organisation "Health Effects of the Chernobyl Accident and Special Health Care Programmes"

http://www.who.int/ionizing_radiation/chernobyl/WHO%20Report%20on%20Chernobyl%20Health%20Effects%20July%202006.pdf

International Atomic Energy Agency "Environmental Consequences of the Chernobyl Accident and Their Remediation: Twenty Years of Experience"

http://www.who.int/ionizing_radiation/chernobyl/IAEA_Pub1239_web%5b1%5d.pdf

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The Chernobyl Forums compilation of the reports by WHO, IAEA and UNDP
http://www.who.int/ionizing_radiation/chernobyl/chernobyl_digest_report_EN.pdf

¹ <http://www.pcf.city.hiroshima.jp/peacesite/English/Stage1/1-5/1-5-6E.html>

² <http://atomicforum.org/france/france.html>

³ <http://nuclearweaponarchive.org/Usa/Tests/index.html>

⁴ <http://www.nuclearclaimstribunal.com/testing.htm>

⁵ <http://www.fas.org/nuke/guide/usa/nuclear/nv209nar.pdf>

⁶ http://www.pjreview.info/issues/docs/12_2/PJR12_2_book_johnson188-191.pdf

⁷ <http://www.greenpeace.org/international/rainbow-warrior-bombing/the-evacuation-of-rongelap>

⁸ <http://www.thebulletin.org/web-edition/columnists/hugh-gusterson/the-effect-us-nuclear-testing-marshallese>

⁹ <http://www.cnn.com/SPECIALS/cold.war/episodes/08/spotlight/>

¹⁰ http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/health-environment/human-costs_article-wyant.htm

¹¹ <http://www.timesonline.co.uk/tol/comment/obituaries/article3359039.ece>

¹² <http://www.iaea.org/NewsCenter/Features/Chernobyl-15/chno-faq.shtml>

¹³ http://www.who.int/ionizing_radiation/chernobyl/chernobyl_digest_report_EN.pdf

¹⁴ <http://www.greenpeace.org/raw/content/international/press/reports/chernobylhealthreport.pdf>