

The risk of radiation from nuclear accident and its safety

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Abstract

1. Whether the nuclear accident is risk depends on what types of radiation received.
2. If the acute radiation instantly received, as the radiation received in the atomic bomb explosion in Japan, it could harm even kill people. If the chronic radiation received slowly, as the radiation received by residents in the Co-60 contaminated apartments in Taiwan, it would not induce cancers but sharply reduce their cancer mortality and hereditary malfunction.
3. In a nuclear accident, most radiation is chronic radiation, and chronic radiation is completely different to acute radiation.

The acute radiation doses in atomic explosion

Estimated and documented by RERF^(2,3)

1. Solid cancers mortality could increasing

No of survivors	Average dose	Excess % of solid cancer
74,775	<200 mSv	1% (6312/61)
11,118	200-2000 mSv	20% (1183/234)
679	>2000 mSv	47% (83/39)

2. Leukemia mortality could increasing

No of survivors	Average doses	Excess % of leukemia
73,986	< 200 mSv	4% (143/6)
11,681	200-2000mSv	70%(76/55)
906	>2000 mSv	93% (30/28)

The harmful Health effects of acute radiation in atomic explosion

- 1. The deterministic health effects of acute radiation from the atomic explosion could injure radiosensitive organs, such as GI system, bone marrow, and could cause final deaths. When people received median lethal dose of LD/50/ 60, it could kill 50% people in 60 days with about 5 Sv ⁽¹⁾. But only few people got such high dose.**
- 2. The RERF estimated the stochastic health effects of acute radiation, 86 % of survivors in low doses did not have cancer mortality increased. 14 % survivors in higher doses had cancer mortality increased ⁽²⁾, and might be in LNT model.**

The beneficial health effects of chronic radiation

- 1 The people living in the high natural background areas, such as in Karla, India, Yangjing, China and the high mountain states in USA, receive more chronic radiation, but have lower cancer mortality. These facts are not recognized by the international regulatory bodies.**
- 2 The chronic radiation received in the Co-60 contamination incident in Taiwan had reduced greatly their cancer deaths, is also not recognized by international regulatory bodies.**

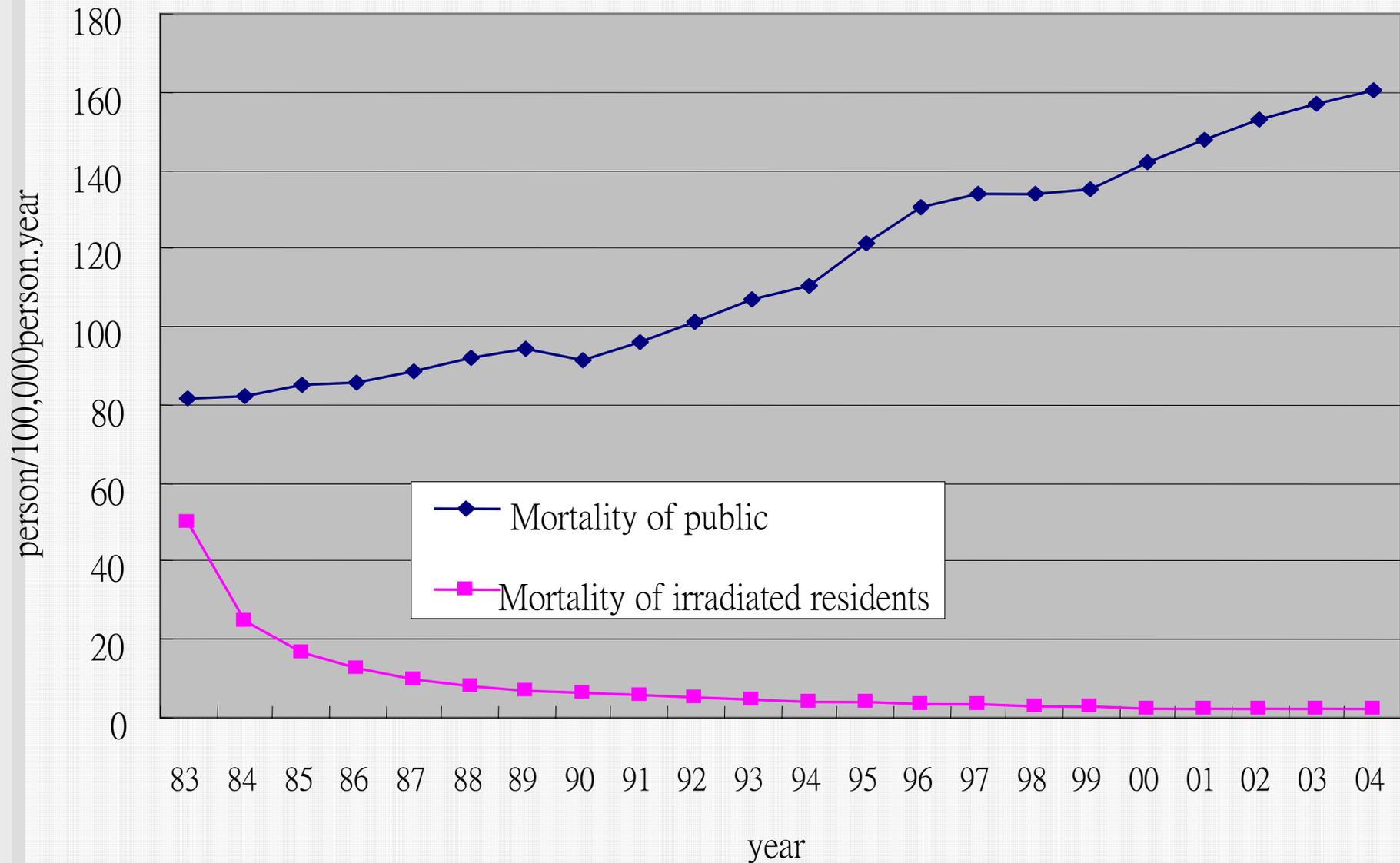
The radiological incident in Taiwan revealed chronic radiation is beneficial to people

- 1. 1700 apartments contracted with Co-60 contaminated rebar in 1982-84. The average dose received by about 10,000 residents was higher than the dose received by the Japan survivors, and the emergency workers in Chernobyl accident.**
- 2. Based on LNT model, there would be 90 excess leukemia and solid cancers after 22 years, actually no any such excess cancer deaths.**
- 3. Based on Taiwan vital Statistics, the residents had 250 nature cancer deaths in 22 years, but only 7 persons, or 3% of the general population observed, as shown in the following curve plotted since 1983.**

The radiological incident in Taiwan revealed chronic radiation is beneficial to people(cont.)

- 4. The radiation could possibly also reduce hereditary defects to the descendants of the residents, they were 67 defects based on LNT, 46 congenital prevalence on statistics, but only 3 observed or 6.5% of general population observed.**
- 5. As the peaceful uses of nuclear energy and medical radiation are seldom bigger than the chronic doses received by the Co-60 irradiated residents in Taiwan. It means chronic radiation is always beneficial to humanity.**

The chronic radiation received by the irradiated residents have reduced their cancer deaths sharply



Health effects of radiation observed in a nuclear accident

- 1. When an nuclear incident occurs, the risk depend on the acute or radiation received. A out of control of small Co-60 sources in Mexico and China, small Cs-137 in Brazil and a supercritical accident in Japan, some number of people were killed as by acute radiation.**
- 2. When an accident occurred in a nuclear power plants, the acute radiation could kill people, but most chronic radiation could benefit huge number people.**

Health effects of radiation from Three Mile Island(TMI) nuclear accident

- 1. Radiological accident of a nuclear power plant was always considered as the most risk to human beings. Actually it also depends on the radiation is acute or chronic.**
- 2. The accident in Three Mile Inlands in USA, the shielding contaminant blocked the fission products released, no workers received acute radiation, no worker was killed. The gaseous fission products released to huge space outside of the plant through the duck, chronic radiation beneficial to them, no cancer deaths increased.**

Health effects of radiation from the Chernobyl power plant accident

- 1. Radiation from the accident of Chernobyl power plant was considered as the biggest disaster in the world. The acute radiation from the fission products had caused 28 firefighters and 3 workers in ARS deaths in a short time, and 14 workers died later on.**
- 2. When the fission products released and decayed in the huge space outside of the plant, the radiation turned to be chronic radiation, which benefited the people. Many Russian scientists proved great cancers deaths reduced.**

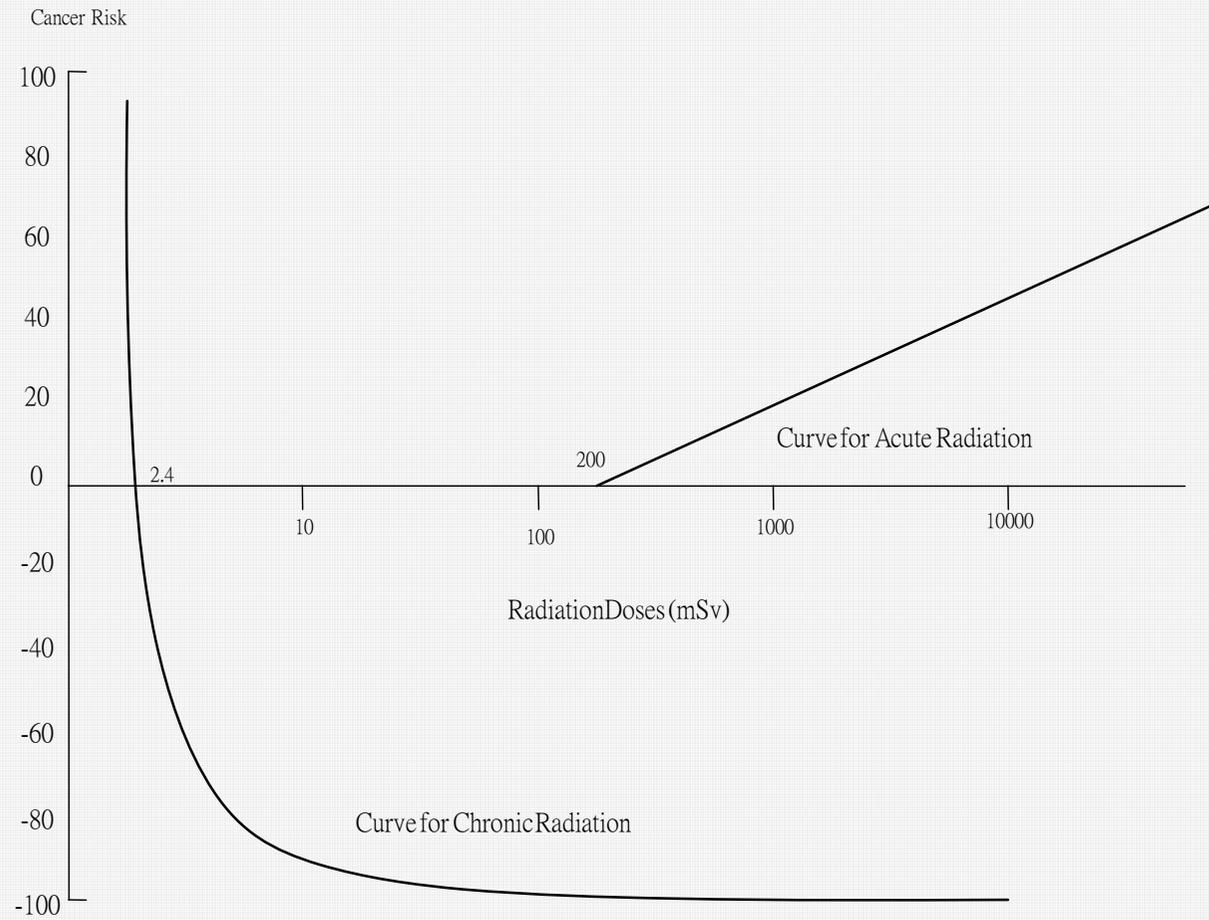
Discussion

- 1. The harmful effects of acute radiation from atomic explosion was the origin of people fear of radiation and nuclear energy. On the contrary, the chronic radiation serendipitously revealed beneficial to people in Taiwan incident are quite similar to the radiation from the nuclear energy and medical application.**
- 2. A nuclear power plant accident might occur, the acute radiation could injure workers if no contaminant designed, but when the radiation releases outside the plant it turn to be chronic and benefit the pulation.**

Discussion (cont.)

- 3. The chronic radiation experienced in Taiwan is about 1 mSv/hr and 1Sv/y**
- 4. There were no definite evidence indicated hereditary defects had been induced by radiation; but the chronic radiation in Taiwan could reduce the hereditary deformations among the children of the residents.**
- 5. Cancers and hereditary deformation are often considered as the miserable sicknesses, medical physicists and communities should try to prevent them.**
- 6. The dose-effect relationship might be shown in the last figure. Chronic radiation is always beneficial, acute radiation >200mSv is harmful.**

Dose-effects relationship



Recommendation

- 1. The message in this paper should be regarded more important than the message from the atomic bomb explosion in Japan. The international scientists and communities, should further know of the health effects of the chronic radiation,.**
- 2. This paper tentatively recommended 1mSv/hr and 1 Sv/y as the chronic radiation and as the free hourly and annually dose limit for workers and the public.**
- 3. Addressing the public, a nuclear accident should never be feared by public, because it would only benefit them.**

Recommendation (cont.)

- 4. As cancers and hereditary defects are the most miserable sicknesses to people, and the chronic radiation observed in Taiwan could effectively to prevent them, So that medical scientists and communities should design the appropriate radiation irradiators, and recommend the optimized doses for the preventing.**
- 5. Animal studies in Japan indicated the chronic radiation could enhance immune system, suppress diabetes and AIDS ⁽³⁰⁾, it should be also tested with humanity.**