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## Forbidden Science: Low Level Radiation and Cancer

By [Norman Rogers](#)

Some things are hard to believe. What you've been told about low-level radiation by the people who are supposed to be responsible authorities is very wrong. The evidence that the official story is wrong is overwhelming. They know about the evidence. Yet because they have a vested interest in being wrong, they willfully keep being wrong. There is massive evidence that low levels of radiation rather than causing cancer, actually suppress cancer. The reason is, probably, that radiation in small or moderate quantities stimulates cellular repair mechanisms. This is not to negate the fact that large amounts of radiation can kill you or make you sick. This protective effect of low levels of radiation is called radiation hormesis.

The case of radiation hormesis provides yet more evidence that the scientific establishment and the EPA are lacking in objectivity when their interests are at stake. They cling to scare stories like leeches. Be it ionizing radiation or global warming they will not admit that they were wrong, at least if they can avoid it.

Our bodies are bombarded with ionizing radiation because it is everywhere. Radiation is ionizing if the rays or particles have sufficient energy to rip electrons from atoms, a feat that can disrupt biochemical systems. Ionizing radiation comes in the form of cosmic rays, radioactive minerals and even potassium 40, the radioactive isotope of potassium that is always in our bodies and lurking everyplace where potassium is found. The particles and rays from radioactive decay rip through our cells leaving a trail of destruction in their wake. Our bodies have powerful mechanisms evolved over millions of years to deal with the destruction caused by radiation.

The official method of estimating the danger of radiation is called the linear no threshold (LNT) method. This can be illustrated by the following fictional analogy. Suppose that if humans are hit in the head, above the ear, by an iron ball weighing 3 pounds and traveling 20 miles per hour, half of the subjects will die. Then ask the question what percentage of the subjects will die if hit in the head by a BB traveling 20 miles per hour and weighing 2 tenths of a gram or 1/6000th as much? According to the linear no threshold theory, the death rate would be 1/6000th as high. Of course a tiny BB thrown gently will be absolutely harmless and no one will die. However if the experiment is performed on hundreds of thousands of people, probably some will die, because people die all the time for various reasons. It is possible that if an epidemiologist were investigating people hit by gently thrown BB's he would attribute the random natural deaths to the BB syndrome, because, after all, that is what he is investigating. Positive results are publishable, negative results are a waste of time for building one's career.

The advocates of the LNT method think that each particle resulting from radioactive decay traversing body cells has a small chance of causing cancer, so the chance of cancer should be proportional to the radiation level. If this model were correct, then elephants would be expected to have an incidence of cancer millions of times higher than mice because many more particles traverse their bodies due to their greater size. But, both creatures have similar rates of cancer. Elephants weight about 250,000 times more than mice and live about 16 times longer. If cancer is proportional to mass times lifetime, as the LNT theory suggests, then elephants should have about 4 million times as much cancer as mice. This dilemma is somewhat resolved if we recognize that there are cellular level and immune system repair mechanisms that repair damage from radiation

and the mechanisms are probably better evolved in elephants than in mice. The fact that cancer is much more common in older animals suggests that the repair mechanisms lose efficiency with age. We should keep in mind that we don't have a really good grasp as to what causes cancer. We have correlations between causes and effects and the meaning is not always clear. Yes, smoking causes lung cancer, but the exact mechanism remains obscure.

We can't double the CO<sub>2</sub> content of the Earth's atmosphere as a quick experiment to test out the theory of global warming. However, we can irradiate animals to test the effects of radiation. Such experiments have even been done inadvertently on humans, for example the atomic bomb attacks on Japan and various radiation accidents and occupational exposures. These experiments usually show that although massive doses of radiation are bad for you, small doses seem to have a positive effect on health. That's an instance of hormesis, the theory that things that are bad for you in large quantities may be good for you in small quantities.

Radiation is conveniently measured in units of millisieverts, abbreviated mSv. A dose of 5,000 mSv in a short period of time will usually kill you. Background radiation from the Earth and cosmic rays is typically about 3 mSv per year. But in certain communities, such as around Ramsar in Iran or certain places in India, background radiation can be 50 times higher, 150 mSv per year or more. The people who live in these places don't seem to suffer any ill effects. The government places a limit of 50 mSv per year for workers in nuclear industries.

A remarkable accidental human experiment was performed in Taiwan beginning in 1983. A large quantity of steel bars used in reinforced concrete construction was accidentally contaminated with highly radioactive cobalt 60. This steel was incorporated into approximately 180 buildings. The radioactivity was gradually discovered from 1992 to 1996. By that time the radioactivity had declined by a factor of 4 since the half life of cobalt 60 is 5.3 years and about 2 half lives had passed. The buildings were extensively investigated and the radiation levels measured in various ways. Approximately 10,000 people were irradiated by varying amounts depending where they lived and how long they lived in the affected buildings. The amount of radiation received by the residents was far above background levels with some residents initially, in 1983, receiving as much as 500 mSv per year or more than 100 times background. The average initial annual dose was about 50 mSv, declining as the cobalt 60 decayed. Using accepted LNT methods based on the International Commission on Radiological Protection, assuming that the age distribution of the occupants was similar to the general population of Taiwan, there should have been 302 cancer deaths among the residents, 232 natural and 70 excess deaths due to radiation. Remarkably only 7 deaths were found. There should have been 46 birth defects, but only 3 were found. The conclusion is that not only does radiation at these levels not cause cancer or birth defects; it has a strong protective effect. All this was described in a highly cited scientific paper [1] published in 2004. The paper was authored by 14 very well credentialed Taiwanese scientists.

The nuclear shipyard study was a well-designed epidemiological study of approximately 30,000 American shipyard workers who worked on nuclear powered ships. [2] They were exposed to radiation related to the nuclear reactors on the ships. A similar sized and well-matched control group of shipyard workers who worked on non-nuclear ships was also established. The exposure of the workers to radiation was well documented because the workers were required to wear radiation badges and careful records of exposure were kept. The study, costing \$10 million, spanned the years 1980 to 1988 for workers working between 1957 and 1981. A 500 page final report was delivered in 1991. The workers' radiation exposure, of about 3 to 5 times background, was much less than the more highly radiated occupants of the Taiwanese apartment buildings [3]. The workers exposed to more than 5 mSv per year had a death rate approximately 25% lower than the control group. Death rates from cancer were also significantly lower. This result is similar to the improved health experienced by British radiologists exposed to a similar amount of radiation compared to physicians not exposed to radiation. [4]

Radon is a noble gas that is naturally present as a decay product of uranium. It seeps out of the soil in very small amounts, but due to its short half life, high radioactivity and subsequent daughter decay products, it is a significant contributor to low level background radiation. The U.S. government has put a huge effort into reducing exposure to radon in homes in order to reduce the incidence of lung cancer. Homeowners are encouraged to test their homes for radon and to modify their homes by adding ventilation or barriers to reduce the concentrations of radon.

Radon is known to cause lung cancer in underground uranium miners who, at least before better ventilation was introduced in the mines, were exposed to very high concentrations. The EPA uses the LNT theory to extrapolate from cancer rates of miners to radon cancers in homeowners. The cancer rate is assumed to be proportional to radon concentration, an application of LNT. Since radon is a gas and can be inhaled it is expected to target the lungs. When it decays it emits an alpha particle that does not travel far, but from inside lungs can damage cells in close proximity to the decay.

The physicist Bernard Cohen, a strong proponent of hormesis, compared lung cancer rates to average home radon concentrations in 1601 counties in the U.S. that hold 90% of the population. If the LNT theory holds, a positive correlation would be expected -- more radon, more cancer. However he found the opposite. At low levels in homes, more radon results in considerably less cancer.<sup>[5]</sup> If Cohen's results are true, the efforts of the EPA to reduce household radon are not only useless, but counterproductive. In a 2002 review article<sup>[6]</sup> Cohen discussed the various mechanisms that can explain hormesis, such as the stimulation of inbuilt cellular repair mechanisms by low level radiation. If Cohen's results were to be accepted, then the government would be shown as sponsoring a radon control enterprise that actually causes cancer. Not surprisingly, Cohen has been dismissed out of hand, even though he put much effort into answering spurious objections to his work.

Epidemiological studies based on interviews with lung cancer victims and measurements of radon in their homes have been done. But these studies are plagued by uncertainties due to the confounding effect of smoking and the uncertain recollections of persons dying of cancer. Almost everyone who gets lung cancer is a smoker, so the studies are trying to discover a small increment in the cancer rate attributable to radon.

Scientific theories can become prisoners of vested interests. If the LNT theory is false and hormesis is true, then vast sums spent to protect against low level radiation have been wasted. The cost of the nuclear power has been unfairly increased by unjustified alarm concerning the effects of low level radiation. The evidence for hormesis is vast, going far beyond the few examples given in this article. Vested interests embedded in government agencies and quasi official bodies, such as the National Academies of Science, refuse to take hormesis seriously because their careers are built on the LNT theory or perhaps because they are just afraid of upsetting the status quo.

A very similar situation exists with global warming. The theories that predict disastrous consequences from adding CO<sub>2</sub> to the atmosphere are very weak and are being contradicted by temperature trends in the atmosphere and ocean. However, the validity of the theory is systematically exaggerated and problems minimized to protect the vast enterprise that runs on global warming hysteria. Note that global warming and hormesis come together in relating to the issue of nuclear power.

A big deal is made of conflicts of interest when industries with vested interests defend their actions with scientific studies. It is assumed that the results are tainted due to the financial conflict of interest. Sometimes the results are tainted and sometimes they aren't. However scientists and scientific organizations (e.g. the EPA or the National Academies of Science) also have vested interests. Often the vested interest is just the human interest in not being shown to be wrong. Sometimes the vested interest is concrete, the benefit of getting consulting contracts, promotions or basking in the sunshine of prestige. Unfortunately the scientific establishment is given a pass and allowed the pretense that it is disinterested and not influenced by considerations of vanity and greed like everyone else.

Bernard Cohen died in March, 2012 at the age of 87. When he did most of his work on hormesis he was already an emeritus professor. Scientific dissenters, be it in global warming or radiation health physics, are often well into senior citizenship. The reason is that the older you get the less you worry about your future career and the less you fear saying what you think.

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[1] Is Chronic Radiation an Effective Prophylaxis Against Cancer? W.L. Chen et al. Journal of American Physicians and Surgeons Volume 9 Number 1 Spring 2004

[2] For s summary of the study see: Nuclear shipyard worker study (1980-1988): a large cohort exposed to low-dose-rate gamma radiation, Int. J. Low Radiation, Vol. 1, No. 4, 2005. Ruth Sponsler and John R. Cameron

[3] Background radiation for occupants of apartment buildings is generally low due to their separation from sources of radiation from the Earth.

[4] Berrington, A., Darby, S.C., Weiss, H.A. and Doll, R. (2001) '100 years of observation on British radiologists: mortality from cancer and other causes 1897-1997', Br. J. Radiol., Vol. 74, No. 882, pp.507-519.

[5] TEST OF THE LINEAR-NO THRESHOLD THEORY OF RADIATION CARCINOGENESIS FOR INHALED RADON DECAY PRODUCTS Bernard L. Cohen-Health Physics February 1995. Volume 68. Number 2

[6] Cancer Risk from Low-Level Radiation, Bernard L. Cohen, American Journal of Roentgenology, November 2002

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