

~Uploaded by Toxic Waste

E-Mail: S088127 AT UMRVMA (BITNET)
Various St. Louis BBS's

Understanding Radiation Hazards

Is Dan Rather more dangerous than Three Mile Island?

The reports of tens of thousands of deaths in Russia from Chernobyl together with the extreme public concern, almost panic in some cases, about the nuclear radiation which came here from Chernobyl and the similar concerns after Three Mile Island demonstrate that we nuclear scientists have failed to provide a common-sense view of health effects from radiation. As with any potential hazard, the general rule is to avoid unnecessary exposure. However, few of us worry about an occasional sunburn, even though extended sun exposure, like high radiation exposure, can cause cancer. Yet we seem to agonize over any exposure to nuclear radiation.

The way in which radiation affects health can be simply put. The radiation unit "rem" is used to measure the amount of nuclear radiation an individual has absorbed. Someone who receives a radiation dose much above 100 rem in a short period of time may feel nauseous and is likely to experience symptoms similar to the flu. At 500 rem there is about a 50 percent chance of death within a few weeks. On the other hand, a person receiving less than 100 rem is apt to notice no short term ill effects at all.

There is an increased risk of future cancer for doses of 100 rem and above. If 100 persons each receive 100 rem, then in time one of them would be expected to get radiation-induced cancer. (Sixteen of the 100 will get cancer unconnected with radiation.) Such cancer-dose relationships are deduced from Hiroshima and Nagasaki and populations of medical patients who received radiation doses in the 100-rem range.

At much lower, more common radiation exposures, no clear effects on health have been found despite more than forty years of trying to find them. If there are any effects, they are so small they are masked by normal variations in health unconnected with radiation. Nevertheless, to provide a conservative estimate it is ASSUMED that any level of radiation has an effect even if it is undetectable. It is ASSUMED that one cancer will result whether (as indicated above) 100 people each receive 100 rem, 1000 people receive 10 rem, or 10 000 people receive 1 rem. In other words, a collective dose of 10 000 rem spread among many people is assumed to produce one cancer among them regardless of how small the individual doses are. When applied to aspirin, this assumption says that if a hundred aspirin will kill a person, then one person will die if 100 people each take one aspirin.

There is no evidence that this assumption is truer for low doses of radiation than for low doses of aspirin; but depending on one's intent, it can be used to set prudent radiation policy, to scare people, to make headlines, or to have fun.

Let's consider Dan Rather, this decade's most watched T.V. news person. A television set emits a negligibly small amount of radiation. Nevertheless, the total viewing audience of 17 million who each day watch the 30-minute CBS Evening News collectively receive an estimated yearly dose of about 1000 rem.

To simplify our discussion (and with apologies to Peter Jennings and Tom Brokaw), let us define a 1000-rem radiation dose distributed among many people as a "Rather." Viewers of the half-hour long CBS Evening News collectively receive one Rather per year. The Three Mile Island nuclear accident in 1979 caused a total population dose of approximately

three and one-half Rathers. Thus, in the seven years since the accident, Dan Rather and CBS Evening News have have imposed on the public twice the radiation exposure received from the entire Three Mile Island event.

The 100 million viewers who watch television about four hours each day receive some 50 Rathers yearly. That's 50 000 rem. Thus, the assumption of one cancer per 10 000 rem predicts that television viewing causes five cancers a year in the U.S. Perhaps when a guest on Ted Koppel's Nightline complained about turning gray after Three Mile Island, Koppel should have suggested she blame television rather than nuclear power. Of course, in less contentious times, she might even have blamed normal aging.

Should one offer sympathy to the citizens of Denver? Naturally occurring low-level radiation is all around us, coming from minerals in the ground and cosmic rays from outer space. But in the Denver metro area, because of its high altitude and high mineral content, 1.8 million people receive about twice the natural radiation dose that is received on the average elsewhere in the U.S. Indeed, Denverites EACH YEAR receive an extra 120 Rathers! My gosh, that's over thirty times more than from Three Mile Island. Not only that, the extra radiation received by a Denverite each year is more than would have been received by a person standing at the highest radiation place at Three Mile Island during the entire accident. In two years a Denverite receives extra radiation about equal to the maximum from Chernobyl anywhere outside of Russia.

Before starting the evacuation of Denver, perhaps we should note the surprising fact that Denverites are less prone to cancer than the average American. Indeed, a study by Argonne National Laboratory found that people in the U.S. living in high radiation background areas have, in general, lower cancer rates than those in low radiation areas. Maybe those who take mineral baths, which usually have elevated radioactivity levels, are on to something. At the very least, those who pray on the radioactive cobblestones in St. Peter's Square at the Vatican (three times higher radiation level than Denver), or pass the radioactive pillars in Grand Central Station, or experience the thirty-fold increased radiation in a jet airplane should feel at ease -- at least when there is no turbulence.

The examples above involve large numbers of people receiving radiation exposures below 1 rem. For larger doses consider the accident at a French nuclear facility a few weeks after Chernobyl. As the television and print media duly reported, five workers received radiation exposures. One worker received 17 rem and the others less. To put this dose in perspective, I queried a number of radiological experts as to whether they would rather get a broken arm or a 17 rem radiation exposure. Not one took the broken arm. Yet, broken arms don't seem to make the news.

To sum up, we note that high levels of nuclear radiation such as are present in certain areas within nuclear plants and at medical and industrial x-ray facilities should be avoided. As a matter of prudence, it is wise to avoid any unnecessary exposure. But at inadvertent exposures of a few rem, and at natural background levels which are a tenth or two-tenths of a rem per year, the effects -- whether harmful, beneficial, or absent -- are so insignificant that they are masked by normal variations in health.

Thus, one should be wary about the meaning and intent of predications of thousands of future cancer deaths from Chernobyl radiation in western Europe, where individual doses were a fraction of those received yearly in Denver. Similarly, predictions of many thousands of future cancer deaths in Russia, as reported in the media, are derived from the exposure of 75 million Russians to levels of radiation comparable to than

in Denver. Such meaningless figures add nothing to the understanding of the tragic events at Chernobyl.

And this brings us back to the question about Dan Rather. Is he more dangerous than Three Mile Island? Clearly, the question being addressed isn't really about Dan Rather, and it isn't about actual radiation exposure. Neither Three Mile Island nor the combined radiation output of Rather, Jennings, Brokaw, and the rest of CBS, ABC, and NBC will produce any measureable public health effects.

The concern is not radiation but rather a public unable to objectively make vital decisions on matters involving radiation. We who are professionally involved with radiation have clearly done a poor job in communicating. But the communication experts in both the print and the broadcasting media have also failed in adequately informing the public about radiation. We must all do a better job in the future, for it should be clear that a misinformed American public is infinitely more dangerous than all the radiation we received from Three Mile Island and Chernobyl put together.

-- Bertram Wolfe, president of ANS
American Nuclear Society News, October 1986