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Risk Perspective

By Edward L. Maurer, DC, DACBR

Environmental pollution, cholesterol, steroids, drugs, iatrogenic disease, radiation effects, and others, have all been highly visible in the media over the past few years. Near daily announcements are made of items which are purported to be carcinogenic. One begins to wonder if it would be easier to list the things that do not cause cancer.

Radiation health and safety are being discussed at social gatherings, and people are generally more aware of associated risks. Many still have visions of Nagasaki, Hiroshima, Chernoby¹, and Three Mile Island whenever radiation is mentioned. Little wonder then that patients frequently ask questions related to the necessity and safety of radiographic procedures. At times simple reassurance will suffice, but often we must attempt to help put things in perspective.

Science and technology have combined to provide some of the most in-depth studies of ionizing radiation known to man. The International Atomic Energy Agency (IAEA) states that "radiation and its effects have been studied by expert bodies for over half a century and more is known today about radiation risks than about those of practically any other physical or chemical agent in our environment." Authorities agree that while no radiation dose level is risk-free, the level used in diagnostic radiology provides low-dose risk and is considered as acceptable to the average individual. According to the 1949 National Council on Radiation Protection and Measurements (NCRP), the definition of permissible dose is: "Permissible dose may then be defined as the dose of ionizing radiation that, in light of present knowledge, is not expected to cause appreciable bodily injury to a person at any time during his lifetime." Since this NCRP statement, the trend in science has been away from the "permissible or acceptable" dose concept to the current "risk" concept. In either approach, the end result is similar, e.g., for the information gained with diagnostic radiology, the radiation risk is minimal.

The IAEA states that "one should not disregard the risks posed by radiation as a health hazard, but it does not pose a unique set of health affects." Other agents pose a much greater health risk. "It is about 100 times more likely that cancer will be produced in the average individual by some other cause than by radiation."

An interesting article by Cohen and Lee entitled, "A Catalog of Risks," published in *Health Physics*, provides a look at radiation risk levels, along with other examples of risks associated with various activities and how they translate into loss of life expectancy. It provides the likely results of both general patterns of behavior and one-time occurrences. According to the study: The drinking of one diet soft drink per day reduces life expectancy by two days; ingesting 100 calories per day by drinking regular soft drinks increases body weight by 7 pounds and reduces life expectancy by 210 days.

If you are 30 percent overweight you lose 1,300 days; 20 percent overweight 900 days. Unmarried males lose 3,500 days, smokers 2,250.

While accidents in an average job cause 74 days of life loss, a job with radiation exposure carries only a 40 day loss. An average person who receives a lifetime of medical (diagnostic) x-rays, results in a life expectancy loss of six days. Radiation to workers in the nuclear industry lose .02 days. Single, individual acts and their associated risks were also reviewed. Smoking one cigarette reduces life expectancy by 10 minutes, eating a calorie-rich dessert by 50 minutes; and the missing of an annual PAP test will cost the average woman 6,000 minutes. One millirem of radiation reduces life expectancy by 1.5 minutes.

This study and many others point out that risks are associated with nearly all activities of daily living. Some can be guarded against, for example, wearing a seat belt, losing weight, stopping smoking, etc., but even these measures will not eliminate all risk. Minimal risk in everything we do during the human experience is near-inherent. While we must constantly work towards the reduction of risk, in all endeavors, we must accept a minimal level as normal. Diagnostic radiology does present risk; but the radiation dose when compared to the benefits of useful information gained, necessary for appropriate treatment selection, is indeed an acceptable trade-off when put into perspective.

References

1. International Atomic Energy Agency, "Facts About Low-Level Radiation," American Nuclear Society, 1982.
2. Cohen, B.L.; Lee, I.S. "A Catalog of Risks." *Health Physics* June 1979; Vol 36: pp 707-722.



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