

From: Charles Willis
To: PXM
Date: Thu, Dec 10, 1998 6:44 PM
Subject: NCRP Draft Report on the Linear Nonthreshold Model

Trish,

I have taken a quick look at the draft report dated October 1998. While I feel a need for more time to do the level of review that seems warranted, I offer the following comments for your use as seems appropriate.

My overall reaction is disappointment. While I certainly did not expect the work to truly resolve the issue, I had hoped that it would do more to move the discussion to a higher plane. This does not seem to have happened.

The "Executive Summary" is an important part of the problem with the report. While the title's reference to the linear nonthreshold idea as a "model" was encouraging, the tone was changed by the first paragraph on the first page of text by reverting to the "hypothesis" expression. From there on, the Executive Summary comes across as the work of "spin doctors" rather than an objective discussion. For example, the second paragraph suggests that for radiation carcinogenesis to be a stochastic process, the dose-response relationship must be linear; in the rest of the world most stochastic processes are decidedly non-linear. Of course, the ICRP has defined "stochastic" in this way but the case has not been made that the dose-effect relationship fits the special ICRP definition. This makes a vast difference in risk assessment, cost-benefit analyses and the like. For example, with the linear model, reducing the dose by a factor of two reduces risk by a factor of two whereas using a "normal distribution" model could give a risk reduction factor of several hundred for the same dose reduction. The Executive Summary seems to offer little more than the non sequitur that the response has not been proven to go to zero therefore the response must be a linear function of dose.

Much of the discussion in the early part of the report seems inconsistent with what is reported in Chapter 8 which deals with observations in laboratory animals. For example, in the Introduction, dose-response functions are discussed with the implication that the effect must be zero at zero dose while in Chapter 8, a response function is shown which has its maximum value at zero dose. Of course, no observation can ever be made at zero dose so we really have no knowledge of what the response would be.

In general, the report's presentation seems off-target because, in both graphs and text, "low dose" seems to mean below 50, or perhaps 5, rad. The area of interest, of course, largely is far lower.

The handling of "Spontaneous DNA Damage" (4.1.8) seems weak. There is the statement that the steady state level of oxidative base damage is equivalent to about 250 rad, and the half life of the repair process is given as about 5 minutes. Presumably, this means that the normal damage process corresponds to 250 rad about every 7 minutes. We need a good story to convince the skeptical that a few mrad per year is going to mean anything in this background, but no such story is offered.

The Chapter on Effect in Human Populations would be helped by the inclusion of more detailed data, perhaps in an appendix. As it now stands, it is a "trust me" mode and after reading the early chapters, the critics will have little trust. The Cohen studies were taken seriously but no serious explanation is offered as to how these results could come about. On the other hand, it seems surprising that the nuclear shipyard workers study is given such short shrift, considering the attention paid to it by the critics of the LNT model.

Perhaps it is outside the scope of the NCRP committee, but what many see as the key issue was not addressed. That is, considering the cost and the uncertainties, is it prudent to use the LNT model? If, in fact, the LNT model is a major factor in people's reaction to radiation, it seems to be causing some 10,000 premature deaths and millions of illnesses annually in the US by blocking food pasteurization by irradiation. Numerous other adverse effects of people's reaction to radiation could be enumerated. This

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raises the serious question as to whether the NCRP is optimizing its recommendations, or even trying to do more good than harm.

In summary, the report seems to need more work, a lot more work, and perhaps a personnel change or two.

Charlie Willis
caw@nrc.gov

CC: BXZ