



New Cancer Data Imply Death Error

THE PRECISION with which we know the constants of nature is one of the foundations of an industrial economy. For example, we know, and need to know, the speed of light to better than six decimal places, and the distance from earth to Mars almost as well. When engineers consider living organisms, however, they must face up to serious uncertainties, within factors of ten or even a hundred, about such vital matters as the health hazards of industrial by-product radiation. All of us will ultimately suffer from inaccuracies in such calculations.

Standards must be set as the basis of engineering design, from whatever information is available. If they are unrealistically stringent, they will thwart the development of nuclear energy and we may stumble in brownouts and choke in increasing air pollution from burning fossil fuels. If the standards are too lax, whether from laziness or exploitation, our own health and the future of the species are at stake.

ONE BASIC standard is the Federal Radiation Council's limit of 170 millirads per year for the general population. This exposure to additional by-product radiation may be compared with the 100 millirads from cosmic rays and natural radioactivity in which we are already immersed, and an average exposure to about 50 millirads per year from medical X-rays.

Nuclear energy activities so far, mostly in the form of strontium-90 fallout from weapons tests, have "used up" less than 10 per cent of the 170 millirad allowance. However, we are on the verge of planning large-scale expansions of nuclear energy plants and other uses, and the validity of the standards is bound to be crucial to the engineering and economics of the technology.

Drs. John W. Gofman and Arthur R. Tamplin of the AEC-supported Lawrence Radiation Laboratory at Livermore, Calif., have sharply attacked the current standards in testimony before the Senate subcommittee on air and water pollution. Their main argument is an analysis of various data that have been collected on the production of specific forms of cancer by radiation.

For each of several forms, the "doubling dose" is about 100 rads. That is, each rad of exposure should increase the spontaneous frequency of cancer by one per cent of its existing value. After 30 years of exposure at the guideline level, the accumulated extra dose would be 30 rads, calculated to give a 5 per cent increase overall in cancer.

These figures are probably not very different from the assumptions that underlie the policy guidelines. The logic of these standards has unfortunately been contaminated, however, by some unsupportable optimism that very low doses of radiation may have a less than proportionate hazard, and that we might be able to ignore these small penalties. However, as Gofman and Tamplin point out, this 5 per cent would add up to another 16,000 cancer deaths a year.

WHICH OF these numbers is the proper assessment is a basic issue of social philosophy that needs to be examined apart from the technical arguments that surround it.

In my first reading, I was tempted to quarrel with the argument that diseases like lung cancer could be influenced by additional radiation exposure, for we believe that this is mainly caused by cigarette smoking. Nevertheless, we must take account of the probable interaction of radiation with other environmental pollutants, and with variations in individual susceptibility.

The hardest fact we have is the natural exposure rate of 100 millirads. We can expect to learn more about radiation hazards, and further news is most likely to be the discovery of now hidden dangers rather than the converse. Quite apart from Gofman and Tamplin's calculations we would be wise to set our guidelines as a small percentage of that unavoidable 100 millirads.

Future developments may loosen these standards in either of two ways. We might learn how to facilitate the natural repair of radiation damage. Or, we may continue to poison ourselves so badly with chemical pollutants that an added dose of radiation would be lost in the smog, or might even be a happy way out.

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