Correspondence

On-Call Stress

Dr. Huntoon’s article stated eloquently one of the nagging problems of medical practice—after-hours call. Like Dr. Huntoon, I took call no less frequently than every third night and every third weekend, and on many occasions, weeks or even months at a time. As a resident I took call every night on the neurology service for a solid year, so I know firsthand whereof he speaks.

I also have a strong interest in the effects of stress on neurological function, including depression, anxiety, dysfunction in decision-making, and the relationship between stress and deterioration of health. The problem is that no one other than the practicing physician seems to care.

We all appreciate that the “system” cares nothing about the health of physicians. If a physician dies from the stress or is forced into early retirement, it matters little to the hospital administrators or government health bureaucrats, because the world is filled with physicians eager to take his or her place. One might expect some concern about the patients, but there is little or none.

Physicians need to band together and put a stop to this harmful system once and for all, and to protect themselves from arbitrary abuse by hospital administrators and government bureaucrats.

Russell L. Blaylock, M.D.
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On p. 40, Luckey writes, “Using a weighted average exposure of 2 cSv, extrapolation of these data indicated an average body burden of 50 cSv would reduce cancer death rates to zero. When this dose was divided by the weighted average of 34 years exposure, the data suggest that 18 mSv/y would reduce cancer incidence so much that it would become a minor cause of death.”

In his books and other publications, Dr. Luckey compiled evidence proving the linear no-threshold hypothesis (LNT) false. A false, straight-line interpolation of biologically significant health effects from high dose effects was the basis for this hypothesis. As Luckey notes on p. 41, “small and large doses produce opposite effects. This can also be referred to as a biphasic dose-response curve.” Every biologic dose-response curve that I’m aware of is S-shaped, not a straight line.

Given the demonstrated false results from interpolation in the linear no-threshold hypothesis (LNT), why does Dr. Luckey seem to give weight to the extrapolation to zero cancer deaths in Figure 4?

Robert J. Cihak, M.D.
Brier, Wash.

In reply: It is good that medical people will consider low-dose irradiation for the prevention of cancer.

The following should clarify Dr. Cihak’s reading of the paper:

Most people equate the biologic effects of ionizing radiation directly with dose. This produces a sigmoid curve.

However, the biologic effects of ionizing radiation depend upon the logarithm of the dose. This plots as a straight line. The log dose presentation provides predictions by extension of the straight line, as in Figure 4.

The data presented are consistent with a straight line from below ambient levels (an acute deficiency of ionizing radiation) to an optimum level. At the optimum level the data clearly show a decreased beneficial effect with increasing levels. This produces the LAMBDA (all caps) curve as shown in figure 1.

The linear-no-threshold hypothesis is wrong when it begins at ambient levels, leaving no place for hormesis. The data, however, support a linear-no-threshold concept when it begins at the threshold, where the dose is more than a thousand times the ambient level.

Low-dose Radiation

My thanks to Dr. Luckey for his article documenting the healthful effects of low-dose ionizing radiation. He has devoted much of his life to investigating these effects.1

I do not, however, understand the extrapolation he makes in Figure 4, where he summarizes and plots biopsitive radiation effects on cancer mortality from several studies. “A weighted average for total cancer mortality rates at 2 cSv allows extrapolation (the heavy line) to zero cancer deaths” at about 50 cSv (essentially the equivalent of 50 rad or 50 rem for humans, at 1 cSv/rad). Natural background averages about 0.3 cSv in the U.S.

Atmospheric Carbon Dioxide and Nuclear Energy

Robinson et al. make an extremely strong case for rejecting the view that the rising atmospheric CO₂ concentration is a grave danger and that the carbon emission from fossil fuel combustion should be drastically reduced regardless of cost. The authors go astray, however, in the section “Environment and Energy.” The authors point out that spent nuclear fuel can be recycled into new nuclear fuel. This is being done in several countries. But reprocessing spent fuel does not mean that there is no high-level nuclear waste. The production of high-level waste—mainly strontium-90 and caesium-137—is inseparable from nuclear fission. This waste must be stored safely for at least 600 years. Transuranic elements with long half-lives are also produced, but it may be possible to render them innocuous; until this can be done, they will have to be stored. This is not an objection to nuclear energy, but waste depositories are unavoidable.

The authors propose that U.S. nuclear generating capacity be increased from 90 GW to 650 GW. It is most unlikely that nuclear reactors can be deployed in the U.S. at a rate faster than 20 GW per year; the program would therefore take more than 30 years to complete, and cannot start earlier than 2015, as design and construction takes 7 years. It is probable that U.S. electricity demand in 2050 will be higher than it is today, for example if gasoline-driven automobiles are replaced by electric vehicles. It is therefore far from certain that there would be 230 GW of nuclear capacity available for production for export.

The authors state that “with plentiful, inexpensive energy, seawater desalination can provide essentially unlimited supplies of fresh water.” But even nuclear energy is much too expensive. Desalinated seawater costs approximately $1.50 per cubic meter, and maize requires 450 cubic meters of water per ton harvested grain (wheat and rice require much more). The use of desalinated water for irrigated maize cultivation would thus raise the price of maize by approximately $700 per ton. There will not be “unlimited” supplies of fresh water until the cost of nuclear energy has fallen to a small fraction of its present cost. Whether this will ever happen is problematic.