BOOK REVIEWS

Nuclear Aftermaths

Effects of Atomic Radiation. A Half-Century of Studies from Hiroshima and Nagasaki. WILLIAM J. SCHULL. Wiley-Liss, New York, 1995. xvi, 397 pp., illus. $45.

Nuclear weapons are horrid things. After the immense destruction of the blast and flame and acute radiation, after the starvation and epidemics and other consequences of widespread devastation and social disorganization, after recovery from burns, fractures, and other such injuries, with little help from an overwhelmed medical system, survivors must still deal with a lifetime of disabilities and risks. Schull writes about the lifelong effects of atomic radiation exposure in language understandable by the concerned layperson or the specialist in another field. He is detailed, cautious, and dispassionate in laying out the evidence.

Schull's title promises a bit too much. He does not touch on the effects of nonionizing radiation from atomic sources; or on atomic irradiation of structural materials; or on effects on living species other than humans (except for a few references to laboratory research); or on acute effects such as "radiation sickness." However, within the range of chronic effects on human health he is remarkably thorough. These effects include many kinds of malignant neoplasms, developmental and neurological abnormalities (especially among survivors exposed at young ages or before birth), chromosomal changes, and lenticular opacities. There is good (though not conclusive) evidence for increased mortality from cardiovascular diseases and liver cirrhosis, changes in immunologic competence, impaired neuromuscular development, and parathyroid disease. He also discusses other consequences that might be of concern but have not been demonstrated: other kinds of malignant tumors, sterility or infertility, a general acceleration of aging, and a range of difficulties in offspring conceived after the bombings.

Schull's base of evidence, and indeed the primary source of knowledge worldwide about the delayed health effects of ionizing radiation, is the work of the Atomic Bomb Casualty Commission (ABCC) and its successor since 1975, the Radiation Effects Research Foundation (RERF). Schull himself has been a major actor in the unfolding of successive waves of studies, though he is quite modest about his own important contributions.

Research began within days after the bombings, and Japanese scientists were prominent from the beginning, as they have remained since. However, it was not at first clear what effects should be looked for or how they should be studied, and of course the early work had to be done with whatever tools and facilities of the middle and late 1940s could be found in a devastated and impoverished area. Though we may regret the absence of some types of survey information and the failure to collect blood and tissue specimens, these deficiencies stand out only in retrospect. On the whole, the research teams were remarkably perceptive about future needs. Epidemiology was recognized as the core discipline very early. Though persons working in the "hard" sciences may regret the general looseness of epidemiologic data and conclusions, epidemiology has the vast advantage of telling quite directly about effects on the species and populations of interest. Schull brings out the great importance, and the great difficulties, of accurate assessment of exposures and doses; incomplete information about these matters still plagues the investigators. One matter that Schull does not explore in depth but that may have considerable continuing importance is the difference in the nature of the two bombs; they released roughly equal amounts of energy but were of substantially different types, with far greater exposure to neutrons in Hiroshima than in Nagasaki.

Although leukemia is perhaps the best known and most feared delayed effect of atomic radiation, the relative excess of new cases reached a peak about seven years after exposure and has declined since then (though it has not yet disappeared). In contrast, increases in the relative excesses of cancer of the lung, breast, stomach, thyroid gland, and other tissues were slower to be identified, but the increases are substantial (several times the accumulated risk of leukemia) and may be still growing.

Among the most devastating effects were those on some hundreds of fetuses and infants, including mental retardation, severe reduction in head size, diminished IQ and school performance, increased frequency of seizures, and generally retarded growth and development. Nuclear war is no respecter of persons.

A major sub-theme here is the organization and management of the ABCC and RERF in the face of serious difficulties—governmental, bureaucratic, economic, scientific, and military (during the Occupation). Even such matters as finding adequate and appropriate space and local staff in the devastated cities were major hurdles. So was hostility from an important segment of the affected community. Budgets have been a continuous concern, and bureaucratic meddling continues unabated to the present day. Through it all, the dedicated scientists working in Hiroshima and Nagasaki have built a monumental structure of knowledge about acute exposure to radiation and its chronic effects on the human organism. Schull has shown how that work was accomplished, why it is of continuing importance, and how much must still be done. We cannot close the book on this story, even after 50 years.

Schull scarcely touches on some of the secondary benefits of this long-term research program. It has led to important advances in both epidemiologic methods and statistical theory, it has given us an unprecedented picture of normal growth and development (in lightly exposed control groups), and it has surely helped to heal the strains that followed the conclusion of military operations.

Hundreds of thousands of ordinary people in two cities were caught up in events that they could not understand or control, a high proportion of them died at the scene, and others are still suffering and dying. I do not suggest that we turn maudlin at these problems among the Japanese; there were other horrors too, in China, Korea, Pearl Harbor, and many other places. (Revisionist history can be interesting, but must not be used to obscure the events that followed Japanese conquests or the prompt end of the war that occurred after the two cities were destroyed.) Nor do I suggest that the good effects, including early termination of the war, outweigh the bad. The sufferings of the persons in the two cities, however, have given us a better appreciation of the imperative to avoid modern all-out war as well as a far richer understanding of the chronic human health effects of acute exposure to atomic radiation. For that we must be grateful, and we must be grateful to Schull for telling the story in a succinct and readable fashion.

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