

# Historical Perspectives

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In 1981 a reassessment was begun of the doses of ionizing radiation received by the survivors of the atomic bombings of Hiroshima and Nagasaki. That work resulted in a new dosimetry system that is now in use to make these reassessments. This article will sketch the events that led up to the reassessment and how the necessary research was carried out, as seen from the perspective of those in the United States.

## RERF

In 1947, the U.S. National Academy of Sciences, at the direction of President Truman, established the Atomic Bomb Casualty Commission (ABCC), with offices in both Hiroshima and Nagasaki, to study the effects of the irradiation of the survivors. The ABCC worked with the Japanese National Institute of Health to this end until 1975. Then Japan and the United States created a cooperative, binational organization, the Radiation Effects Research Foundation (RERF), to take over the work. The two governments share the funding and administration of RERF; the U.S. funds are supplied by the Department of Energy and are made available through the National Academy of Sciences-National Research Council (NAS-NRC). RERF collects, stores and interprets the information about the survivors. The new dosimetry system resulting from the work being described here is installed on the RERF computer at Hiroshima.

## T65D Doses

The doses that are being reassessed were determined in 1965. They are called the T65D doses (tentative 1965 doses—"tentative" because

the scientists who developed the 1965 dosimetry system felt it would be replaced by a better system).

The 1965 dosimetry system was based on the results of a research program called ICHIBAN that was carried out by the Oak Ridge National Laboratory (ORNL) and on some of the measurements carried out in Japan that were described in the preceding paper by Dr. Hamada. ABCC, with the collaboration of ORNL, worked out a systematic way of applying these data to individual survivors to derive the T65D doses. An excellent description of the ICHIBAN program and the T65D and earlier dosimetry systems is given in a book by J.A. Auxier [1].

In brief, the ICHIBAN program included measurements at weapon tests, on weapon components, at a reactor, and at a high tower on which was mounted, at different times, an unshielded reactor, a large  $^{60}\text{Co}$  gamma-ray source, and high-intensity neutron generator. The primary data resulting from these studies were: (1) what we now call the kerma free-in-air (or the free-field kerma), the kerma that the radiation at a point in an arrangement including only the bomb, the atmosphere, and the ground would produce in soft tissue, and (2) measurements made in and around mock Japanese houses to estimate the shielding they provided.

Technicians from ABCC interviewed most of the proximally exposed (within 1,600 m of ground zero at Hiroshima and 2,000 m at Nagasaki) survivors to determine their location at the time of the bombing and how they were shielded from the radiations from the bomb. The T65D doses were calculated from these data.

## NCRP

The reassessment was the result of several streams of events. One of these involved the National Council on Radiation Protection and Measurements (NCRP). In 1976, H.H. Rossi presented a talk at the Council's annual meeting in which he combined new calculations of depth doses by Jones [2] with T65D dose estimates and concluded that a radiation worker continually exposed to neutrons at the maximum permissible level recommended by the NCRP had a probability of developing leukemia that was several times greater than that of a person receiving the maximum permissible level of x or gamma rays. Rossi recommended that the NCRP reduce its permissible doses for neutrons by an order of magnitude. The subject of his talk was later developed further in an article with C.W. Mays [3].