N232. Re-Revising the Hiroshima Dosimetry Revision

A study performed for the U.S. Department of Energy's Lawrence National Laboratory in California shows that scientists may have acted too quickly six years ago when they announced a revision in estimates of the amount of radiation released by the atomic bomb dropped on Hiroshima. The 1986 revisions suggested that the biological effects of gamma radiation -- the kind most important for setting standards for human exposure -- were greater than had been believed for more than two decades.

In the October 1 issue of *Health Physics*, Tore Straume, of the University of Rochester, and six U.S. and Japanese colleagues, say the Hiroshima dosimetry needs to be revised again in a way that would suggest gamma radiation is about as potent a biological agent as was estimated in the 1960s.

According to Straume, the number of low-energy neutrons released by the Hiroshima bomb, known as "Little Boy," was underestimated in the 1986 estimates by as much as a factor of 10. If so, neutrons must have contributed substantially more to the biological effects observed among survivors of the bombing. In turn, this means that gamma rays contributed less to the effects, and, therefore, their biological effects on humans is lower than currently believed.. "If neutron doses are really off by a factor of up to 10, then the effects of gamma rays at Hiroshima will be one-fourth to one-half that previously believed. The biological effectiveness of x-rays and other low-effect radiation would be similarly affected across the board," Straume said. Ironically, Straume said the 1965 dosimetry, through more crudely done than the 1986 revision, may have estimated the number of neutrons released by the Hiroshima bomb more accurately. That is something of a shock to the scientific community, since the 1986 revision, which suggested that six to 10 times fewer neutrons were released, was considered the most significant change in a decade in estimates of the doses received by A-bomb survivors. Says Straume, "The present findings question whether that decrease was warranted."

In the new study, Straume and his colleagues used a highly sensitive accelerator mass spectrometer to measure the amount of Cl-36 in concrete and granite samples taken at several distances from the spot where the bomb exploded. Cl-36 is produced when natural Cl-35 is hit by, and captures, a neutron. Cl-36 has a half-life of 300,000 years, so it offers a lasting record of past neutron bombardment. Scientists do not question the 1986 estimates of the amount of gamma radiation believed to have been released by the bomb dropped on Hiroshima, which has been validated by measurements of residual energy in ceramic roof tiles.

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