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Lifetime mortality risk* from cancer and circulatory disease predicted from the Japanese atomic bomb survivor Life Span Study data taking account of dose measurement error

To estimate radiation exposure risk in studies of A-bomb survivors, researchers must estimate survivor radiation doses with accuracy. Such dose estimates are calculated using detailed information about bomb yield, a study participant's physical surroundings at the time of the bombing, and models of size, shape, and composition of the human body. Much individual information used to calculate dose estimates is not precise, because survivors might not have remembered their precise location at the time of the bombing. Therefore, the radiation dose estimated for any individual might differ randomly from his or her actual dose. Such random errors must be taken into account in dose estimates during data analysis to obtain accurate risk estimates.

The authors investigated use of Bayesian analysis to adjust for random dosimetry errors in analyses of solid cancer and leukemia incidence as well as cardiac mortality in RERF's Life Span Study.** They compared their analyses results to those of similar analyses using regression calibration, a conventional method used at RERF. The authors applied their analyses results from A-bomb survivors to contemporary populations in the United Kingdom, United States, France, Russia, China, and modern Japan, which all have different natural incidences of cancers and cardiac diseases compared with those in post-war Japan.

The authors concluded that the new method was effective but did not result in risk estimates substantially different from those using the conventional method. They also found that radiation risk varied somewhat among populations, with lower cancer risks in aggregate for China and Russia, but higher circulatory disease risks for Russia. More pronounced variation for certain cancer sites was also observed, leading to markedly lower estimated breast cancer risk in China and Japan but higher estimated stomach cancer risk.

*Lifetime mortality risk: estimated probability of dying from a disease such as cancer during a lifetime

**RERF LSS cohort: The main purpose is to investigate the long-term effects of atomic bomb radiation on the cause of death and cancer incidence. At the time of the 1950 national population census in Japan, about 94,000 atomic bomb survivors were selected from among those who were confirmed to be in Hiroshima and/or Nagasaki at the time of the atomic bombings and about 27,000 who were not in city at the time. This study has tracked about 120,000 subjects.

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RERF's objective with this brief outline is to succinctly explain our research for the lay public. Much of the technical content of the original paper has been omitted. For further details about the study, please refer to the full paper published by the journal.