Longevity of Atomic-bomb Survivors

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Purpose: Knowledge of low-dose effects of ionizing radiation is important for radiation protection and for health management of radiation exposed persons. Conflicting claims have been made regarding human biological and health consequences of exposure to low doses of ionizing radiation. Although some studies have suggested that certain low-dose exposed atomic-bomb survivors live longer than their peers, the effect of radiation on longevity has not been studied using validly standardized measures of mortality in a well-defined radiation exposed cohort.

Methods: We examined the effect of radiation exposure—especially low doses—on lifespan in the Life Span Study cohort of 120,321 survivors of the atomic bombings of Hiroshima and Nagasaki, Japan, a prospective cohort study encompassing 45 years of mortality follow-up. Relative mortality rates and survival distributions were calculated using cohort-based estimation of background mortality.

Results: Median length of life decreased continuously with increasing radiation dose by about 1.1 years per Gray. Median loss of life among cohort members with estimated doses below 1 Gray was 2 months, but among the small number of cohort members with estimated doses of 1 Gray or more it was 2.5 years. Median loss of life among all persons with greater-than-zero dose estimates was 3.8 months.

Conclusions: There is no indication that radiation-exposed survivors live longer than comparable unexposed persons. Previous statements in scientific reports and the media suggesting greater longevity among atomic-bomb survivors may be due to bias resulting from the use of inappropriate comparison groups. Because the Life Span Study Cohort was intentionally constructed to contain a higher proportion of high-dose atomic-bomb survivors, average loss of life among all exposed atomic-bomb survivors should be less than the 3.8 months found for the cohort.