

Radiation Risks for the Incidence of Kidney, Bladder and Other Urinary Tract Cancers: 1958–2009

This report focuses on the risks of kidney and urinary tract (system involved in the excretion of urine from the kidneys) cancers as part of a recent series of updated papers that comprehensively describes radiation risks for incidences of solid cancers (arising in “solid” tissues such as organs) after radiation exposure among atomic bomb survivors of Hiroshima and Nagasaki based on RERF’s Life Span Study (LSS)*. The analysis of kidney and urinary tract cancers began with a total of 105,444 participants from the LSS who were alive and cancer free in 1958 and covered a 52-year follow-up, through 2009. This newest update represents an additional 11 years of follow-up since the last such paper.

The study observed 790 urinary tract cancer cases and 218 kidney cancer cases. After adjustment was made for smoking, there was found to be a strong radiation dose response (increased cancer incidence with increased dose) for urinary tract cancer. The average excess relative risk** for males and females per Gy*** was 1.4. Both males and females showed a clear dose response, with the magnitude of the female radiation risk estimate 3.4-times greater than the male risk estimate. Urinary tract cancer radiation risks did not vary greatly by age at exposure or attained age. Approximately 18% of urinary tract cancer was estimated to be due to radiation, while that due to smoking was 48%. No clear association of kidney cancer with radiation exposure was observed.

* Life Span Study (LSS):

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 over many years about 120,000 participants.

**Excess relative risk:

Excess relative risk is the percentage increase or decrease of health risk in an exposed group compared with a control group. An excess relative risk of 0 means that radiation exposure, for example, did not affect risk. An excess relative risk of 1 in the exposed group would indicate a rate of disease that is double the rate in the unexposed, or control, group.

***Gray (Gy):

Gray (1 gray = 1,000 milligray) is a unit of radiation that represents the amount of radiation dose absorbed by a substance when it is exposed to radiation. The average dose for RERF’s LSS participants is around 140–200 milligray (0.14–0.2 Gy). As reference, the average annual amount of radiation we are all exposed to in our daily lives, include medically, is estimated to be around 2–6 milligray (0.002–0.006 Gy).

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(Note: Doi—digital object identifiers—are permanent, content-specific numbers assigned to most digital information and can be used to locate materials online through an internet search.)

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.