The possible impact of passive smoke exposure on radiation-related risk estimates for lung cancer among women: the Life Span Study of atomic bomb survivors

Previous analyses by RERF of the Life Span Study (LSS)[1] of A-bomb survivors have shown a gender difference in excess relative risk (ERR)[2] of lung cancer due to radiation exposure, with women having about four times the risk of men. The reason for this difference is not completely understood, but one possibility is that the effects of passive smoke exposure were not taken into consideration in the previous analyses of LSS members. Such passive smoke exposure is now thought by many to increase risk of lung cancer. Like other Japanese populations of the same generation, the smoking rate among men in the LSS population tended to be high, whereas the rate among women was low. With that, the percentage of women exposed to passive smoking is larger and therefore analysis of only active smoking (direct exposure) effects, without including passive smoke exposure, might be one reason why a high ERR of lung cancer was observed among women in the LSS population following radiation exposure.

RERF scientists investigated the extent of decrease in this sex difference in the ERR of lung cancer due to radiation exposure after passive smoke exposure effects were taken into consideration. Since no data have been collected regarding the issue of passive smoke exposure in the LSS, the assumption was made, based on the smoking habits of men in the LSS, that passive smoke exposure effects on non-smoking women would be equivalent to a range of 0–50% of active smoking effects. When the effect was increased from no passive smoke exposure effects (in other words, when passive smoke exposure effects were equivalent to 0% of active smoking effects) to passive smoke effects estimated to be 50% of active smoking effects, the ERR of lung cancer following radiation exposure in women decreased, from 1.54 at 0% to 0.78 at 50%, and the risk difference between men and women also decreased in the same way, from 5.30 to 2.69.

The study results suggest that the lack of consideration of passive smoke exposure might have been one factor in the high ERR of lung cancer due to radiation exposure in women previously observed in LSS analyses.

Notes

[1] Life Span Study (LSS):
The main purpose of this study 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 subjects.

[2] Excess relative risk (ERR):
The increase or decrease of a certain health risk in an exposed group compared with a control group. An excess relative risk of 0 means that radiation exposure 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.

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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.