

Radiation effects on atherosclerosis in atomic bomb survivors: a cross-sectional study using structural equation modeling¹

Past reports have indicated that radiation exposure at low-to-moderate doses might pose a risk for cardiovascular disease. In this study, the association between radiation exposure and atherosclerosis was investigated in 3,274 atomic bomb survivors who cooperated in RERF Adult Health Study health examinations.

Using multiple markers of atherosclerosis measured in health exams during 2010–2014, the authors performed multivariate analyses² with a structural equation model to assess three distinct atherosclerosis components: arterial atheromas (arterial stiffness), calcification (calcium deposits on arterial walls), and plaque (solid protrusions on arterial walls).

The results indicated that calcification and plaque were linearly associated with radiation (such that the greater the radiation dose, the greater the risk of development of the two markers) at a level roughly equivalent to two years of aging or one-fifth of smoking habit per gray³ of radiation. On the other hand, radiation was not found to be significantly associated with arterial atheromas.

The results of this study suggest possible radiation effects in the development of atherosclerosis, but future long-term studies are needed to validate this hypothesis and explore potential mechanisms.

Notes

¹ Structural equation modeling:

Structural equation modeling is a technique in statistical analysis used to express structural (in other words, causal) relationships among several variables (quantities that can vary during a calculation).

² Multivariate analyses:

Multivariate analyses refer to investigations of complex data that contain more than one variable.

³ Gray (Gy):

Gray (1 gray = 1,000 milligray [mGy]) 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 mGy (0.14–0.2 Gy). As reference, the average annual amount of radiation we are all exposed to in our daily lives, including medically, is estimated to be 2–6 mGy (0.002–0.006 Gy).

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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.