

Longitudinal Changes in Red Blood Cell Distribution Width Decades after Radiation Exposure in Atomic-bomb Survivors

Red blood cell distribution width (RDW) indicates the degree of variation in size of red blood cells and might represent bone marrow dysfunction and disrupted red blood cell production. Numerous reports have indicated that RDW, which generally increases with age (meaning that as one grows older, blood cell sizes become more and more varied) is a strong risk marker¹ of incidence and death rates for various diseases. In long-term follow-up studies of A-bomb survivors conducted at RERF, radiation effects on RDW and its relationship to death rate remained unexplored.

This study investigated whether RDW was elevated in association with prior radiation exposure in survivors, based on 15-year tracking of RDW data from around 4,200 A-bomb survivor participants in RERF's health examinations conducted every two years.

Statistical analyses revealed a linear association between RDW and radiation dose, such that RDW increased 0.18% per gray² of exposure. This RDW increase was associated with higher rates of death from all causes, cancer, and cardiovascular disease. The biological mechanisms involved require further investigation if long-term changes in RDW are found to be related to disease- and death-risk estimates in radiation-exposed individuals.

Notes

¹ Risk marker:

Measurements mostly at the cellular and molecular levels that can be used to illustrate the status of bodily functions and tissues and to assess the risk of disease.

² 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 exposed to radiation. The average dose for RERF's Life Span Study (LSS) members 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, including medically, is estimated to be around 2–6 milligray (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.