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Radiation risk of central nervous system tumors in the Life Span Study of atomic bomb survivors, 1958–2009

The RERF Life Span Study (LSS)* has shown that radiation exposure increases risk of central nervous system (CNS) tumors. However, the patterns of radiation risk by type of CNS tumor, sex, and age are thus far unclear.

In this study, RERF evaluated radiation risks of glioma, meningioma, schwannoma (tumor types that originate in specific cells that support nerve cells), and "other" or "not otherwise specified" (other/NOS) CNS tumors in the Life Span Study (LSS) cohort of atomic bomb survivors.

Between 1958 and 2009, 285 cases of CNS tumors were diagnosed among 105,444 atomic bomb survivors with known radiation dose to the brain. The breakdown of these tumors was 67 gliomas, 107 meningiomas, 49 schwannomas, and 64 other/NOS tumors.

In this study population, exposed to a range of radiation doses, the CNS tumor risk increased with increasing dose. It was estimated that at one gray of radiation, CNS tumor risk in the exposed people was higher than that in the unexposed: for glioma 2.7 times higher, for meningioma 2.8 times, and for schwannoma 2.5 times. In terms of gender, we found that for a given dose men were at higher risk than women for all three tumor types, with meningioma showing the highest difference in radiation risk by sex. In terms of age, schwannoma risk decreased with age, but this tendency was not observed in the other tumors.

Further follow-up is necessary to more clearly characterize the lifetime risks of specific CNS tumors following radiation exposure.

* Life Span Study
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 about 120,000 subjects.

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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.