

Study of Atomic-Bomb Survivors: Even lower levels of ionizing radiation exposure may lead to soft tissue cancers

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In one of the largest and longest follow-up studies ever conducted to assess the effects of ionizing radiation upon the development of soft tissue sarcomas in humans, the investigators found that much lower levels than previously ever identified lead to the development of soft tissue sarcomas and poor survival rates. This study was conducted by Dr. Dino Samartzis, from the Department of Orthopaedics and Traumatology, The University of Hong Kong, and colleagues at the Radiation Effects Research Foundation of Hiroshima and Nagasaki, Japan. Details of this study appear in the February 6th issue of the *Journal of Bone and Joint Surgery [Am]*.

Soft tissue sarcomas represent approximately 1% of all [cancer types](#). They can occur anywhere in the body, can severely affect function, decrease the quality of life, are often difficult to clinically manage, and may often lead to death. The [risk factors](#) associated with the development of these sarcomas are numerous, but high levels of ionizing radiation exposure greater than 9 Gray have in the past been strongly associated with their development. Radiation-induced soft tissue sarcomas also have poor prognostic outcomes.

The investigators assessed 80,180 atomic-bomb survivors of Hiroshima and Nagasaki, who were recruited following the dropping of the atomic-bombs in August of 1945, to become a part of the [Life Span](#) Study of the Radiation Effects Research Foundation of Japan. Atomic-bomb

survivors represent one of the best populations in the world to assess the long-term effects of ionizing radiation upon the human body. Following a follow-up of 56 years since the time of radiation exposure to assessment, the investigators identified 104 cases of primary and malignant soft tissue sarcomas with a mean colon dose of 0.18 gray. Following comparison to control subjects, the study found that even lower levels of ionizing radiation were associated with the development of these sarcomas. A linear dose-response of radiation exposure and soft tissue sarcomas was identified, noting that exposure of 1 gray of radiation doubles the risk in developing these sarcomas. The investigators further noted that the overall 5 year survival rate for these subjects was 39%.

The use of ionizing radiation (e.g. x-rays, CT scans) in the medical setting in the United States has increased four-fold from the 1980s to 2006. Nuclear facility catastrophes, such as the recent Fukushima Daiichi, and other occupational settings present a risk of ionizing radiation exposure that at times is not fully understood. Lead investigator of this study, Dr. Samartzis, notes that "In an age where the use of ionizing radiation at times is liberally and frequently used in the medical setting, scatter effects from radiation therapies may even pose risk to surrounding tissues, and since potential occupational and environmental hazards of [radiation exposure](#) may be present, we need to be aware of the long-term effects of such exposure, big or small, upon the body and how to prevent them." He further adds, "This study reminds us that we need to be cognizant of the effects that even low to moderate exposures of [ionizing radiation](#) can have upon the development of human disease."

More information: Samartzis, D. et al. Ionizing radiation exposure and the development of soft tissue sarcomas in atomic-bomb survivors. *J Bone Joint Surg (Am)* 2013;95A:222-29.
jbjs.org/article.aspx?articleid=1558606

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