

Carcinogenic Effects of Ionizing Radiation

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Abstract

This presentation evaluates the role of dose and dose rate on the induction of cancer. It is important to realize that high doses of radiation produce cancer. The level estimated by the National Academy of Science is 5% per Sievert. Since most environmental exposures result in exposures in the mSv range and dose rates protracted over months or years the extrapolation of the data from high doses to low doses results in uncertainty. The DOE funded a research program to study the biological changes induced by low doses of radiation using modern cell and molecular techniques combined advances in technology. These studies determined that there is a need for basic paradigm changes in radiation biology and suggested that mutations and chromosome damage may not play the major role in the induction of cancer by ionizing radiation. At high doses of radiation where increases in cancer can be easily detected in both humans and experimental animals there is extensive cell killing, tissue disorganization and tissue damage. Dose rates that result in large doses per cell turnover also produce extensive cell killing, tissue disorganization, immune suppression, induction of chronic inflammatory disease, fibrosis and pneumonitis and changes in metabolic pathways. Such research suggests that cell killing and tissue damage and the physiological responses to that damage are the major mechanisms for radiation induced lung cancer, not mutations or chromosome damage. This presentation will discuss paradigm changes and the need for a serious rethinking of radiation standards and the implementation of protective action following low doses and low dose rate exposures to human populations.

the BEIR VI report on Radon Health Effects and was the Chief Scientist for the Department of Energy Low Dose Radiation Research Program. He recently published a book "Low Dose Radiation, The history of the U.S. Department of Energy Research Program." He has published over 200 peer reviewed articles and served on many national and international review groups.



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Biography:

Graduated from Dixie J.C., Received BS and MS Degrees from University of Utah and a PhD from Cornell University. Retired professor from Washington State University. He served on the National Council for Radiation Protection (NCRP) for almost 30 years and was on the Board of directors for that organization, was a member of the EPA science advisory board, was on the National Academy of Science team that produced