(The opinions expressed in this section are those of the authors and do not represent the official opinion or position of the Journal, the Health Physics Society, or the authors' institutions.)

Extrapolation of Radiation-Induced Cancer Risks from Nonhuman Experimental Systems to Humans, NCRP Report No. 150, 2005, 279 pp. (soft cover), $65.00, National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Suite 400, Bethesda, MD 20814-3095; ISBN 0-929600-86-X; www.NCRPpublications.org.

Ionizing radiation is one of the few cancer-causing agents for which substantial human data are available to estimate risk. Given the substantial human experience from medical, military, and occupational exposures one might wonder why a report on cross-species extrapolation would be necessary. In fact, this report is extremely valuable and addresses the importance of animal studies in refining cancer and genetic risks of radiation, and radiation weighting factors and dose-rate effectiveness factors. These factors directly impact radiation risk estimates at doses of importance in occupational and environmental settings.

The report was authored by an outstanding committee of scientists who have extensive experience in radiation carcinogenesis and mutagenesis in non-human systems and in risk assessment.

The report consists of seven chapters and focuses on the history of extrapolation of health effects from nonhuman experimental systems to humans, species differences in selected tissues and organs with emphasis on the cells of origin of cancers, radiation effects at the molecular and cellular levels, and various models and methods for cross-species extrapolation. The report provides an excellent overview of cancers of particular interest in radiation protection including breast cancer, thyroid cancer, leukemia and lymphoid tumors, and lung cancer.

Perhaps the most valuable aspect of the work is the discussion of extrapolation models and methods. There is extensive literature on cross species extrapolation particularly in pharmacologic risk assessment. Preclinical testing of anti-cancer and other drugs has provided a large body of data that has served as the foundation for current understanding of interspecies correlations and uncertainties in cross-species extrapolations. The report discusses acute vs. chronic toxicities, interspecies predictions of mortality, extrapolation of dose-rate effects, and interspecies comparisons of the behavior of internally-deposited radionuclides from experimental animals to humans.

The report offers several recommendations and conclusions. Key among these are: (1) the need to obtain and utilize molecular mechanisms underlying the cellular events that lead to cancer in various animal species, (2) the need to archive data in a manner amenable to meta-analyses, and (3) the need to acquire more information on the carcinogenic effects of heavy-charged particle radiation encountered by astronauts on deep-space missions.

This report will be of considerable interest to anyone concerned with problems in risk assessment and particularly how studies of nonhuman systems can help reduce uncertainties in risks that cannot be addressed in epidemiological studies.

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