INDUCTION OF THYROID CANCER BY IONIZING RADIATION (NCRP-80)

National Council on Radiation Protection and Measurements, Bethesda, 1985, 93 pp, $13.00

NCRP-80 is a generally well-organized compendium of epidemiologic statistics characterizing the association of thyroid cancer with prior exposure to ionizing radiation. It should prove to be a useful, concise summary reference for statisticians, health physicists, and physicians whose work at a particular point in time needs review of such data. This information is timely in view of continued societal concerns about the relationship of ionizing radiation and cancer.

An initial carefully developed chapter describes components of the absolute risk estimate equation and how the numbers are derived. These concepts and figures are neatly linked to the two subsequent chapters examining the evidence for thyroid cancer following external radiation exposure and internal exposure from iodine-131 (^{131}I), respectively. The section on animal studies dramatically emphasizes how different the findings are with small animals as compared with humans. Typical of NCRP publications, the printing and tabular materials are outstanding.

It is difficult for the reader not to be overwhelmed by the mass of data presented. The monograph would be improved by chapter summaries and a final summary interpretation of the data as they now stand: the upper range risk estimate for *external* radiation exposures beneath 1,500 rad is ~ 2.5 cases/million persons/rad/yr from exposure to risk onset in children; for adults, the risk is half that for children; and the risk from *internal* exposure to ^{131}I is considerably smaller, if it exists at all.

It is not clear why the committee did not address a major issue generated by their review, i.e., why does thyroid cancer seem to arise following exposure to *external* radiation but not to the *internal* radiation from ^{131}I? Amid the reasonably large number of human and animal studies that have been done, there surely must be some clues from which to generate hypotheses about this important phenomena. Also, in view of the efficacy of ^{131}I for producing hypothyroidism and goiter, is there some clue to cancer prevention in the development of these two entities with the absence of cancer?

A short chapter relating the reported observations to radiation cancinogenesis in general might have been more useful than the chapter summarizing a variety of less pertinent physical and biologic characteristics of the radioiodines and technetium-99m (^{99m}Tc). On the other hand, the physical data were not used to discuss whether the curie is indeed a valid dosage unit, recognizing that the particulate emissions per disintegration vary among the isotopes cited.

Other generic conceptual and operational difficulties are highlighted by the text. The methods of dosing with external x-irradiation are not discussed, although I suspect they were extremely heterogenous for many of the human and animal studies. For example, what are the experimental bounds on the doses reported in the literature? How are these sources of imprecision integrated into the risk estimates? Is there any effect of the x-ray energy spectrum on carcinogenesis?

Because these reports are of a quasistatutory nature, the statements made therein must be held to a high standard of validity. Based on the physical data tabulation, however, the authors suggest ^{123}I and ^{99m}Tc pertechnetate will be considered to have an upper bound risk coefficient for thyroid carcinogenesis which is the same as that for external radiation. Is this a correct, consistent, or prudent deduction? What are the implications for nuclear medicine practice?

The text also states that low-dose exposures from internal ^{131}I have not been shown to be carcinogenic for the human thyroid, yet it recommends an upper limit value of risk as one-third that of external irradiation. If there are no data available now or if data thus far show no relationship, then would it not be more correct to so state, rather than to imply that an unsubstantiated figure be quoted for application to the general population, litigation and to public policy? In the absence of a proven direct sequence for experimental carcinogenesis, I propose the title be, *Association of Thyroid Cancer with Ionizing Radiation.*

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DIGITAL IMAGE PROCESSING IN RADIOLOGY

A. E. James, J. H. Anderson, C. B. Higgins. Baltimore, Williams & Wilkins, 1985, 271 pp, $57.00

Major advances in digital image acquisition and processing have occurred in diagnostic radiology in the past 15 years. The most significant example is the ubiquitous computed tomography (CT) scanner, which is dependent on the successful marriage of computer and x-ray detector technology. Another example, much more limited in extent, has occurred in angiography where there has been a growing romance between image intensifier-videocamera systems and computers. During the same time period, parallel advances also have been made in nuclear medicine image-processing technology. Since the display and processing of radiographic and nuclear medicine images on digital computers often utilize similar algorithms, a new publication that surveys the current state-of-the-art of image processing in radiology would be particularly educational for nuclear medicine readers. *Digital Image Processing in Radiology* is a strong candidate to fulfill this task. In general, the publishers have produced a text of excellent quality with the minor exception, in my opinion, of the font size, which is a little smaller than normal for a book of this type.

Digital Image Processing in Radiology contains a compilation of 20 papers by experts in various areas of digital radiography. An excellent historical survey (Nudelman) of the