BOOK REVIEWS

BONE AND BONE SEEKING RADIONUCLIDES: PHYSIOLOGY, DOSIMETRY AND EFFECTS. V. Volf, Ed. New York, Harwood Academic Publishers, 1981, 153 pp, $32.00

The use of radium for painting watch and instrument dials was stopped many years ago when as a result of radiation, the marrow changes and bone-tumor induction effects became evident. Considerable scientific interest has been evident in the continued study of these effects. This concise monograph reports the proceedings of a symposium held in 1980, sponsored by the European Late Effects Project Group, with discussants from England, Germany, and Sweden. This meeting concerned itself primarily with some basic and experimental work pertinent to bone-tumor induction by radiation. With the current threat of possible exposure of populations to alpha- and beta-emitting radionuclides from nuclear accidents, the subjects reviewed in this symposium became most relevant to modern radiation medicine.

The symposium is introduced with an overview of the significance of bone-tumor induction by radiation. In addition to the obvious application to accidental exposures, the study of bone-seeking radionuclides has basic dosimetric considerations, application to study of bone physiology, and elucidation of the larger problem of cancer induction in general.

The discussants first describe the basic aspects of bone- and bone tumor-related radionuclides beginning with an exquisite and concise review of bone cell origin by Maureen Owen of Oxford. The discussion documents the origin of the osteoclast from hematopoietic stem cell lines, and the osteoblast from stromal elements (including the endothelial cells lining walls of the sinusoidal vessels). An extensive and current bibliography is included. Following is a review that nicely outlines the embryological development of bone structure. Here it is suggested that there are two types of radionuclides of concern: The "volume seekers," such as Sr-90 or Ra-226, which may deposit in bone matrix as calcium substitutes and are speculated to have less tendency to cause bone tumors than the second type, the "surface seekers," such as Pu- 239. The latter may be deposited in accreting bone surfaces or marrow, with their energy deposition primarily on the reparative cells (osteoblasts), which are then subject to mitotic transformation (and malignant potential). A major portion of the symposium is then concerned with these "surface seekers."

One discussion described the "cycle" of plutonium in bone, in which it is first deposited on endosteal surfaces. As a result of constant bone remodeling, the plutonium is resorbed with adjacent bone by osteoclastic action, enters macrophages (from the marrow), and is then redeposited on new bone. This allows continued exposure of bone-forming cells and surfaces to the deposited radiation. Another chapter briefly reports an elegant method for analyzing alpha-particle dosimetry in bone by use of computer-processed autoradiography.

The final section of the book is concerned with experimental studies of short-lived bone-seeking radionuclides. Data regarding biological variations of importance in tumor induction by specific particulate radiation are given in two final chapters.

The symposium is not encyclopedic but presents a brief, balanced view of the basics of bone physiology, radioactive particle dosimetric considerations, pertinent experimental studies, and logical conclusions. The discussions are concise, well referenced, and convincing. The data are summarily presented, but the illustrations are clear and relevant. The editor hopes that the proceedings will give an up-to-date insight into this specialized field of radiation biology, which should be of concern to all with "nuclear" interests in today's world. I think it succeeds, and I recommend this book to those concerned with tumor induction by radiation, and especially to scientists involved with dosimetry and biological effects of radiation in bone.

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MEDICAL PHYSICS AND PHYSIOLOGICAL MEASUREMENT. B. H. Brown and R. H. Smallwood. Oxford, UK, Blackwell Scientific Publications, 1981, 558 pp, $31.95

This book originated from course notes used in the Sheffield (UK) Department of Medical Physics and Clinical Engineering. As such, the scope of the text is broad, encompassing introductory electronics, computers, statistics, nuclear physics, and other topics. The level of the presentations in the book's 21 chapters is introductory throughout. Although a limited bibliography is provided at the end of the book, these references are not keyed to individual chapters and generally refer to books (without mention of specific chapters or pages) that are published in the United Kingdom.

The sections of particular interest in nuclear medicine include Chapter 2, "Basic Nuclear Physics and Radiation Biology"; Chapter 8, "Imaging Using Ionizing Radiation"; Chapter 9, "Dynamic Studies using Radioisotopes"; and Chapter 10, "In-Vitro Testing". This material constitutes only a very brief introduction to the subject and would be of little interest to the specialist.

The material on other practical subjects, such as ultrasonic imaging, vascular measurements, audiology, respiratory, EEG and EKG instruments, and hemodialysis, was of interest. The text is readable, interesting, and well illustrated and can be recommended for an introduction to the topics covered for the interested non-specialist, particularly at the undergraduate level in clinical engineering.

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"DOSIMETRY OF X-RAY AND GAMMA-RAY BEAMS FOR RADIATION THERAPY IN THE ENERGY RANGE 10 keV TO 50 MeV" NCRP Report No. 69 Washington, D.C., NCRP Publication, 1981, 110 pp, $12.00

As stated in the preface, "This report describes and discusses the many recommended procedural details for the continuing proper delivery of absorbed dose by radiation therapy machines. The report also considers the salient features of exposure and absorbed dose measurement that relate them to the national radiation standards and includes a discussion of the uncertainty in the delivery of absorbed dose." Lest the potential reader be misled by the title of the report, this is not a treatise on dosimetry in radiation therapy, but rather a very good discussion of the dosimetric cali-