QUANTITATIVE METHODS IN BONE DENSITOMETRY.
A.L. Huddleston. Boston/Dordrecht/London, Kluwer Academic Publishers, 1988, 217 pp, $90.00

This book is an informative introduction into the field of bone densitometry. It covers, in a very readable form, basic principles, methodology, and clinical application of many different techniques from the early years of x-ray-based densitometry to state-of-the-art quantitative computed tomography and dual photon absorptiometry. The book is written for physicians, scientists, engineers, and medical physicists, but anyone interested in bone densitometry should consider reading it.

In different chapters, the book covers radiographic film methods, single photon absorptiometry, dual photon absorptiometry, quantitative computed tomography, scattering methods, and activation analysis. A final chapter on clinical applications and comparison of methods serves as a helpful guide to sort out the clinically useful procedures for contemporary medical practice. All chapters are illustrated with original figures from the literature which helps establish familiarity with the true contributions to the field. A short introduction describes the composition of bone tissue and perhaps too briefly refers to the relationship between bone mass and bone strength. An examination of this relationship is most important when bone mineral measurements are used in predicting fracture risk.

The chapters are well researched. The book contains 469 references which are well integrated into the text and not just annotated. The newcomer to the field of bone densitometry will discover the long history of efforts to quantitate bone mass in vivo, the large number of investigators who have been in the past or are at present involved in bone densitometry, and will learn how our understanding of bone physiology and pathology has been influenced by these efforts.

The author himself is well known for his work in bone density measurements by a Compton-scatter method and this makes him able to convey to the reader a sense of the underlying objectives, and of the often frustrated hopes in the use of these techniques.

This overview was finished before dual energy x-ray absorptiometry became available and this method, an outgrowth of dual energy absorptiometry based on isotope sources, is not reviewed.

The book fills a gap in the literature on bone densitometry, since similar overviews such as the classic review by Cohn in the CRC series are at least 10 years old, which is a long time in a fast moving field as bone densitometry. The price of $90 was disappointing.

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NCRP REPORT NO. 101, EXPOSURE OF THE U.S. POPULATION FROM OCCUPATIONAL RADIATION.
Maryland, National Council on Radiation Protection and Measurements, 1989, 106 pp, $15.00

This is the report of one of the five radiation dose assessment committees of the NCRP whose combined summary was presented in NCRP Report No. 93, Ionizing Radiation Exposure of the Population of the United States. Although an early draft of this was used for Report No. 93, the general information and conclusions in the summary are still valid, only the data in this report are more current. The report consists of five chapters and a glossary.

Chapter 1 introduces the objectives of this literature review on occupational exposures and defines the scope of the populations studied and the limitations of personnel dosimetry data. The goal is to determine average annual effective dose equivalents and collective effective dose equivalents for the U.S. work force. Eleven major work categories, many with several subcategories, are defined.

Chapter 2, "Personnel Dosimetry," reviews seven reasons for monitoring personnel and the methods and uncertainties of these measurements. Recognizing that there are many variables that introduce uncertainty in the assessment of effective dose equivalent from a personnel dosimeter, the report still notes that compared to other hazards in the work place, radiation is probably the best characterized and measured. It is also recognized that the internal effective dose equivalent has much higher uncertainty than the external, but that for most of the occupations studied it is likely to be trivial in comparison.

Summaries of dose equivalents by occupation are described in Chapter 3, the major component of this report. The primary sources of personnel dosimetry data readily available are those of NRC licenses and federal facilities and their contractors. These include occupations associated with nuclear power production, DOE laboratories, those monitored by the U.S. Public Health Service, and medical licenses in nonagreement states. There are some excellent summary tables on numbers of exposed, average annual dose equivalents, and cumulative dose equivalent from an EPA report in 1984. Also, because of NRC reporting requirements, there are more data available on nuclear power plants than any other occupational category. From the EPA report it is noted that between 1960 and 1985 the mean annual dose equivalent for monitored workers declined or remained constant whereas the collective dose equivalent increased. Even so, this collective dose equivalent is trivial compared to that from background radiation.

The section on medical occupational exposure was disappointingly brief, due to incomplete data because agreement states in general don't require annual reports like the NRC. The data do show, however, that whereas the number of monitored medical workers has increased by 46% between 1970 and 1980, and 93% since 1960, the mean annual dose equivalent has decreased by 42% and 63%, respectively. The cumulative dose equivalent has decreased by 18% and 29% over these same time periods.

The last two chapters summarize the findings and present conclusions and recommendations. They note that occupations that involve the largest mean annual dose equivalents include underground uranium miners, commercial nuclear power plant workers, fuel fabricators, physicians, flight crews, industrial radiographers, and well loggers. Also emphasized is that the frequency distributions of annual dose equivalents in most radiation related occupations are highly skewed, most receive low doses but a few receive doses approaching the regulatory limits. One of the recommendations of the report is to evaluate in much more detail the medical personnel exposure data from non-government sources and institutions. Expansion in this area would make this report more useful to the nuclear medicine community.

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CORRELATIVE IMAGING: NUCLEAR MEDICINE, MAGNETIC RESONANCE, COMPUTED TOMOGRAPHY, ULTRASOUND.
M.P. Sandler, J.A. Patton, M.I. Shaff, T.A. Powers, C.L. Partain. Baltimore, Williams & Wilkins, 1989, 660 pp, $110.00

The title *Correlative Imaging* captures both the intent of the authors and contents of the book. The organization of the various topics into the different chapters is both comprehensive and orderly. The treatment and discussion of each imaging modality in the appropriate chapters is generally fair and even. All chapters are well-referenced. The format and style of presentation, despite numerous contributors, is homogeneous, and thereby results in the overall easy blend of information. The fact that the authors/editors are all from the same institution has probably facilitated conferencing and consultations, thereby resulting in this desired homogeneity. The first three chapters are devoted to the basics of physics and instrumentation in the commonly utilized imaging modalities covered. These, as are most of the chapters in Section 1, are written in an easy-to-read/understand format. Inarguably, these chapters are written carefully with perhaps the physician or physician trainee in mind. The introduction section to "Magnetic Resonance Imaging" and the use of simple, clear diagrams and illustrations are the best I have seen.

The issue of quality assurance is more than adequately addressed in Chapters 7–9. The authors are to be complimented for including these quality assurance chapters in nuclear medicine, magnetic resonance imaging and other correlative modalities, i.e., digital subtraction angiography and computed tomography. All three chapters make for easy references in this rather obligatory and timely area. Small institutions particularly may benefit most in finding the section an excellent general guideline for their own quality assurance program.

The reviewer found particularly comprehensive and outstanding the chapters on cerebrospinal fluid, adult cardiac, hepatobiliary system, adrenal gland, gastrointestinal tract and inflammatory imaging. The chapter on peripheral vascular imaging, when compared to the rest of the chapters, appears to be somewhat weak. Specifically, the resolution of the images on radionuclide venography and arteriography are of lesser quality. Additionally not all accepted lower extremity radionuclide venography approaches have been adequately covered in this section. Whether technetium-99m-labeled macroaggregated albumin (MAA) or human albumin microspheres are the pharmaceuticals of choice in radionuclide venography is moot.

It was doubly delightful to see nuclear medicine "orphan procedures" such as imaging of the cerebrospinal circulation, gastrointestinal transit studies and difficult-to-image structures, such as the adrenals treated with sensitivity and detail by authorities who have accumulated vast data based on their own clinical experience. The sometimes difficult-to-follow physiological and pathophysiological pathways of cerebrospinal fluid circulation are clearly explained and illustrated in Chapter 11.

The inclusion of a full chapter on pancreatic imaging (CT and US) is an appropriate subtle reminder to nuclear physicians that the pancreas is still a vital part of human anatomy that is heir to diseases. On the other hand, testicular imaging which appears in a rather limited section in the chapters on Pediatrics and Inflammatory Imaging could have been expanded in the renal section and the latter retitled Genitourinary Imaging. Testicular imaging is a simple, well-tested nuclear procedure that has by far the highest positive yield when adequately performed.

In perusing this book, one does not get the feeling of turf chauvinism, but in its stead a sincere message to the reader and student of diagnostic imaging, that current imaging modalities, although many and varied as they are, need not necessarily be competitive but complimentary; and if properly applied and directed will yield the best results in assisting the image specialist to help the patient.

Putting together a book of this magnitude, juxtaposing and comparing all currently available imaging modalities, without losing track of the book's initial thrust which the title clearly defines, is no small feat. To their credit, the authors have achieved this with flying colors. Second, the student of diagnostic imaging is also given a good perspective of areas of imaging other than his/her own specialty without resorting to volumes of references. It was a pleasure to review this book.

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Books Received

Scintigraphy of Inflammation with Nanometer-Sized Colloidal Tracers. *M. De Schrijver, Dordrecht, The Netherlands, Kluwer Academic Publishers Group, 1989, 212 pp, $69.50*

Synthesis and Applications of Isotopically Labelled Compounds 1988. *T.A. Baillie, J.R. Jones, New York, Elsevier Science Publishing Co., 1989, 828 pp, $294.75*

NCRP Report No. 102, Medical X-Ray, Electron Beam and Gamma Ray Protection for Energies up to 50 mEv (Equipment Design, Performance and Use). *Bethesda, Maryland, National*