Nuclear Imaging in Drug Discovery and Approval. H. Donald Burns, Raymond E. Gibson, Robert F. Dannals and Peter K.S. Siegl, editors. Birkhäuser, Boston, 1993, 343 pages, (contact publisher for price).

This text utilizes the knowledge and experience of 34 contributors drawn from academia and industry to describe the utility of nuclear medicine imaging in drug discovery and development. The foreward by Dr. Wagner puts the text in perspective:

> The potential use of [nuclear medicine] by the pharmaceutical industry has been recognized but just barely tapped. It can greatly reduce the cost and time required for chemicals to be transformed into FDA approved drugs. The goal of this book is to provide the pharmaceutical industry with a look at how this technology can contribute to increasing the efficiency of drug development and to shorten the time from initial synthesis to approval of new drugs.

The authors describe the utility of radionuclide techniques in 17 chapters. The initial chapters are devoted to a description of the technology of radionuclide imaging. Subsequent chapters describe specific studies where radionuclide imaging played a role in drug evaluation. The text offers a substantial collection of references on drug synthesis and is at its best when the contributors from industry are describing their applications of nuclear techniques for drug discovery and development. In that regard, the chapter by Heald et al. on the gastrointestinal transit and systemic absorption of diltiazem from a modified release dosage form stands out. The authors novel approach to the evaluation of this drug was used by the company to gain approval for this dosage form. The details of their experimental procedures and controls define the kind of meticulous detail necessary to accomplish research on the level required by the FDA. It is unfortunate that many of the chapters are short, particularly since the authors try to present a wealth of material. As a result, the reader is left with the impression that they have glimpsed a beautiful smorgasbord, but have only been permitted to sample a few appetizers.

Radionuclide imaging has much to contribute to drug discovery and approval. Perhaps the second edition of this text will permit a more detailed description of specific instances where radionuclide data played a key role in shortening the drug development and approval process.

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Pediatric Nuclear Imaging. J.H. Miller, M.J. Gelfand, editors. W.B. Saunders, Philadelphia, 407 pages, $95.00, 1994.

This book consists of 13 chapters, written by 15 authors, and addresses most of the issues that might arise in the performance and interpretation of radionuclide studies in children.

Most of the chapters are well-written and informative. The illustrations are clear and the book is well-referenced. This is an edited volume and, as a practical matter, the editors have interspersed brief, referenced "Editor's Comments" within the contributed chapters. More experienced practitioners will appreciate the additional perspective, particularly when the authors share insights derived from their many years of clinical practice. Occasional disagreements, however, may confuse those who are new to the subjects presented. For instance, there is a statement in the skeletal chapter that the somewhat quixotically named "reflex neurovascular dystrophy" (aka "reflex sympathetic dystrophy") presents with diminished activity on all three phases of the bone scan. The editor notes, in an adjacent comment, that the appearance will vary both with the patient's age and the time interval since injury. While this partial emendation rescues an otherwise misleading and telegraphic description, the novice reader may still emerge confused. Such differences of opinion may strike a more harmonious chord with experienced practitioners, to whom the book may be best directed.

As a nuclear imaging textbook, most of the material focuses on the use of radionuclides in diagnosis. Most of the chapters accomplish this well, but the coverage of some sections fails to accord full recognition to other imaging methods and these omissions take an occasional partisan overtone. For instance, testicular scanning is discussed without mention of color-flow Doppler. Liver spleen scanning is presented as a viable imaging technique for hepatic metastases and splenic trauma (an anachronism in the world of current generation CT scanners). With respect to the imaging of splenic trauma, the claim that the radionuclide liver-spleen scan "also allows evaluation of the liver" will not raise too many eyebrows among our CT colleagues.

There is much in the book that will be of value to the experienced nuclear physician, particularly in light of the variety of viewpoints presented. Second year nuclear medicine fellows and more advanced radiology residents may also profit from reading it.

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Physics and Radiobiology of Nuclear Medicine. GB Saha, editor; Springer-Verlag, New York, 208 pages, $49.50, 1993.

This textbook is a brief, straightforward exposition of the basic physics, technology and radiation biology of nuclear medicine. It contains 14 chapters and 76 illustrations presenting, in logical order, the essential topics in nuclear medicine technology. It includes 11 chapters on topics such as: atomic and nuclear structure of matter, modes and mathematics of radioactive decay, radiation counting statistics, production of radionuclides, interaction of ionizing radiation with matter, ionization and scintillation radiation detectors, radionuclide imaging devices and characterization of their performance and tomographic radionuclide imaging. One chapter focuses on radiation biology, internal radionuclide radiation dosimetry, radiation protection and regulations. The figure legends are generally adequate but unremarkable. Although the mathematically oriented chapters (e.g., on radioactive decay) include several solved numerical examples, more such examples would have been helpful. Each chapter concludes with a series of mathematical and/or nonmathematical questions (with the answers to the former presented in an appendix) and a short list of suggested readings, typically standard nuclear medicine textbooks. In addition, there are two other useful appendices, a tabulation of important units and constants and a brief but thorough glossary. The table of contents and the index are logically organized, thorough and accurate.

The book is remarkably free of noteworthy errors. Three such errors, however, are the implication that nuclear reactors can explode like nuclear bombs, numerically erroneous risk factors for radiation carcinogenesis and misidentification of the absorbed fraction as the specific absorbed fraction in dosimetry formulas. The presentation of material is occasionally too abbreviated and too simplified, particularly in the chapters on radiation biology and internal radionuclide radiation dosimetry. For example, the author makes the unqualified statement that the genetic doubling dose in humans is 50 to 250 rad. Although strictly correct, the author fails to include the critically important observation that germ cell mutations have never been definitively demonstrated in man, even among A-bomb survivors in Hiroshima and Nagasaki who received average gonadal absorbed dose equivalents approaching 100 rem. The most troublesome errors, however, are of omission. Most notably, the chi-square test is not included in the chapter on radiation counting statistics, the formula for the energy of Compton-scattered photons is not presented, quench correction methods for liquid scintillation counting are enumerated but not described, the important practical topic of prefilters (and their cutoff frequencies) in SPECT is virtually ignored, the definitions of and distinctions between stochastic and nonstochastic radiation effects are not included, and the definitions of and formulas for effective half-life and multicomponent (i.e., multi-exponential) distribution functions in internal radionuclide radiation dosimetry are not clearly presented. Moreover, the didactic presentation of several important topics, such as Auger electrons, the operating principles of nuclear reactors and of thermoluminescent dosimeters, and direct and indirect radiation effects, would have been enhanced with appropriate diagrammatic figures.

This book is remarkably similar in depth and scope to the popular textbook, *Introductory Physics of Nuclear Medicine*, by Ramesh Chandra. It is comprehensive and material is presented in an appealingly simple though generally superficial manner, perhaps appropriate for nuclear medicine technology students or beginning nuclear medicine and radiology residents. Although it would be a useful starting point for students and trainees, a somewhat more thorough and advanced text, such as *Physics in Nuclear Medicine* by James Sorenson and Michael Phelps, would ultimately prove more useful and economical.

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