

BOOK REVIEWS

TRACER KINETIC METHODS IN MEDICAL PHYSIOLOGY. N. A. Lassen and W. Perl. New York, Raven Press, 1979, 189 pp, \$22.00.

This is a remarkable book. The authors have effectively taken a complex subject with multiple ramifications in medicine and physiology and incorporated it in an extremely lucid, well-illustrated, stimulating, albeit challenging, text. Dr. Niels Lassen is widely recognized as a major authority on the application of tracer kinetics. His enthusiasm, understanding, and clear thinking can be immediately appreciated in reading the text. Dr. William Perl, before his untimely death, was renowned as a prime contributor to the theories of tracer kinetics. The book is an outgrowth of many years of collaboration by the authors, who worked diligently to develop the teaching methods necessary to share their understanding of an intellectual discipline that has now become a cornerstone of both medical physiology and applied nuclear medicine.

The chapters lead in a systematic and progressive fashion from the application of Stewart's constant infusion method, through a thorough discussion of the distinction between constant infusion and bolus injection with either outlet or inlet mixing, to an approach toward "black box analysis" including capillary permeability studies. The references are extremely well chosen and placed in relation to the text to provide a most useful opportunity for historic reflection. Although the subject matter is complex and requires some mathematical understanding, it is so well presented that even the novice will be able to develop a significant appreciation of the thought that has gone into the use of tracers in the study of physiology and disease. The illustrations are simple, clearly pointing out those elements of understanding that may be difficult to verbalize. The packaging is remarkably appealing—the equations, illustrations, and references are placed in such relation to the text as to provide continued reinforcement and refreshing insight. While there may be some disagreement about the relative merits of alternative approaches to various problems raised, the authors have presented a balanced and readily understandable basis for the formulation of future developments in this field. The problems at the end of each chapter serve as an appropriate stimulus to confirm an understanding of the issues. I hope that the availability of this text will lead to the development of medical school and basic medical physiology courses in this most important area.

This text provides an exciting new dimension in our efforts to teach and understand this discipline, and I would strongly urge that it be read by every specialist in nuclear medicine and by many medical and physiology students. We should become increasingly aware of the importance of tracer kinetics to both physiology and nuclear medicine. This information is particularly relevant when seen in light of recent developments in nuclear medicine that are based on the principles of applied time-dependent studies rather than static imaging. A broader understanding of tracer kinetics may well provide a stimulus toward a wider application and the development of diagnostic tests related to regional physiology. This knowledge is prerequisite to realizing the potential of cyclotrons and emission computed tomography since their application requires a thorough understanding of the tracer method. I hope that this book will receive wide acceptance in the nuclear medicine

community as a fundamental text for the discipline. The authors have dedicated the book to Kenneth Zierler of Johns Hopkins University, who also made significant contributions to the development of this basic field. I compliment Drs. Lassen and Perl and the publisher on a superb job.

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TEXTBOOK OF NUCLEAR MEDICINE: CLINICAL APPLICATIONS. A.F.G. Rocha. Philadelphia, Lea and Febiger, 1979, 495 pp, illustrated \$32.50.

The need to update frequently basic medical texts is apparent to no greater degree than in clinical nuclear medicine. Changes in concepts as well as modifications in techniques and knowledge may have a great impact on effective practice in this field. Although soon dated, a textbook serves as a compendium of knowledge unavailable in individual articles. A distinguished group of authors has provided in this text a relatively complete volume, in a clear and concise manner.

The chapter on the thyroid is a well-balanced review, primarily focused on testing and results, but with a summary discussion of diseases and the approaches to therapy of hyperthyroidism and thyroid cancer. The authors' methods of diagnosis and therapy are often given, but adequate references allow the reader to review in depth other approaches. Although appreciable differences of opinion exist in this area, the authors succeeded in summarizing the most important philosophies and methods. With the introduction of computed tomography (CT), for a time the radionuclide brain scan became a secondary procedure for cerebral disease evaluation in many institutions. As experience accumulated, however, the radionuclide study re-emerged as a valuable diagnostic tool, especially in flow evaluation, the early diagnosis of encephalitis, and for screening purposes. In addition to an excellent review of basic brain imaging, the chapter provides a comprehensive discussion of the more important diseases detected by radionuclides. Radionuclide cisternography and other CSF applications are equally well discussed. The basic mechanisms of skeletal imaging are clearly explained and the clinical discussion is concise. Several problem areas, such as differentiating osteomyelitis from cellulitis and the role of routine bone imaging in tumor patients, are not discussed. The chapter on the gastrointestinal system furnishes an excellent discussion of available techniques; however, the pancreas receives more attention than would seem warranted by current medical practice, particularly with the other available diagnostic modalities. Radiocolloid imaging of the liver is exceptionally well covered, with appropriate discussions of many diseases. Rose bengal studies are explored in depth, but the newer biliary imaging radiopharmaceuticals are slighted. The chapter on the lung is the second longest and one of the best in the book. The physiology, pathology, and diseases are comprehensively covered and well written. In fact, this chapter could stand alone as an excellent monograph. Although radionuclide studies of the heart have become almost a separate nuclear medicine specialty, this chapter, although it covers many of the basics, is somewhat limited to be of more than orientation value.

Thallium-201 is briefly mentioned, whereas rubidium-81 is prominently discussed. The chapter seems somewhat heavily oriented toward peripheral vascular evaluation, which is infrequently used, and the discussion of placental scanning also seems out of place today. On the other hand, lymphoscintigraphy is well covered. The renal section begins with a discussion of basic principles, but the inclusion of complicated equations without *clinical* applications or further discussion is confusing. Unfortunately, the author's methods of renal functional evaluation are stressed, with only brief discussions of the more classical renogram and its variations. Diuretic renography is not mentioned at all. The section on renal imaging is, nonetheless, very comprehensive, but the discussion of bladder procedures is quite brief. Adrenal scanning is presented as the "state-of-the-art" by the current primary authority on this subject. The chapter is clear, useful, and furnishes excellent examples.

A very pertinent clinical discussion of the blood is given, including ferrokinetics, volume studies, in vitro studies, and marrow and spleen imaging. The chapter is remarkable in its clinical emphasis, while keeping methodological details to a minimum, and should be especially helpful to those with little familiarity in this area. In the chapter on neoplasms a large bibliography and the author's experience with gallium-67 scanning is concisely covered, but other tumor localizing agents are only briefly mentioned. Pediatric considerations are primarily concerned with dosimetry and sedation, and no specific clinical pediatric discussion is included. A short chapter on water and electrolytes provides a good summary of the basic principles involved in studying various compartments. The final chapter covers that most important subject, diagnostic test evaluation, which has just begun to be understood and explored. It is a useful summary of a complicated and very pertinent subject.

Overall, this is an excellent book, with some outstanding strengths and a few weaknesses. I recommend it highly to all who practice nuclear medicine full or part-time. It should be especially useful to those in training programs.

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THE TOXICITY OF PLUTONIUM, AMERICIUM AND CURIUM. J. C. Nenot and J. W. Stather. Published for the Commission of the European Communities. New York, Pergamon Press, 1979, 225 pp, \$27.50.

This is a report prepared under contract for the Commission of the European Communities within its Research and Development Program on "Plutonium Recycling in Light Water Reactors." The objective of the report is to provide a biological basis for an assessment of the radiological health problems that result from human exposure to plutonium (Pu), americium (Am) and curium (Cm). Since only limited data are available on the metabolism of these actinides in man and there has been no recorded incidence of serious long-term effects, current knowledge is mainly derived from animal experiments. The authors have summarized infor-

mation from over 400 papers and reports (to 1978), including several of their own, as well as those of W. J. Bair, J. E. Ballou, R. D. Lloyd, R. Masse, J. F. Park, C. L. Sanders, and others. This mass of data has been superbly organized in a few chapters that deal with the physical and chemical properties of biological importance, human experience, metabolism in animals, tissues at risk, pathological effects in animals, the "hot particle" problem, treatment for accidental intakes, and concludes with a quantitative assessment of the biological consequences of human exposure to Pu, Am, and Cm, and a summary. This excellent book belongs in the library of those scientists concerned with these problems of toxicity.

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TEXTBOOK OF NUCLEAR MEDICINE TECHNOLOGY. P. J. Early, M. A. Razzak, and D. B. Sodee. St. Louis, C. V. Mosby Co, 1979, 691 pp, illustrated, \$26.95.

This book provides a good review in the basics of nuclear medicine technology. It is divided into two sections, "Nuclear Science" and "Clinical Nuclear Medicine." The first section covers nuclear physics, imaging, and counting statistics. The chapter on radiation detection is broad and incorporates many of the most current techniques that have come into clinical use since publication of the author's previous edition. Similarly, the imaging section includes a discussion of the newer "state of the art" instrumentation, such as total body and emission tomographic scanners, and an explanation of the various correction devices used on current cameras to achieve field uniformity. The chapter on computer systems, although quite elementary, does provide a basic understanding of the hardware and software components and the varied applications for data acquisition and analysis.

The second portion of the text deals with the clinical applications of nuclear medicine. The authors have prepared an excellent comparison with other imaging modalities by clearly presenting and explaining the techniques involved in transmission computerized tomography and ultrasound. There are excellent illustrations for comparison of the complementary benefits of the various instruments. Brief chapters on radioimmunoassays and radionuclide therapy complete the book. These chapters tend to be rather superficial in nature and although a reasonable bibliography is included, a more extensive text on the primary data is needed to completely cover these subjects.

The chapters tend to vary between basic information, introductory approaches, and extensive topic coverage; however, with the exception of the radiopharmaceutical quality assurance assurance, (which is not covered in great detail) the major nuclear medicine subjects are reviewed in a style that is well written and easy to read. The book provides a good general reference tool for use by both physicians and technologists.

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BOOKS RECEIVED

Biological Foundations of Biomedical Engineering. Jacob Kline, ed. Little, Brown & Company, 1976, 988 pp, \$42.50.

Photochemical and Photobiological Reviews, Vol. 5. Kendrick C. Smith, ed. Plenum Press, 1980, 316 pp, \$30.00.

Nuclear Medicine Review Syllabus. Peter T. Kirchner, Senior Editor, New York, Society of Nuclear Medicine, 1980, 619 pp, \$30.00.

Chain Reaction—Twenty Years of Nuclear Research and Development in South Africa. A.R. Newby-Fraser, Atomic Energy Board, 1979, 212 pp.

Ultrasound in Urology. Martin I. Resnick, Roger C. Sanders, Baltimore, William & Wilkins Co., 1979, 390 pp, \$37.95.