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Essentials of Nuclear Medicine Imaging, 5th ed.

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well as its strengths and limitations. A complete set of criteria for diagnosing stenosis, occlusion, collateral pathways, vasospasm, and elevated velocities in sickle cell disease is included. Another chapter in this part, very well-illustrated, includes scanning techniques and criteria for the diagnosis of temporal arteritis.

The well-established applications of abdominal, pelvic, and Doppler are very complete. However, the newer applications of volume acquisition of sonographic images and their clinical applications of 3D/4D for abdominal/pelvic areas have yet to be established; therefore, they are not included in this edition. Volumetric images of the kidneys and urinary bladder are portrayed in 3D format.

Part 10 represents a complete set of chapters on the role of Doppler in the evaluation of native and transplanted organs and specific applications such as transjugular intrahepatic portosystemic shunts, renal artery stenosis, and chronic mesenteric ischemia. Every chapter discusses in detail normal and abnormal hemodynamics portrayed on spectral waveforms, offering clues to the underlying pathology related either to cardiac disease or to the organ being evaluated.

The entire book has state-of-the-art illustrations, with excellent color, power, or 3D/4D sonographic images. The authors and editors have compiled a very comprehensive text regarding sonography measurements: gray-scale, color/power, and spectral Doppler. Those interested in neuroradiology can derive basic comprehension of the diagnostic sonography field as it pertains to prenatal intracranial assessment and middle cerebral artery flow and its value in the assessment of fetal growth restriction. Neonatal neurosonology, transcranial Doppler, and extracranial carotid occlusive disease are other applications pertaining to neuroimaging.

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BOOK REVIEW

Essentials of Nuclear Medicine Imaging, 5th ed.

Fred A. Mettler and Milton J. Guiberteau, eds. New York: Elsevier, 2006, 512 pages, 600 illustrations, \$95.00.

For an imaging textbook to have a 5th edition, the previous 4 editions must have been quite good. Indeed, since the first edition of the text was published in 1983, this historically concise textbook has been a mainstay choice for radiology-resident nuclear medicine education. For many years, the prior editions of this text have been very popular choices as the single nuclear medicine book that radiology residents would read in preparation for their boards. Nuclear medicine has seen great changes in the past 23 years, and this 5th edition follows a full 8 years after the 4th edition. Thus, much innovation has occurred in this time (like nearly all of clinical positron-emission tomography [PET] and now PET/CT), so new material had to be added to make the book relevant to the substantially different and more complex current practice of nuclear medicine.

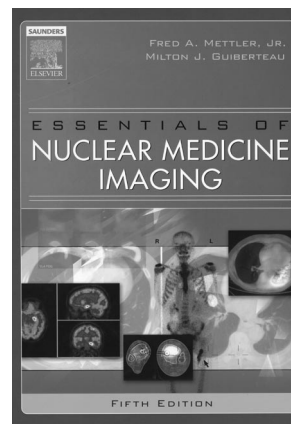
Including the index, the “concise” book now contains nearly 580 pages. The book is attractive, with substantial use of color in a variety of chapters, including images, tables, and artists’ drawings. There are 14 chapters, a 70-page set of “unknown cases,” and 13 appendices. Although the title of the book is “Imaging,” there is some treatment of the growing area of therapeutic nuclear medicine, especially as it relates to radiation safety issues. The organization of the book is generally logical. The first chapter deals with radioactivity, radionuclides, and, to some extent, radiopharmaceuticals. The second and third chapters cover instrumentation and quality control. Chapters 4–12 deal with organ system imaging, tumor imaging (non-PET), and inflammation imaging. These chapters essentially exclude PET imaging in toto, but chapter 13 is a nearly 70-page minitext on all of PET. Chapter 14 deals with radiation safety and regulations. The 13 appendices follow and include a rather comprehensive and valuable chapter on sample techniques for nuclear imaging (a “how to” section).

In each chapter, there are illustrations, tables, and figures in color and a very useful section at the end of each chapter entitled “Pitfalls,” which has highlights of the chapter. The overall design of the book works reasonably well, but there is a clear lack of integration of the PET physics, chemistry, and imaging results with the rest of the book. This was clearly an easier choice for the authors than trying to break up PET by organ systems and to integrate it into the organ-based sections. It does lead to some discontinuities in the text. For example, if one wants to know how to image thyroid disease, one has to look in 2 places, 1 for single-photon emitters and another for PET. This is somewhat cumbersome, but understandable. Overall, the book is quite reasonably organized and contains useful information, some very hard to acquire easily in other ways, and most of it is accurate.

Although the book covers most nuclear medicine and seems to be a very good choice for a radiology resident in training or someone wishing to update themselves in the field after a lapse in practice, of relevance to readers of this journal is how well it addresses the needs of a practicing neuroradiologist who wishes to brush up on nuclear medicine either to do some PET or some on-call nuclear studies.

The first 3 chapters are quite useful, though the first chapter has very little about radiopharmaceuticals, despite its name. Rather, radiopharmaceuticals are discussed elsewhere in the book by organ system, but their treatment is brief. A minor omission in the chapter on mechanisms of localization is the absence of radiopeptide-receptor imaging methods (eg, somatostatin-receptor imaging). In the instrumentation chapter, the figures are generally good.

Given the overall quality of the paper used in the book and placement of color figures and tables throughout, I had high expectations for the quality of images. However when a 5th



edition of a book is written, there is a tendency to reuse the “oldies but goodies” cases that illustrate key points. This practice can be good and is understandable, but some of the images are truly of marginal quality and obviously dated. Although lung scans have not changed that much, the images in the thoracic chapter were taken from an article published 30 years ago. These are of poor quality and are not state of the art as printed. Although they make the teaching point, they probably should have been updated. In the important pulmonary chapter, there is inconsistency between the text, the tables, and the Pearls and Pitfalls. For example, it is stated as a “Pearl” that “unless it is completely and absolutely normal never interpret a ventilation perfusion scan without a recent chest radiograph.” This seems clear, but a few pages earlier, 2 additional separate situations are described in a table in which the chest x-ray is “irrelevant.” This is contradictory. Similarly, the authors give the negative predictive value of a normal perfusion lung scan as over 90%. Although this is true, most authors believe the negative predictive value is much higher. The extensive use of tables and Pearls may not have been cross-checked quite enough. The quality of the figures in the textbook is simply not as high as might have been expected in 2006. There are references for each chapter, but the references are brief and usually refer to review articles as opposed to original scientific contributions. This is not unreasonable given page limitations.

The cerebrovascular system imaging chapter (excluding PET) should be of great relevance to neuroradiologists. It begins with several pages of planar images of brain scans. This treatment is reasonably comprehensive, especially given the small number of cases currently performed. The treatment of cerebrovascular brain parenchymal single-photon emission tomography (SPECT) imaging is not quite as comprehensive but is reasonably thorough. The quality and choice of the SPECT brain images selected as normal findings are concerning. The authors correctly refer to the use of 2 brain parenchymal imaging tracers, ethyl cysteinate dimer and hexamethylpropyleneamine oxime, but the images (from a 1988 document) appear possibly to be from another radiotracer, *N*-isopropyl-*p*-iodoamphetamine, which is not mentioned in the text, and are of poor quality. To show 8-year-old or older images using what appears to be a tracer that is not described or commercially available as the “normal” case is not as useful as showing images with the relevant imaging systems with the relevant radiotracers. This is a bit unclear because the type of tracer is not labeled.

A small omission from this section is any mention of quantitative analysis methods. These have been applied and may be worth mentioning because they help add consistency. The section on CSF shunts is quite nicely done as is the portion of the chapter on CSF leaks and radionuclide cisternography. In the Pearls and Pitfalls section, another brain tracer, *N*-13 ammonia (a PET tracer), is mentioned. It is not too clear why because it was not discussed in the chapter (or if anyone in the world is actually using this to image brain perfusion). The chapter on thyroid, parathyroid, and salivary glands is quite good but also suffers to some extent from dated images. Of interest is that no

SPECT is shown in this chapter, despite it being used fairly frequently to detect parathyroid adenomas, for example.

The chapter on PET is quite comprehensive. It is a stand-alone approach to PET, which starts with physics and goes through clinical applications. It is rich with tables and full-color illustrations, and many of the figures are of a more recent vintage than the rest of the book. The physics section is concise. Somewhat surprising is that “coincidence” is not mentioned in the physics section but is discussed first in the instrumentation section that follows. Briefly, the neophyte might misunderstand how PET detection actually works, but this is cleared up soon. The figures (artist’s drawings) of the physics of PET are very nice. They make the points clearly but obviously have to be exaggerated to be visible.

For example, the positron appears to travel one third of the way across the brain before it annihilates, which could lead to concern regarding serious resolution degradation unless the text is read carefully. Nonetheless, this section of the book is a very reasonable review of the physics of PET. One minor omission in PET radiopharmaceuticals in commercial production is NaF. Although ammonia is mentioned here, NaF is discussed later in the book, so it probably should be included here. The discussion of standardized uptake value (SUV) is a bit confusing because it suggests that there may be units of grams per milliliter on the parameter. Similarly, glucose correction is advocated, but no means to perform it is discussed. Overall, however, this chapter is quite good and is a recommended summary.

In the PET chapter, there are some inconsistencies that may confuse readers. For example, in the text, it is stated in 1 place that fluorodeoxyglucose (FDG) reaches a plateau of accumulation in tumors at 45 minutes; 4 pages later, it is stated that SUV increases in tumors at least up to 2 hours. Similarly, there are inconsistencies between the very nice summary tables and the text; for example, Table 13.9 states that there is moderately intense FDG uptake in the liver but low tissue FDG uptake in the testes, penis, and stomach (though this can be focally intense). However, a few pages later, it is stated that the contracted normal stomach often has greater activity than the liver (which has moderate level tracer uptake). Later it is stated that activity is usually seen in the testes and, to a lesser extent, in the penis.

These inconsistencies likely are the growing pains of adding a new chapter rich in text and tabular data and the challenges associated with reviewing all the information presented. Nonetheless, the text and tabular data should be correct and concordant. Although many of the images in the PET chapter are of very good quality, it is not clear if they are really PET/CT images or if they are software fusion images, and some are of lower quality. This raises the question as to whether a dedicated PET camera was used or whether coincidence imaging was performed for some images. For example, Figure 13 of Alzheimer disease is of very low resolution and not of the quality one would see on modern PET systems. The images “courtesy of Dr. William Spies” are of uniformly high quality, however, and appear to be from modern PET systems. Some statements in the text are very conservative regarding the accuracy of PET. For example, the utility of PET in cervical (pel-

vic) cancer is probably understated given the lack of reference to PET/CT here. The number of cases relevant to a neuroradiologist is limited, but overall this is a reasonable overview of the field and would provide a reasonable update.

The chapters on bone, cardiac, gastrointestinal, and renal imaging are quite reasonably done and suitable for reviews/resident education. Some of the cardiac figures are dated, but most are modern and of high quality. The appendices are generally strong, and the radiation safety, spill, and treatment considerations are very strong. The large section of unknown cases is likely a reasonable challenge for radiology residents but a bit unusual in a didactic text. Whether the 70 pages should have been used with unknowns for testing or for a more comprehensive text is a philosophic discussion. I would vote for an expanded didactic text. I am sure some will appreciate all the images. Somewhat disconcerting at first review are the answers to the unknowns, which typically involve 1 factual answer and then pose 1 or 2 more questions that must then be answered by going back to the text. This likely is targeted as a “mock radiology board” type of discussion/interaction, but it is somewhat odd for a traditional text. It may be fine for radiology residents or nuclear medicine trainees.

Overall, the authors must be congratulated on their success, persistence, and energy in producing 5 editions of this textbook and on the major improvements in this version: 1) inclusion of PET, 2) use of extensive color, 3) generally excellent tables and artists’ figures, 4) updates of each section, and

5) Pearls sections in each chapter. This reviewer found it generally quite readable. Certainly this textbook will be selected often by radiology residents as their only text and by nuclear medicine trainees as their first text, and this will be a good choice. Neuroradiologists and practicing radiologists performing a limited amount of nuclear medicine may find the book useful if only for the PET section and the excellent appendices, which can be very helpful in setting policies in a nuclear medicine clinic. Competitive books for radiology residents or those wanting a general introductory review of nuclear medicine would include the recently updated nuclear medicine text from the *Requisites Series* (C.V. Mosby), which I have seen being selected by many residents. For the neuroradiologist mainly interested in an update on PET, one of several dedicated textbooks of PET or atlases in the field, ideally ones that include high-quality state-of-the art images, would possibly be useful alternative choices. Overall, this book is a welcome and a generally well-done update to a venerable text in the field of nuclear medicine.

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BOOKS RECEIVED

Oxidative Stress and Neuroprotection (Journal of Neural Transmission Supplement 71). S.H. Parvez and Peter Riederer, eds. New York: SpringerWien; 2006, 265 pages, 72 figures, \$149.00.