tumor location and extent, radiation technique and dosage, and concurrent chemotherapy and dosage, since many factors could affect the outcome of treatment.

The final two chapters cover spinal cord injury. A.R. Kagen et al. discussed the tolerance of the brain and spinal cord to injury by radiation, and W.J. Brown and A.R. Kagan compared myelopathy associated with megavoltage irradiation and remote cancer.

The one most important defect that the readers will find in this volume is the study of long-term performance status on brain tumor patients. The literature suggests that the favorable long-term performance of the cured brain tumor patients who received radiation alone is better compared with the results with combined chemo-radiotherapy.

In summary, as the editors indicate, the volume focuses attention on the current and future risks of radiation for neural tumors, and the diagnosis and treatment of irradiation injury. It is a lengthy synthesis of an extensive literature and reviews two decades since Lindgren's work *On tolerance of brain tissue and sensitivity of brain tumors to irradiation.* In view of the valuable and extensive literature review contained in the volume, it will be eminently useful for all specialists including radiation and neuro-oncologists.

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MEDICAL DIAGNOSTIC IMAGING SYSTEMS: TECHNOLOGY AND APPLICATIONS. B. Hamilton, Ed. New York, F & S Press, 1982, 240 pp, $39.50

This book attempts to assess the current status and future developments of the medical imaging industry, by providing, according to the "Introduction," ". . . a comprehensive review of the diagnostic imaging field . . . (and) . . . an assessment of the potential, both diagnostic and commercial, of the new advanced imaging equipment and techniques under development today." The target audience is not identified, but the book appears to be oriented primarily toward businessmen, investors, hospital and government administrators, and other "non-imaging-specialists," who want to be aware of advances in the rapidly evolving field of medical imaging, and how, when, and where to spend or invest their money during the next decade.

The first chapter contains brief descriptions, of the basic principles of various imaging modalities (radiologic, CT, nuclear, ultrasound, and thermography), and a chapter describing areas of clinical applications for each modality follows. Chapter 3 provides a profile of the industry, listing the various manufacturers of medical imaging products and their share of the market, based on 1976-78 statistics. Chapter 4 describes briefly the current sources of research support (industry versus government agencies) but does not provide data either in absolute dollars or relative amounts.

Chapters 5-14 cover a broad spectrum of advanced imaging systems by categories, including x-ray (5 and 6), CT (7 and 8), nuclear (9 and 10), ultrasound (11), thermography (12), NMR (13), and miscellaneous (14), and they may be considered the "meat" of the book because they provide the basis for predictions of future developments in the medical imaging industry. Some 40-plus "new" systems or ideas are described in varying detail, ranging from systems that already are in clinical use (e.g., digital fluorography) to some that exist only on paper (e.g., a new design for high-speed CT, based on the "simple solution" of using a "rotating cathode filament with a fixed, large circular anode"). Most of this material was prepared by the book's author, with some contributed chapters and only the latter are provided with references.

The final chapter (15) attempts to project, on the basis of the preceding chapters and certain assumptions regarding government control of expenditures, etc., what the marketplace share will be for various conventional and advanced systems for each year from 1981-1990. Detailed breakdowns are given by product area, but the bottom line is that various "advanced systems" are predicted to account for about one third of dollars spent for medical imaging systems by 1990. The book closes with a bibliography (unfortunately, not referenced to corresponding chapters), a list of acronyms and major manufacturers, and an index.

Generally speaking, this book is technically accurate and free of typographical errors, but it does not contain a great deal of information useful to medical imagers or imaging scientists, except perhaps for those at the administrative level. The descriptions of technologies and systems are below that of the specialist's level, and many of the "new" systems described have been around for some time (e.g., DSR, ultrasonic holography, coded aperture imaging). Possible new information for imaging specialists includes marketplace and industry profiles and brief descriptions of some of the more unusual "imaging modalities of the future" (e.g., microwave scanners, heavy ion radiography, and impedance cameras). The book could have filled a need for those in business who are investors or are administrators. In my opinion, however, it fails to meet this objective for two reasons: (a) unevenness of coverage, and (b) lack of *critical* commentary and insight into the potential value of the various advanced systems described.

Regarding the first criticism, for example, in the description of basic principles in Chapter 1, conventional x-ray generators and tubes are described reasonably well, but film-screen systems are only mentioned in passing, and image intensifiers are not mentioned at all. In Chapter 2, under applications, conventional roentgenograms receive a scant half page, plus a table listing parts of the body that can be imaged with x-rays, which is essentially a list of all the major portions of human anatomy. No insight is given as to the value of conventional x-ray imaging, and why it is currently the most important of the many modalities discussed. Conventional fluoroscopy, angiography, cineangiography, etc., all receive only passing notice, if any at all. By comparison, nearly two pages are devoted to applications of thermography with much more detailed discussion (which, by the way, is more than adequate for this little-used technology).

Several important current and proposed imaging technologies are not mentioned, e.g., the Anger tomoscanner and 7- or 12-pinhole tomography for nuclear imaging, the Picker digital chest scanner, and the Fuji metal halide image receptor plate. Such systems are of at least as much importance in medical imaging as, for example, heavy ion radiography. One major problem area for the 1980s, mass storage of digital image data, is mentioned only in passing and the one sentence dismissal of permanent magnets as a practical alternative for NMR imaging is another major deficiency.

The second criticism, lack of *critical* commentary on the various "advanced" imaging systems that will supposedly account for one-third of the market by 1990, applies to most of the chapters on advanced imaging with the notable exceptions of Chapters 6 and 8. Some of the systems are described in tones that one expects to find in product promotional literature or grant proposal abstracts. Expressions such as ". . . early diagnosis of cancer . . ." are used to describe the potential value of some systems, with no justification that this would be the principal value of the proposed system, or, even if it were, that the system would offer any significant advantages over current systems for achieving this objective. One x-ray system is described as providing images with the "minimum possible x-ray dose," without mentioning that poor resolution and quantum noise will severely limit its range of potential diagnostic applications. A major application of DSR, according to the author, will be for mass screening for lung cancer, a statement that seems to have been offered with little or no concern for cost or practicality.

In summary, this book will be of little interest to most medical imagers or imaging scientists, especially considering its price and the scant content of new information. It may be useful as an overview for the businessman, investor, and/or administrator, but its value is diluted considerably by the uneven coverage of different imaging modalities and technologies and the lack of critical commentary on many of the proposed systems for the future.

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HEAD INJURY. P.R. Cooper, Ed. Baltimore, MD, Williams & Wilkins, 1982, pp 412, $49.00

This small, multiauthored text was evaluated from the perspective of a neuroradiologist rather than that of a neurosurgeon although *Head Injury* was written for "practicing neurosurgeons" by neurosurgeons. The twenty chapters seem to completely cover the topic in its broadest sense, with excellent discussion of the epidemiology of head injury, diffuse brain injury, posttraumatic mass lesions, and complications of head injury. The topic of increased intracranial pressure, including physiology, pathophysiology, monitoring, and management, receives extensive and authoritative treatment.

The importance of imaging in the evaluation of head injury is emphasized by virtually every author, and the chapter on radiologic evaluation is well written and well illustrated. Unfortunately, the images in the remaining chapters are of variable quality. Most of the CT figures are 160 × 160 matrix images, and the many criticisms referable to these are certainly less true than to those images obtained with better scanning equipment. The contention of one author that "stem injury can often be demonstrated if adequate CT scanning is available" is illustrated unfortunately by a CT image above the level of the petrous bones. The artifact generated by the petrous bones on all CT equipment make the pons and medulla most difficult to examine. In view of the importance of carotid dissection as a frequent mechanism of traumatic carotid occlusion, and, in some cases, the subsequent formation of cervical carotid aneurysms, it is insufficiently emphasized in the chapter on intracranial and cervical vascular injuries. The statement that "thrombi, emboli, and dissection are frequently indistinguishable by arteriography" is not true in posttraumatic carotid and vertebral occlusion. There is, however, a good discussion of carotid-cavernous fistula.

This text should interest neurosurgeons, general surgeons, and emergency room physicians, but it will not be of as much value to those with a particular interest in imaging.

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BOOKS RECEIVED

Biologie de L'action des Rayonnements Ionisants. Christiane Ferradini, Jacques Pucheault. Paris, France, Masson, 1983, 224 pp, 150 F

Computed Tomography in Radiation Therapy. C. Clifton Ling, Charles C. Rogers, Robert J. Morton, Eds. New York, NY, Raven Press, 1983, 284 pp, $45.00

Radiation Biology (CRC Series in Radiotracers in Biology and Medicine). Donald J. Pizzarello, Ed. Boca Raton, FL, CRC Press, 1982, 298 pp, U.S. $85.00, outside U.S. $95.00

Biological Transport of Radiotracers (CRC Series in Radiotracers in Biology and Medicine). Lelio G. Colombetti, Ed. Boca Raton, FL, CRC Press, 1982, 329 pp, U.S. $94.00, outside U.S. $105.00

General Processes of Radiotracer Localization, Volume I (CRC Series in Radiotracers in Biology and Medicine). Leopold J. Anghileri, Ed. Boca Raton, FL, CRC Press, 1982, 257 pp, U.S. $78.00, outside U.S. $88.00

Segmental Anatomy: Applications to Clinical Medicine. Marvin Wagner, Thomas L. Lawson. New York, NY, Macmillan Publishing Co., Inc., 1982, 650 pp, $95.00

Atlas of Topographical Anatomy of the Brain and Surrounding Structures for Neurosurgeons, Neuroradiologists, and Neuropathologists. Wolfgang Seeger. Austria, Springer-Verlag/Wien, 1978, 544 pp, $164.00