do not hesitate to recommend this book as a reference for the topics I have discussed. Chase and Rabinowitz is an old standby and will have to continue to be so although certainly its treatment leaves a great deal to be desired.

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This volume represents a good overview of an important issue—late effects of radiation on the nervous system, a topic of interest to everybody who deals with neurooncologic problems. The book is well edited and includes almost all relevant subjects ranging from diagnostic and dosimetric considerations to treatment of radiation brain necrosis.

The first two chapters are devoted to the experimental observations of delayed necrosis in normal animal brain and a review of clinical experience on irradiation injury of the human brain. W. F. Cavness has demonstrated that a dose of 8,000 rad in eight weeks to the monkey brain causes irreversible damage, which was not seen with 6,000 rad in six weeks. M. M. Mikhail correlated the CT findings of brain necrosis with the tumor dose based on isodose reconstruction maps in his chapter, “Dosimetric Consideration in the Diagnosis of Radiation Necrosis of the Brain.” In “Imaging Techniques in Diagnosis” M. D. F. Deck presented eight case reports to show the variable appearances of brain lesions on CT scans as a result of delayed radiation injury to the brain. He has also observed various patterns of evaluation of delayed radiation changes; i.e., some lesions resolved either spontaneously or by steroid medication whereas others progressed to fatal radiation necrosis within or outside the brain lesion.

D. R. Groothuis and N. A. Vick (“Radionecrosis of the Central Nervous System”) presented several key issues along with four case reports dealing with radiation damage to the central nervous system. They also reviewed the neuropathological changes of radionecrosis of the brain and found that the characteristic vascular abnormalities correlated poorly with the demyelination and necrosis but that coagulation necrosis was the most extensive and irreversible type of damage. M. S. Edwards and C. B. Wilson suggested a new direction in the treatment of radiation necrosis in their chapter “Treatment of Radiation Necrosis.” They discussed the efficacy of surgical and/or medical treatments of radiation necrosis, and surgery appeared to be a life-saving measure. In the future this approach should be ideal in many patients. T. J. Kinsella et al. have discussed uncommon problems of radiation damage to the cranial and peripheral nerves. The dose-fractionation schedule and volume irradiated are considered to be the major determinants of damage, often caused by poor radiation technique and unacceptable dose inhomogeneity.

Based on survivors of childhood leukemia, M. A. Bleyer and T. W. Griffin have examined adverse late effects of disease and its treatment. The apparent late sequelæ following chemo-radiotherapy were: (1) decreased intellectual function; (2) necrotizing leukoencephalopathy; and (3) mineralizing microangiopathy with dystrophic calcification. They found that the risk and severity of delayed neurotoxicity are directly proportional to the number of therapeutic modalities used; e.g., intrathecal (IT) methotrexate (MTX), high-dose intravenous MTX, and radiotherapy. Correlation between the risk of leukoencephalopathy and cumulative dose of IT MTX were discussed, i.e., chemotherapy given with radiation intensified damage to normal tissue. “Effects of Irradiation on the Hypothalamic and Pituitary Regions” by G. E. Richards is an important but controversial and complex topic. Well-designed, prospective, and careful studies will be needed in the future to correlate various factors such as age at treatment.

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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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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.