from the most knowledgeable physicists, all of whom have worked extensively in this area, and their presentations are written in sufficient detail and clarity to be easily used by a physicist trained in general medical physics.

Physicians will not choose to follow these manuscripts in detail, but physicists and medical radiation safety personnel will want to study every page, discussions included.

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NMR IMAGING. PROCEEDINGS OF AN INTERNATIONAL SYMPOSIUM RESONANCE IMAGING. R. L. Witcoski, N. Karstaedt, C. L. Partain, Eds. Winston-Salem, NC, Bowman Gray School of Medicine, 1982, 201 pp, $15

Twenty-seven articles with extensive references provide a broad, accurate, and complete presentation of the subject. The "Introduction to NMR" by Moore, Wilcott et al., and Gore provides a brief, but clear explanation of basic NMR principles, NMR spectroscopy, and relaxation effects. These articles are as timely now as when the talks were presented and, unlike some recent works, are technically accurate and correct. Articles on "Technological Considerations" by Bottomley, Hoult, and Hanley constitute a comprehensive description of instrumental details and techniques. Excellent diagrams and sufficient equations provide the medical physicist with a solid introduction to the field of NMR imaging. The discussion of superconducting and resistive magnets by Hanley is of particular value, although the cost figures are out-of-date. Detailed discussions of "Imaging Methods," including a critical evaluation of various methods by Mansfield, a description of options by Young et al., the spin warp method by Hutchinson, and real-time moving images by Ordidge et al. cover all the currently used techniques. Mansfield's discussion of the time required to obtain an image compared with its information content and Young et al.'s discussion of the information obtained by different pulse techniques are both excellent and should be required reading for anyone entering the field. The discussion of "Biological Hazards of NMR" by Saunders is extremely valuable, providing facts and figures documenting the apparent safety of the technique as presently used and how the electromagnetic fields (and their possible effects) associated with clinical imaging differ from those associated with other medical or occupational exposures. Budinger presents an excellent comparison of NMR imaging with other techniques. His predictions of the rate at which NMRI will be established as having diagnostic value appear in retrospect to be quite conservative.

A quarter of this book is devoted to discussions of "Protocols and Imaging Results" from virtually every laboratory that had an operating imager at the time of this symposium. Although the quality of images presented and the quantity of data available have improved by almost an order of magnitude since this work was published, it still constitutes one of the most concise and complete presentations of clinical results (albiet preliminary) available. As such, it provides the clinician with a quick, single source introduction to the field. Of particular value are the numerous tables of T1 and T2 values for various tissues and examples of the advantages and difficiencies of using different pulse sequences and imaging modalities for different tissues and pathologies.

In general, the potential opportunities indicated have been amply confirmed in recent years, and the predictions appear in retrospect quite conservative. The last fifth of the book is (or was) a look at future prospects including imaging with other nuclei, metabolic/spectroscopic imaging and localized spectroscopy, flow imaging, and cardiac imaging. Major advances have occurred in all of these areas since publication of this work.

In summary, while specific details may be a bit dated in this rapidly developing field, this work provides a breadth of coverage of uniformly high quality that makes it a valuable addition to the library of anyone entering the field of NMR imaging for several years to come.

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PHARMACOANGIOGRAPHY IN THE DIAGNOSIS OF TUMOURS. Gy Vargha, Akadémiai Kiadó, Budapest, Hungary, 1981, 240 pp, $37.00, illustrated

For the past 20 yr, angiographers have used pharmacologic agents to improve flow in an arterial bed or to enhance opacification of a disease process such as a tumor or infection. In the first situation we continue to use vasodilators and vasoconstrictors in a variety of areas of peripheral vascular and cardiac angiography. In the second group of diseases the utilization of pharmacologic agents has decreased dramatically along with the decline in visceral angiography secondary to the advancements in computerized tomography (TCT) and ultrasound. Therefore, a portion of this book is somewhat dated.

The authors present a very thorough investigation using both animal models and patients. The specific areas included are pharmacoangiography of the kidney, bone, joint and soft tissue tumors, and some application to the stomach and bronchial arteries. There are many illustrations of good quality with helpful legends. The tables and graphs are also very thorough and allow easy references. At times the translation (from Hungarian) is slightly awkward, but this does not detract from the text.

The individual chapter format is very good in its organization. The beginning reviews the historical aspects. Next is a discussion of the animal experiments, which is then followed by a description of their experience with patients, and finally an excellent summary is presented. In addition, the final chapter contains a total summary of the observations.

For myself (an angiographer) I found the book to be informative. Although much of the material pertaining to patient utilization is provided in other angiographic texts, there are some facets of pharmacoangiography that are much more completely covered in this book. I commend the authors for their exhaustive efforts. This is a scholarly work that provides a reference source for an important adjunct to angiography and should be included in medical institution and radiology department libraries. This is not a book for general medical readership because it is directed toward the angiographer.

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