BOOK REVIEWS

DIGITAL IMAGING: CLINICAL ADVANCES IN NUCLEAR MEDICINE. P. D. Esser (ed). New York, NY, Society of Nuclear Medicine, 1983, 304 pp, $25.00 members; $35.00 nonmembers

This book is a compilation of 26 papers from the 1982 Symposium of the Computer and Instrumentation Councils of The Society of Nuclear Medicine. Each paper describes some aspect of digital imaging and discusses recent advances that have occurred over the last several years in this area of rapid growth and increasing technological sophistication. The book is organized into four main sections: "Digital Imaging Technology," "Digital Radiography," "Advances in Nuclear Medicine Data Processing and Instrumentation," and "Advances in Clinical Nuclear Medicine."

The first section covers the internal architecture and design of digital systems, the technical aspects of an optical mass memory, human visual perception, networking and data management systems, and includes a discussion of the requirements of a radiological science group to manage the technology.

The second section deals with digital subtraction angiography and begins with a basic overview of the subject. It includes discussions of image enhancement and of kinetic parameters generated from time-density curves and their potential application to renal function.

The third section covers nuclear medicine data processing and instrumentation. Included are papers on image filtering, a computer-simulated cardiac model for quality control, and the use of array processors for cardiac imaging. Also, in this section there are discussions of programming languages, advanced computer systems, and single photon emission computerized tomography.

The last section is devoted to clinical advances in nuclear medicine. There are several works on cardiac applications covering basic indices of ventricular function, applications of functional imaging, interpolative background correction, automated methods of ventricular wall motion analysis, and quantitative thallium scintigraphy. Also included in this section are papers on single photon emission computerized tomography of the liver, on functional imaging of brain blood flow, and on imaging of the respiratory cycle, and pulmonary functional imaging using krypton-81m.

The book can be recommended to those who wish an update of current work in the field of digital imaging. The chapters run the gamut from practical to philosophical and from basic applications to future esoteric—so there should be something of interest in this book for everyone.

The book probably delivers a well-rounded summary of the current status of digital imaging, but this is an unfocused area of development, which may be frustrating to those looking for clear answers. The field seems almost to be an explosion of high-technology solutions searching for clinical problems and fostering a subculture of those trying to solve the technical problems created by the new technology. They say it is here to stay and it is progress.

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NUCLEAR POWER IN AMERICAN THOUGHT, DECISION BOOKSHELF, VOLUME 8. Washington, D.C., Edison Electric Institute, 1980, 84 pp, $2.50, softcover

This book is one of a series on energy-related topics published by the Edison Electric Institute. It consists of four essays discussing the role of nuclear power and controversies surrounding this energy source in America. Unlike most publications on this subject, however, it does not focus on technical issues. The authors include a political scientist, a psychiatrist, and two philosophers, each of whom has established credentials in their field. It is the premise of this book that nontechnical considerations, including ethics, psychology, history, philosophy, politics, and similar humanistic concerns are major issues in the nuclear debate, and these areas are the focus of this book.

In the first essay, "Nuclear Power and Nature: Intellectuals and Engineers," political scientist Andrew Hacker identifies the current controversy over nuclear power as part of an ongoing debate in this country between intellectuals and engineers over the role of technology in our society. He traces this debate to the early days of this country. The principal protogonists at that time were Jefferson, who argued for a rural America, and Hamilton, who favored an industrialized nation. Jefferson's arguments were based on the supposed "moral superiority" of an agrarian lifestyle, whereas Hamilton saw industrialization as the pathway to fulfilling human material needs. The debate eventually was "won" by Hamilton, with the subsequent development of highly industrialized America. Hacker contends that the debate continues today, with antinuclear activities raising the same "moral arguments" against nuclear technology, and in favor of more "natural" sources (solar, wind, etc.) as were first raised by Jefferson. The essay also includes a review of statistics showing the effect of technological development on the changing distributions of occupations and increasing level of education in this country. Hacker notes the irony that the educational and occupational opportunities of "antitechnological" intellectuals were made possible largely by technological achievements of their engineering predecessors in this country.

In the second essay, "Nuclear Phobia: Phobic Thinking about Nuclear Power," psychiatrist Robert DuPont reviews the history of public and media reactions to nuclear power, focusing his attention on the Three Mile Island incident. DuPont defines a phobia as "a fear based on exaggerated, unrealistic danger." Phobic fear is expressed by an endless series of "what if" questions, in which the most frightening consequences of failure or accident are the foci of concern, without regard to actual probabilities and realities.

DuPont characterizes current public thinking about radiation risks as one of phobic fear. He is especially harsh on the media and its treatment of the Three Mile Island incident for promoting this phobia. He feels, however, that the phobia eventually will subside, when the "what ifs" fail to materialize, and when the public comes to recognize and accept the risks of nuclear power in the same context as other, more "familiar" risks of living in a technological society. DuPont notes that greater public familiarity with nuclear technology (e.g., public tours of nuclear-related facilities) will speed this process.

In "American Acceptance of Nuclear Power," philosopher William Barrett reviews the causes of the current "malaise" in public attitudes toward technology. Barrett blames this on the perceived failure of technology to solve society's ills, particularly the spiritual and moral ones. He sees modern antinuclear activism as part of a spiritual and moral crusade against technology and as the cause of spiritual and moral disorder in our society. Barrett responds to this premise by holding that technology, including nuclear, is spiritually and morally neutral, with import depending only on the use to which it is put. Barrett advocates that the proponents of technology strike a middle ground and not oversell its potential. He also recommends that there be a better identification and separation of those problems that do and those that do not have technological solutions.

In the final essay, "The Nuclear 'Genie': Beyond Faust, Fate, and Incantations," prepared by philosopher Margaret Maxey, the target is "soft technology," or, perhaps more accurately, the contention that soft technologies such as solar, are ethically more acceptable than nuclear power. The basis of this contention is that development of nuclear technology would commit future generations to risks not of their own choosing. Maxey counters with opposing ethical arguments, noting the many deficiencies of current and foreseeable solar technology, and that reliance on unproven solar prospects may commit future generations to deprivation. She also notes that concerns over long-range nuclear waste disposal problems are out of proportion to the actual risks involved. She proposes that such risks can ethically be ignored when they become smaller than natural risks of the same type, e.g., background radiation levels, or concentrations of radioactive and other toxic elements in natural ore bodies. This concept is also relevant to ALARA and other current regulatory issues.

The medical radiation community is involved in current public controversies over radiation and its effects. Recent examples include the virtual stoppage of mammographic screening and the closure of low-level waste disposal sites in the late 1970s, due to public and political concerns over low-level radiation. Although this book deals with nuclear power and the nontechnical aspects of the nuclear power debate, there is substantial overlapping of the issues (and personalities) involved in medical radiation controversies. For this reason, a book such as this one should be of interest to the medical radiation community. It is a small, inexpensive book, very suitable for reading while traveling or at quiet moments "away from the office." Readers with a taste for philosophic discussion will find this a particularly stimulating and challenging book.

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THE SYNTHESIS OF CARBON-11, FLUORINE-18, AND NITROGEN-13 LABELED RADIOTRACERS FOR BIOMEDICAL APPLICATIONS. J. S. Fowler, A. P. Wolf. Nuclear Sciences Series (Report No. NAS-NS-3201), Springfield, VA. Technical Information Center, U.S. Department of Energy, 1982, 124 pp, $11.25

This monograph, the first in a new series on radionuclides in nuclear medicine, deals with general concepts and methods on the synthesis of positron-emitting labeled radiotracers. The stated objective of this work is "to treat the topic (carbon-11, nitrogen-13, fluorine-18 labeled radiotracers) principally from the standpoint of synthetic organic chemistry." The authors have organized the information into seven sections: "Introduction," "Radiotracer Design," "Radiotracer Synthesis," "Carbon-11," "Fluorine-18," "Nitrogen-13," "Experimental Design and Related Technology," and two appendices. These are combined with both significant and recent references along with a subject index. Most of this material is found dispersed in many reviews, and the creation of a self-contained volume seems appropriate at this time.

The sections on "Radiotracer Design" and "Radiotracer Synthesis" are concerned with the choice and positions of labels, synthetic strategies, reagents, radiotracer purification, and optimization of reaction rates. The emphasis is not so much on fundamental principles, but rather on the practical aspects of positron-emitting radionuclide chemistry. This section offers an abundant source of advice on problems that chemists frequently face during their work, and could be useful for graduate students who are learning about this chemistry, methods, and analytical techniques. Furthermore, these sections are of interest to investigators because they approach problems; e.g., noncarrier added, carried added, carrier free, etc., that have confused many workers in this field for a long time.

The sections on "Carbon-11," "Nitrogen-13," and particularly "Fluorine-8," admirably reveal the existing complexities of the chemistry with positron-emitting labeled radiotracers, and are a valuable source of information on the synthesis of these compounds.

The section on "Experimental Design and Related Technology" is heavy on practical applications, e.g., ion chamber and well counter callibration, radioactivity monitoring during synthesis, and shielded work areas. Also included are recipes taken from the literature for the preparation of selected positron-emitting labeled radiopharmaceuticals.

Anyone involved in research in nuclear medicine, and particularly in positron emission tomography, will find this concisely written book well worth reading, since it offers an overview of what the synthesis of carbon-11, fluorine-18, and nitrogen-13 radiotracers entails, and points out the material that must be understood to gain insight into the field.

Perhaps the chief value of this monograph is that it includes in one short volume an extensive, rather than exhaustive, review of the literature complemented by a pleasing number of tables, formulas and references (almost 500). The sections are well organized and written at a level readily understood even by workers in related fields.

In summary, this modestly priced volume is a useful reference book for researchers, and is highly recommended for both the novice and the expert.

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RECENT ADVANCES IN BRACHYTHERAPY PHYSICS. AAPM. Monograph No. 7, D. R. Shearer, Ed. New York, American Institute of Physics, 1981, 202 pp, $50.00

This volume contains the proceedings of an American Association of Physicists in Medicine workshop held in Sturbridge, Massachusetts, in October, 1979. Despite the delay in publication of this volume, it contains a great deal of up-to-date information on the practice of brachytherapy physics and some of the medical reasons for the resurgence of interest in this important mode of therapy. The ability to control tumors is limited principally by the radiation tolerance levels of the surrounding normal tissues. These tissues are necessarily included in both external beam treatment ports and implant therapy, but in the case of implants a much higher dose can be delivered to a large portion of the tumor for a given dose to normal tissues. In an era when micrometastases are becoming more easily controlled with systemic agents, the local control of more advanced bulky tumors is becoming more important. Brachytherapy offers a real improvement on the control of such tumors.

This monograph provides much of the background and technical information needed by the medical physicist to understand and practice the intricacies of implant dose calculations, source standardization, and radiation safety. The invited lecturers were chosen