dation. Cold storage of sodium pertechnetate is not common U.S. practice. Individual monographs list *Organ Specificity* but times, animal species, and methods are not given so the utility of thse specifications is obscure.

The concept of using various process controls is an important dimension of quality assurance often omitted in previous quality-control discussions. Unfortunately, the two most important process controls, monitoring for aseptic technique in drawing and dispensing doses and monitoring personal radiation exposures and biocontamination, are not included. This booklet is a step towards providing a handy, quick, quality-control reference; however, it should be used with other texts or other references from current nuclear medicine practice.

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QUALITY ASSURANCE IN DIAGNOSTIC RADIOLOGY. Medical Physics Monograph No. 4, American Association of Physicists in Medicine. New York, American Institute of Physics, 1980, 180 pp, members AAPM $10.00; nonmembers $20.00.

This monograph contains the proceedings of the symposium "Higher Level Quality Assurance in Diagnostic Radiology" held in Cincinnati in July, 1977. The stated purpose of the monograph is to "enable technologists working with the guidance and supervision of a medical physicist to set up a viable quality assurance program in diagnostic radiology with minimal expense." Although the publication provides considerable useful information, it does not achieve its stated purpose uniformly throughout the text. This shortcoming occurs because much of the information is not suitable for use by technologists, and almost no information is provided about the cost of required test instrumentation, manpower commitment, or methods to evaluate the effectiveness of quality-assurance procedures. Another deficiency is the unfortunately long delay between the date of the symposium (July 1977) and the publication of the proceedings (December 1980).

The book is divided into 13 chapters covering the need for higher level quality assurance (Chap. 1), assessment of automatic exposure and brightness control systems (Chap. 2), evaluation of generator performance (Chap. 3), photographic processor quality control (Chap. 4), cineradiographic systems (Chap. 5), image intensifier and television systems (Chaps. 6 and 7), the modulation transfer function (Chap. 8), x-ray filters and beam quality (Chap. 9), protection surveys (Chap. 10), radiation exposures to patients (Chap. 11), testing results on certified equipment (Chap. 12), and description of an approach for a unified view of radiological imaging systems (Chap. 13). Although useful information is presented in each chapter, the most practical information is found in Chaps. 1-5, 9-11. The information in Chap. 11 on radiation doses from diagnostic procedures is particularly valuable since it presents an excellent overview of the subject with an extensive reference list.

This book represents a useful addition to the literature in the area of quality control, and it is recommended to those individuals actively involved in the field.

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PHYSICAL TECHNIQUES IN MEDICINE. Vol. 2. J. T. McMullan, Ed. Chichester/New York/Brisbane/Toronto, John Wiley & Sons, 1980, 158 pp, illustrated, $45.00

This is the second in a series on biomedical engineering subjects written by authors from the United Kingdom and South Africa. The aim of the series is to "discuss these physical techniques and to present the necessary background together with clinical applications." In the preface, we learn that the series "is intended to meet the needs of students and research workers in medicine, medical physics, bioengineering, and related areas."

In this second volume, the five chapters are: The CAT Scanner, Pressure Sores, Hyperbaric Medicine, Cryosurgery, and Radiation Therapy. Although the level of these chapters indicates they are intended for the beginner, the depth varies significantly from chapter to chapter. The mathematical level is elementary throughout this book. A comprehensive index is provided.

The discussion of the CAT Scanner is particularly disappointing: the level of treatment is very superficial, the illustrations are poor, and many of the statements made in the text, especially those relating to clinical applications, are remarkably naive. The discussion of reconstruction procedures does not include filtered backprojection. Eight references are provided, but the best texts and reviews on the subject are omitted.

Upon reading this chapter, radiologists and nuclear medicine specialists will be interested to learn that "it is not possible to see through the heart shadow" on conventional chest x-rays. Potential purchasers of CAT scanners will be loathe to find that "the price of a CT scanner is probably similar to the price of a commercial airliner or a new sports stadium: certainly it is a good deal less than that of a nuclear submarine." Such erroneous comments are common in this chapter.

The discussion of radiation therapy in 21 pages with seven figures and five tables is necessarily rather superficial. This is an honest effort, however, and a novice may digest the material quickly in a single sitting. Only four references are provided, none more recent than 1978. The author refers to his 1974 text on the subject, published in England, but no current American texts are mentioned.

The remaining chapters on pressure sores, hyperbaric medicine, and cryosurgery treat their rather narrow subjects in greater depth, and each is accompanied with appropriate references.

This book, with the exception of the chapter on CAT scanners, may be useful for beginning readers with general interest in the topics presented.

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COMPUTERS IN ULTRASONIC DIAGNOSTICS. P. N. T. Wells, J. P. Woodcock. Forest Grove, Oregon, Research Studies Press, 1980, 94 pp, illustrated, $27.50

This is volume 1 in the Medical Computing Series (edited by D. W. Hill). This brief monograph is organized into ten sections, each with appropriate tables and illustrations and a set of references for each section. A total of 107 references is provided, but they are somewhat dated. An extended table of contents is provided, but there is no index.

The sections include data acquisition, data recording and digitization, signal analysis and processing techniques, ultrasonic tomographic reconstruction, digital picture enhancement, feature extraction and pattern recognition, three-dimensional applications, and examples of some early ultrasonic imaging computer systems.

The mathematical level of the monograph requires some prior knowledge of Fourier, Laplace, and z transforms. Both one-dimensional pulse echo and Doppler technology are considered. Real-time two-dimensional scanners and small-parts scanners are not treated in depth. The commonplace, digital, solid-state scan conversion memory was not in wide use at the time the monograph was written and therefore is not described in detail.

The material relating to specific computer systems and ultrasonic data acquisition and processing hardware is badly out of date. The reader can, however, develop an appreciation of the level of development of ultrasonic computer technology several years ago.

The principles of data acquisition, signal processing, and display are clearly explained, and remain applicable in current systems.

This monograph will be useful as an introduction to computer processing of ultrasonic data for medical applications. It cannot be used as a guide to the current literature.

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COMPUTERS IN MEDICINE: AN INTRODUCTION. Derek Enlander. St. Louis, Toronto, London, C. V. Mosby Co., 1980, 124 pp, illustrated, $12.85

Computers as generic instruments exist only in engineering and computer sciences departments; elsewhere, computers are tools to perform a given task. Recently we have seen a massive invasion of diagnostic radiology by computers, which are, however, called CAT scanners, whole-body scanners, etc. One can, and one does, use these machines without even the perception that they are a core surrounding a CPU, or for that matter that the logic is totally based on a binary system. There is nothing very special about this circumstance, since teenagers use telephones, children use color television sets with automatic tuning, and almost everyone plays electronic games. None of these applications requires a knowledge of computers as generic tools. The author, however, assumes that the user of a computer in medicine will gain something by learning about I/O, CPU, analog versus digital, binary arithmetic, eligible names, etc.

The book probably succeeds in explaining the very basic concepts point by point, but it is not clear to me what is gained or by whom. The short section on binary arithmetic will be helpful to some. The section on programming is not original, nor could it serve as a reference text. The twelve pages of (very elementary) BASIC programming are not meant to prepare someone for a career in programming, since this type of material is readily found in hundreds of manuals, which have the advantage that they include the more advanced information. Nor is it immediately clear what information is transferred by the inclusion of multiple photographs of antiquated systems or their components from the outside. The section on data files is somewhat helpful, since one feels that there is some use for the tool. A section on how to buy a computer should be disregarded. Nuclear medicine is not discussed, and correctly so, since the jump from bits and bytes to clinical applications requires more muscle than offered here.

These comments may fail to give a true view of the book since it really seems to be directed at an audience for elementary encyclopedias. After reading the book, one will have gained a vocabulary and conversational knowledge, but no technical knowledge. On reflection, the major value of the book may be a demystifying one: the book should be recommended to those who are afraid of the subject, with a proviso: Do not stop after reading this book.

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OPTIMIZATION OF RADIOTHERAPY. REPORT OF A WHO MEETING OF INVESTIGATORS. WORLD HEALTH ORGANIZATION TECHNICAL REPORT SERIES NO. 644. Geneva, World Health Organization, 1980, 89 pp, Sw. fr. 6

This report is a publication of the proceedings of the World Health Organization (WHO) meeting of investigators held in Cambridge, England, in September of 1978. It provides general guidelines for planning and implementing radiotherapy services, particularly in developing countries. The report consists of three main sections: general considerations for radiotherapy care of the cancer patient; equipment acquisition, physics, and dosimetry planning; and ongoing clinical studies for the optimization of biological response to radiotherapy.

The WHO committee acknowledges some of the general problems of cancer care in developing countries: no viable tumor registries, differences in the age distributions of cancer patients, late diagnoses and referrals, and lack of transportation and patient accommodations. The most serious problem, however, is the severe limitation of treatment capacity. The committee recommends that a multidisciplinary approach must be initiated and that the establishment of radiotherapy centers are a necessity for those countries whenever cancer programs are envisioned. Another major need is the recruitment of trained and competent radiotherapists, nurses, physicists, and technologists, and the concomitant problem of establishing radiotherapy and clinical oncology training programs in area medical schools. A final need is an area-wide public educational awareness program concerning cancer and cancer therapy.

With the goal of providing quantity radiotherapy care, the investigators make specific recommendations concerning equipment acquisition and dosimetry planning. They recommend that for at least the next 5-10 years, radiotherapy in developing countires should rely principally on cobalt-60 teletherapy machines (one vertical and one isocentric unit). They estimate that a cobalt-60 therapy beam is satisfactory for the treatment of 85-90% of patients. Only in certain circumstances can accelerators be recommended for developing countries. Accelerators of various types (linear accelerators, betatrons, and microtrons) entail considerably higher capital cost and annual expenditures than do cobalt-60 units, and they are more difficult to repair and maintain. The committee did recommend brachytherapy (cobalt-60 or cesium-137) as a tool when used in conjunction with external beam therapy. In recognition of the need for ±7% accuracy of prescribed radiation dose, it emphasizes the major role of physics and clinical dosimetry in radiotherapy centers—machine output and calibration parameters, assessment of patient dosimetry, including in vivo dosimetry, and dose computations. In conjunction with the IAEA, the committee also recognizes the need for and recommends the institution of more standardization and calibration laboratories for dosimetry. For treatment planning and optimal use of available radiotherapy equipment, it suggests the following: use of as few treatment fields as necessary, awareness of differences in normal and tumor tissue, and knowledge of the total three-dimensional irradiation volume. For improvements in radiotherapy quality in developing countries, the members at present suggest acquisition of a treatment planning computer over the purchase of more sophisticated teletherapy units.

The final section addresses approaches to optimal radiotherapy using the available accepted clinical methods including combination radiotherapy and chemotherapy, time-dose fractionation effects, and radiosensitizers. However, for developing countries time-dose relationships (nominal standard dose system, the cumulative radiation effect system, and cell population kinetic models) may be the only option available. Thus, the committee acknowledges a need for the correlation of clinical data for various fractionation regimes, especially the nonstandard ones. It suggests a program study be initiated for the world-wide collection and evaluation of clinical radiotherapy data. The data gathered would also provide the clinical background for deviations from conventional treatment regimes necessary to cope with the social, economic, and other constraints encountered in developing countries.

Although the report provides suggestions for developing countries, the adopted guidelines could well be followed in developed countries in the interest of cancer patients. This report is a recommended background reference for those institutions considering the establishment of a cancer center with a viable radiotherapy department. The report provides supplemental background