jnm/BOOK REVIEWS

NUCLEAR MEDICINE AND ULTRASOUND. Leonard M. Freeman and M. Donald Blaufox. New York, Grune & Stratton, 1976. 169 pp, $13.50.

This short book (which is a reprint from the October 1975 *Seminars in Nuclear Medicine*) provides an excellent and up-to-date review of those studies in which both ultrasound and nuclear medicine are of diagnostic value. Systematic consideration of all organ systems in which there is any application of both ultrasound and nuclear medicine is presented, with one exception, that is the combined use of ultrasound and radiogallium in the diagnosis of abdominal abscesses. In our laboratory we have found that in the appropriate clinical setting, questionable masses can often be resolved by both gallium scanning and ultrasonic scanning of the abdomen where there is convergence of both examinations.

The introductory chapter to the use of diagnostic ultrasound is short and concise but gives an adequate review of the physics of the various modalities in ultrasound. Each of the remaining chapters that discuss the combined use of ultrasound and nuclear medicine in the evaluation of the thyroid, liver and biliary tract, pancreas, kidney, and cardiovascular system are excellent in their systematic attention to the technical aspects, interpretation, and in the interrelation of the diagnostic modalities in evaluating a particular problem.

The chapter on radionuclide and ultrasonic evaluation of the placenta gives a well-documented and comprehensive review of placental localization using radionuclides. In light of improved technology in gray scale ultrasound and real-time techniques, however, placental localization by radionuclides has little to offer in the modern practice of obstetrics.

Recent technologic improvements in gray scale ultrasound that result in less dependence upon technician expertise, make the addition of ultrasound to the nuclear medicine laboratory desirable and should improve diagnostic accuracy. This book should be very useful as a handy reference to anyone who has or plans to be involved with ultrasound or nuclear medicine.

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THE BASIC PHYSICS OF RADIATION THERAPY, 2nd ed. J. Selman. Springfield, Ill., C. C. Thomas, 1976. 715 pp, $25.75.

The *Basic Physics of Radiation Therapy, 2nd ed.*, follows the first edition by 13 years, and has been updated to include the physics of megavoltage radiotherapy and the introduction of ultrahigh energy therapy, including high LET radiation. Quoting from the author, "The purpose of this book is to explain the fundamental physical principles underlying radiation therapy in as comprehensive and comprehensible a manner as possible, without sacrificing accuracy for simplicity." Dr. Selman accomplished his purpose by understandably placing emphasis in the following areas: simple mathematics in radiation therapy, basic physical concepts, radiation quality, radiation exposure and dosage, therapy planning, newer modalities in radiotherapy, and radioactivity and radionuclide therapy.

Two of the introductory chapters on radiation physics cover the nature of radiation and the interactions between radiation and matter. A detailed discussion of the origins and properties of x-ray and gamma rays follows a simplified introduction to electromagnetic radiation and quantum theory. The areas discussed are the major attenuation interactions of photons with matter, classical scattering, photoelectric effect, Compton scattering, and pair production, and the dependence of these interactions on energy requirements and absorbing media. Also included are the properties, energy requirements, and interactions with absorbing media of particulate radiations.

The author has presented an excellent review of radiation exposure measurement and dosage calculations necessary for treatment planning. Information is given on chamber requirements and applicable correction factors necessary for ionization measurement and subsequent calibration of conventional megavoltage therapy units. The concepts of scatter, given dose, tumor dose, percentage depth dose, tissue-to-air ratio, and isodose curves are presented as functions of the therapy parameters: beam quality, treatment distance, tumor depth, and treatment area. A chapter on treatment planning provides information on tumor localization and verification and examples of single, parallel-opposed wedge, and multifield techniques in therapy for kilovoltage x-ray, Co-60, betatron, and linac units.

The chapter entitled "Radioactivity and Nuclear Physics" presents an outstanding discussion on the topics of nuclear stability, types of radioactive decay, radioactive decay processes, equilibrium, and the nuclear activation of atoms. The uses of radionuclides in implant therapy are also presented with emphasis on radium and radon. The therapy planning guidelines and rules of the Quimby method and the Patterson–Parker method are discussed, and appropriate tables for each are included in the text material. Mention of the use of radionuclides in both diagnostic and therapeutic procedure in nuclear medicine is included; however, the major emphasis is placed on radionuclide absorbed dose calculations and counting instrumentation.

The text also includes chapters devoted to radiobiology and health physics. Of particular merit in the radiobiology section is the information on time–dose relationships and tissue recovery and their applications to radiotherapy, and the time–dose concept proposed by Frank Ellis. A separate chapter covers common acceptable health physics practices with particular emphasis on shielding requirements and shielding calculations necessary in a megavoltage therapy department.

This new edition of *Basic Physics of Radiation Therapy* is highly recommended as a general reference text in radiation physics and refresher guide for both practicing radiotherapists and medical physicists in a radiation therapy