BOOK REVIEWS

BREAST CARCINOMA—THE RADIOLOGIST'S EXPANDED ROLE. Wende Westinghouse Logan, ed. New York, John Wiley and Sons, 1977, 378 pp, Illustrated. $32.75.

In October 1976, a conference was held at Roswell Park Memorial Institute to discuss breast cancer, mammography and radiation risks. In a commendable fashion, Dr. Logan organized the conference, compiled the presentations and edited the material for publication. The conference brought together many of the foremost workers in the field of breast imaging at that time. They discussed the benefits and risks of mammography, the physics of imaging systems, the development of new imaging modalities, the experience of screening centers, and the use of specialized techniques for diagnosis. The book is divided along these general lines; however, specific topics are scattered throughout the book. As an example, magnification radiography is discussed in three areas separated by over 250 pages. This deficiency is overcome by an adequate subject index.

The exposition of physical factors and the description of newer imaging modalities are the strengths of this volume. In particular, the physics of focal spot, object, and receptor are described and their effects on image quality illustrated. Greater discussion of dose reduction methodology would have strengthened these sections. Development of microfocus magnification, computerized tomography, electrostatic imaging and ultrasound are discussed. Although reports concerning the physics of mammography and the introduction of other imaging modalities exist scattered throughout the literature, I know of no other place where so much concerning these subjects is discussed in such condensed form. The book is strongly recommended as an introduction to these topics.

Portions of the book dealing with the risk:benefit ratio of mammography have been supplanted by recent developments. The interested reader is referred to the September 1977 issue of the *Journal of the National Cancer Institute*, in which the risks of radiation are presented and to the Beahrs Report of that same month in which the BCDDP preliminary results are evaluated.

Since this conference was organized along very technical lines, clinical material other than screening was limited, and hence this volume is of little use to the average clinician unless he has a special interest in mammography. For that same reason, it will be of limited usefulness to the average radiologist who has a limited exposure to mammography. The lack of a nuclear medicine section reflects the fact that radionuclides have not yet found a role in the early diagnosis of breast cancer. Perhaps this will not be true in the future as radioimmunologic techniques are developed.

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THE FUNDAMENTALS OF X-RAY AND RADIUM PHYSICS, 6th Ed. J. Selman, Springfield, Ill., C. C. Thomas, 1977, 557 pages.

The Fundamentals of X-Ray and Radium Physics, 6th edition, follows the 5th edition by 5 years. The book, containing 23 chapters, was written as an introduction to diagnostic x-ray physics.

Chapters 1 through 9 are a review of the laws of physics. There are excellent chapters devoted to mathematics, the structure of matter, electrodynamics, and magnetism, and they present a fundamental approach to the physics underlying all the sciences.

A four-chapter section on x-ray production and x-ray circuit control includes an analysis of tubes and circuits and provides an excellent prospective to the concepts of high voltage production and rectification. Equipment components and requirements for diagnostic x-ray circuits are listed and advantages and disadvantages discussed.

A detailed accounting of film processing and the chemistry of radiography are presented. Dark-room techniques and associated dark-room chemistries are compared and contrasted with the more modern film processors.

The physics of x-ray production and the interactions of x-ray radiation with matter are detailed extremely well. The subjects covered include: conditions necessary for the production of x-rays; electron interactions with target atoms; and target efficiency. Properties of the resulting x-rays, x-ray quantity and quality, interactions with matter, and x-ray damage are also discussed.

Those components involved in x-ray imaging to enhance radiographic quality are defined and discussed. Topics reviewed relating to effects on definition and resolution include: types and handling of film, intensifying screens, focal spot size, motion, quantum mottle, distance, and technique.

A separate section involves the special procedures and equipment currently utilized to help improve radiographic quality. It includes an excellent review of the design and use of grids (stationary and moving) relating to ratio, frequency, focusing distance, and contrast improvement. An analysis of anode cut-off, and the heel effect, is also discussed. A special equipment and procedures section covers the following subjects: image intensification systems for fluoroscopy, stereoscopy, tomography, macroradiography, mammography, xerography, and high kVp radiography of the chest with field emission tubes.

The text includes an excellent fundamental approach to the physics of radioactivity; and the production of radionuclides, nuclear instrumentation, and the use of radionuclides in nuclear medicine imaging are discussed.

The final subject is health physics and the protection practices necessary for radiology departments, and it covers such items as normal tolerance doses, protection precautions, and radioprotective shielding. Also included are tables of selected results of the x-ray exposure studies of the Bureau of Radiological Health. These tables provide data for exposure per film for various routine diagnostic examinations both for the area being studied and the dose contribution to the gonads.

This new edition of *The Fundamentals of X-Ray and Radium Physics* is recommended as a reference text for those requiring a fundamental working relationship of x-ray physics. It is recommended especially for diagnostic radiology residents, radiologic technologists, and practicing physicians as a guide to diagnostic x-ray physics and could serve as a basis of study for the diagnostic physics sections on national board examinations.

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