

## BOOK REVIEWS

**THE CHEMISTRY OF RADIOPHARMACEUTICALS.** Ned D. Heindel, H. Donald Burns, Takashi Honda, and Luther W. Brady, eds. Masson Publishing USA, Inc., 1978, 294 pp, illustrated. \$27.50.

This book is based on a symposium held April 23–24, 1976, at Hahneman Medical Center. As the title indicates, it emphasizes the chemical aspects of radiopharmaceutical preparations, not so much for the established clinical compounds but rather for the new wave of compounds intended to make "measurements of temporal changes and patterns—the very essence of human physiology. . . ." There are three introductory chapters dealing with the development of nuclear medicine, a history of radiopharmaceutical development at Brookhaven National Laboratory, and a review of federal regulations governing the introduction of new radiopharmaceuticals. Four chapters cover supportive topics that range from quality control and animal models to color imaging, and this section includes clear explanations of the annihilation process and positron imaging. A review of the development of I-125 fibrinogen from "concept to clinic" is also presented.

The remaining ten chapters deal, to varying extents, with the chemistry of radiopharmaceuticals but emphasize the development of biochemical and pharmacologic tracers. Dr. Ned Heindel reviews the principles of target-tissue localization and stresses the chemistry involved in preparing compounds based on biochemical substrates. Dr. H. Donald Burns completes the review with his discussion of the choice of radionuclide and the design of radiopharmaceuticals that interact with a structurally specific binding site. An exhaustive review of the agents suggested as pancreatic localizing radiopharmaceuticals follows. The chemistry of positron-emitting radionuclides and of Tc-HIDA derivatives are given by Dr. Joanna Fowler and Dr. Michael Loberg, respectively, and represent two chapters most faithful to the title of the book. Dr. Fowler discusses the synthesis of C-11-labeled compounds (carboxylic acids, glucose, psychotropic drugs, proteins and amines), N-13-labeled tracers, and F-18-labeled radiopharmaceuticals. In the chapter on radiolabeled drug analogs, Dr. Loberg describes the characterization of the radiochemical and chemical properties and the biologic behavior of Tc-99m-HIDA. Drs. Winstead and Winchell present the synthesis of some 26 C-11-labeled carboxylic acids, 17 C-11-labeled hydantoins, and 22 C-11-labeled aminonitriles, and this chapter illustrates what Dr. Heindel describes in the first chapter as "serendipity." In screening this large number of radiochemicals, the authors have found an interesting compound—C-11-labeled-anilinophenyl-acetonitrile—which crosses the blood-brain barrier and appears in the cerebrospinal fluid. In the final chapter, Burns et al. discuss their attempts to determine the structure of technetium radiopharmaceuticals and include the first publication of their technique to determine the number of chelating agents per atom of Tc-99m, one of the rare structural techniques that can be used for carrier-free radiopharmaceuticals.

This book is one of the few texts that addresses the general problem of the design of biochemical and pharmacologic tracers. The chapters are readable and concise, which is unusual in this era of double volumes. Although all topics are not covered exhaustively, the authors give adequate

reference to recent reviews, which makes this a valuable book for those interested in the latest trends in radiopharmaceutical chemistry.

**WILLIAM ECKELMAN**

George Washington University Medical Center  
Washington, D.C.

**BASICS OF RADIOPHARMACY.** Buck A. Rhodes and Barbara Y. Croft. St. Louis, C. V. Mosby Co., 1978. 195 pp, softcover. \$14.95.

This profusely illustrated manual was written to provide a first-course textbook in radiopharmacy for undergraduates in pharmacy and nuclear medicine technology. The outline of material is derived from courses offered at four universities. The text, presented in an informal and conversational way, is divided into 12 chapters and covers the production of radionuclides and radiochemicals, tracer techniques in medicine, and mechanisms of concentration of radiopharmaceuticals. Criteria for the design of new, safe, and effective radiopharmaceuticals are amply and well presented. Some particularly cogent (and brave) remarks concerning regulatory control of radiopharmaceuticals by the government will strike a responsive chord among developers and users of such products. Radiation dosimetry calculations are described, therapeutic radiopharmaceuticals are mentioned briefly, and the construction and operation of existing and potential future generator systems are covered. The basic mathematics of parent-daughter nuclide relationships is clearly presented, along with practical application to daily generator operation in the dispensing radiopharmacy. Also provided is a pocket-calculator program to compute Tc-99m generator eluate characteristics from typical input data. The most commonly used technetium pharmaceuticals and methods for their quality control are given.

Detailed illustrations of the physical layout, equipment, and personnel in a radiopharmacy demonstrate how to maximize efficiency of operation and yet minimize personal radiation exposure. All facets of routine radiopharmacy operation are described.

The book contains a handy glossary and is usefully indexed. Seventy problems, mostly computational, are included to test the reader's assimilation of the text.

Throughout the book, the authors emphasize the importance of interaction between the radiopharmacist and the patient. This interaction, frequently overlooked and undervalued, involves taking a drug history, resolution of patients' questions regarding drugs and procedures, and monitoring adverse reactions. Such efforts are analogous to those necessary in a clinical pharmacy setting.

Some noticeable errors have crept into this book. In a discussion on phagocytosis, the reticuloendothelial cells are reported to trap particles 40–5000  $\mu$  in size. Sulfur colloid is reported to be 300–1500  $\mu$ . Instead of ligand, "carrier substance" is described as determining biodistribution of a given radionuclide. Several figures and/or their legends contain errors. An outdated edition of the United States Pharmacopeia is referenced to provide current information. The column of a rechargeable Tc-99m generator is pictured as containing "Alum oxide" and being topped by an "Alum seal." Technetium lung agent kits are described as contain-

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ing (among other ingredients) "solubilizing agents," whereas surface-active or "suspending agents" is meant.

This book can serve as a useful text for a course in radiopharmacy, if the instructor corrects and clarifies where necessary. Despite its good points, however, it cannot be recommended to the novice pharmacist or nuclear medicine technologist for independent study or reference. Nonetheless, this book could meet the needs of physicists, biologists, and other professionals who have minimal training in the basic concepts of pharmacy but are called upon to prepare radiopharmaceuticals for parenteral administration. For this group the book has the greatest potential value, and with the necessary corrections in a subsequent edition this potential can be reached.

JOHN COUPAL  
Veterans Administration Hospital  
Lexington, Kentucky

**ORIGINS OF HUMAN CANCER.** H. H. Hiatt, J. D. Watson, and J. A. Winsten, eds. Cold Spring Harbor Laboratory, 1977, 1889 pp, illustrated. index, 3-book set. \$60.00.

The September 1976, Cold Spring Harbor Conferences on Cell Proliferation assembled a significant group of scientists for a symposium focused on the multi-faceted approach to current cancer research. Individual presentations from representatives of a number of disciplines were requested to promote better understanding of the research and policy problems in a variety of fields all having the common goal of cancer prevention. This three-volume set summarizes the work of the conference.

Book A is devoted to the incidence of cancer in humans and contains papers that examine the effects of geography and genetic background, occupation, industrial and agricultural chemicals, air and water pollutants, drugs, radiation and diet. Book B, *Mechanisms of Carcinogenesis*, contains 38 reports subdivided into sections on electrophilicity, modifying factors, aryl hydroxylase genetics, damage to DNA and its repair, DNA viruses, and RNA viruses. The third book, *Human Risk Assessment*, contains the collected presentations on animal cancer tests, predictive value of short-term assays, possible dietary carcinogens, public policy panels, and proposals for setting further strategies and standards relating to environmental carcinogens.

The entire collection consists of 123 papers, from basic

research presentations to arranged discussions with representatives of government, industry, science, and the news media. These stimulating question-and-answer sessions are concentrated in Book C and follow papers dealing with the complex problems of government regulation and the social impact of topics such as the use of diethylstilbesterol (DES) to increase meat production. In addition, the visible and vocal concern of citizens over possible carcinogens in the environment is reflected by the number of papers regarding research in these areas. It seems apparent that at this time the mere mention of the word "nuclear" is enough to prompt heated discussions not only at social functions but also at scientific meetings. For that reason the nuclear medicine physician may find many chapters in this set profitable reading—e.g., "Estimates of the Cancer Risk Due to Nuclear Power Generation."

This comprehensive symposium report contains a great amount of information; and as an aid to the reader for locating particular items of interest, the editors have added section subject titles in the table of contents and extensive author and subject indices. Mistakes are infrequent but perturbing, particularly in the author index, where some participants with the same surname have been confused. The indices appear only in Book C, which is also a minor inconvenience.

In the final article, J. Cairns notes that "the origins of human cancer is not a topic that can be reviewed or summarized in a systematic, logical way," and so it is with this collection—it is simply too large to review in its entirety. The three volumes will provide the reader with a source book of current oncology research, and each paper concludes with a reference list so that more extensive information is easily obtained. Because the conference was held in 1976 some of the material is already outdated, but this seems unavoidable.

*Origins of Human Cancer* may not be of direct importance to the clinical practice of nuclear medicine, but it is a valuable reference edition of current concepts in oncology.

(The remarkably low price for the three-book set is the result of supporting grants from the Rita Allen Foundation and the Charles E. Merrill Trust.)

RONALD NEUMANN  
Yale-New Haven Medical Center  
New Haven, Connecticut

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## BOOKS RECEIVED

*Gynecologic Oncology*, Larry McGowan. 435 pp, illustrated. New York, Appleton-Century-Crofts, 1978. \$35.00.

*Radioimmunoassay and Related Procedures in Medicine - 1977, Volume 1. Proceedings of an International Symposium on Radioimmunoassay and Related Procedures in Medicine Held by the International Atomic Energy Agency in Co-Operation with the World Health Organization in Berlin (West), 31 October-4 November, 1977.* 539 pp, illustrated. Vienna, International Atomic Energy Agency, 1978. \$43.00.

*Cancer Therapy by Hyperthermia and Radiation*, Christian Stregger, D. van Beuningen, F. Dietzel, E. Rottinger, J.E. Robinson, E. Scherer, S. Seeber, K.-R. Trott, eds. 344 pp, illustrated. Baltimore/Munich, Urban & Schwarzenberg, 1978. \$39.50.

*Thallium-201 Myocardial Imaging*, James L. Ritchie, Glen W. Hamilton, Frans J. Th. Wackers, eds. 154 pp, illustrated. New York, Raven Press, 1978. \$14.50.

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