

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.

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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 μ in size. Sulfur colloid is reported to be 300–1500 μ . 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-