The fourth edition of *Radiopharmaceuticals in Nuclear Pharmacy and Nuclear Medicine* further builds on the strong foundation of the previous editions. This latest edition reorganizes the 943-page text into 6 sections: introductory materials, physics and radiation safety, radiopharmaceutical chemistry, radiopharmacy practice considerations, regulatory considerations, and clinical applications. Five new chapters have been added that expand on previous-edition subtopics; adverse reactions to radiopharmaceuticals; pregnancy, pediatric, and breastfeeding considerations; mechanisms of localization of radiopharmaceuticals; nonradioactive pharmaceuticals used in nuclear medicine; and PET radiopharmaceutical manufacturing and distribution. The existing chapters also benefit from updates to information as well as additional tables and figures.

The first section consists of 2 introductory chapters. The first is a general overview of the different imaging modalities, nuclear medicine, and nuclear pharmacy. The second is a thorough expansion on the history of nuclear pharmacy from the previous edition. This chapter provides the reader with extensive background information on how the field of nuclear pharmacy was conceived and has evolved over time. Many of the early pioneers of nuclear pharmacy are discussed, along with their contributions to the field.

The second section, on physics and radiation safety, delves into the more familiar material of the previous edition. The chapters in this section cover the principles of radioactivity, radionuclide production, interactions of radiation with matter, radiation detection and instrumentation, radiation safety, and radiation biology and risk. These chapters provide the foundation to understanding the chemical and physical properties of radiopharmaceuticals. The chapter on the principles of radioactivity begins with basic atomic structure and builds through the energy levels and modes of radioactive decay. The next chapter introduces the reader to reactor- and cyclotron-based methods of radionuclide production and how some of that material is incorporated into radionuclide generators. Next is a chapter on interactions of radiation with matter, which sets the stage for subsequent chapters on detection and instrumentation and on radiation safety and biologic risk. The organization of this section is well designed for a logical progression from learning the fundamentals to applying them to more complex concepts.

The third section consists of 4 chapters devoted to radiopharmaceutical chemistry. The first chapter reviews basic chemistry concepts with respect to radiochemistry and radiopharmaceuticals. Important chemistry concepts that are unique to radiopharmaceuticals are discussed, such as radiolabeling and specific activity. The second chapter of this section focuses on the radiopharma-

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materials, the general public, and the patients. Regulatory consider-
erations are the topic of the fifth section of the book, containing
3 chapters. The first, entitled, “Licensing and Regulatory Control:
Radioactivity and Radioactive Materials,” provides up-to-date in-
formation on Nuclear Regulatory Commission licensing and reg-
ulatory control of radioactive materials pertaining to diagnostic
and therapeutic radiopharmaceuticals. The next chapter, entitled,
“Licensing and Regulatory Control: Radiopharmaceutical Ov-
ersight,” discusses the regulatory evolution of radiopharmaceuticals,
with a primary focus on Food and Drug Administration oversight
at the federal level. These 2 chapters help to define the of-
ten-confusing but important regulatory differences in the drug and
radioactive components of radiopharmaceuticals. The final chapter
of this section discusses the mechanisms of radiopharmaceutical
localization. Although the material is not regulation-based, this
chapter provides a transition to the clinical section by discussing
how various radiopharmaceuticals localize to their intended tar-
gets. Several figures in this chapter illustrate biodistribution via
these processes.

Clinical applications are the topic of the sixth and final section
of the book, containing 13 chapters. The restructuring of the new
edition includes 2 new chapters in this section, the first of which is
on considerations relating to pregnancy, pediatrics, and breast-
feeding—a welcome upgrade from a subtopic in the previous edi-
tion. The second new chapter is another subtopic breakout, on
adverse reactions to radiopharmaceuticals. The next chapter, on
nonradioactive pharmaceuticals used in nuclear medicine, dis-
cusses adjunct pharmaceuticals used as part of a nuclear medicine
study. These pharmaceuticals are also discussed in their respective
chapters of use, but this chapter provides a nice consolidation and
somewhat more detail on mechanism, dosage, and patient man-
agement concerns.

The next 7 chapters of this section describe the clinical uses
of radiopharmaceuticals in specific organs or organ systems. All
chapters are refreshed with updated material, figures, and tables.
There are many more images and colored overlays in this edition
that help the reader visualize how the data are obtained and
analyzed. Following the specific organ system chapters is a chapter
on total-body SPECT and related procedures, which focuses on
whole-body, soft-tissue studies for infection and tumor imaging.
Updated information in this chapter includes the recently ap-
proved $^{68}$Ga-DOTATATE for neuroendocrine tumors and the
highly anticipated prostate-specific membrane antigen–targeting
ligands for prostate cancer. Next is a chapter on PET whole-body
imaging procedures. This chapter includes an extensive discussion
of the biodistribution of $^{18}$F-FDG in normal tissues and on its clinical
uses in a variety of cancers. The remainder of the chapter is dedi-
cated to nononcologic imaging procedures such as for the heart, epilepsy,
dementia, β-amyloid, and prostate cancer with $^{18}$F-FDG or alterna-
tive PET radiopharmaceuticals. The final chapter of this section is on
therapeutic applications of radioactive agents. This chapter starts with
the older therapeutic radiopharmaceuticals such as strontium and
samarium and transitions to the newer generation of therapeutic ra-
diopharmaceuticals such as yttrium, radium, and lutetium, with dis-
cussion of the approach to using small molecules to bind to specific
receptors for delivery of targeted radiotherapy.

Radiopharmaceuticals in Nuclear Pharmacy and Nuclear Med-
icine is a well-written and well-organized textbook that builds on
the success of the previous editions. The text is versatile enough to
be understood by students and effective enough to serve as an
essential reference for the professional practitioner or to help those
preparing for board certification testing. This textbook continues
to justify its position as one of the best references in the field and
should be included in the library of any nuclear medicine or radio-
pharmacy practice.

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