

# Optimal Radionuclide Imaging of Splenic Disorders: The Value of SPECT/CT

Cheryl Rickley, CNMT; Michele Barasch, CNMT; Charles Intenzo, MD; Sung Kim, MD  
Thomas Jefferson University Hospital  
Philadelphia, Pennsylvania 19107, USA

## Objective

Dedicated radionuclide imaging of the spleen is useful in conditions such as accessory spleen and splenic trauma. Nuclear Medicine plays a key role in the diagnostic molecular SPECT/CT imaging of splenic disorders.

## Methods

The patient was injected with 10.0 mCi (370 MBq) of heat-denatured, Tc-99m-labeled autologous RBCs (HQRBC). The tracer is prepared by labeling RBCs removed from the patient with Tc-99m in vitro. The labeled RBCs are damaged by heating them in a water bath at 49° C for 20 minutes.

## Results

55 year-old male with a history of diverticulitis, presented with abdominal pain. He was sent for CT of the abdomen w/o contrast that showed trace periaffendiceal fat. He was then referred for MRI of the abdomen, which showed a well-defined lesion within the pancreatic tail measuring approximately 1.3 x 1.7 cm, suspicious for a pancreatic neuroendocrine tumor versus accessory spleen. A nuclear medicine SPECT/CT scan was recommended to rule out the possibility that this lesion represent splenic tissue.

SPECT/CT images of the abdomen demonstrate focal tracer activity, approximately 1.7 cm in the pancreatic tail, corresponding to the finding noted on the recent MRI scan. This SPECT/CT finding is consistent with a splenule in the pancreatic tail.



Figure 1  
CT coronal image of abdomen



Figure 2  
T2 MRI image of abdomen



Figure 3  
SPECT/CT coronal abdomen image

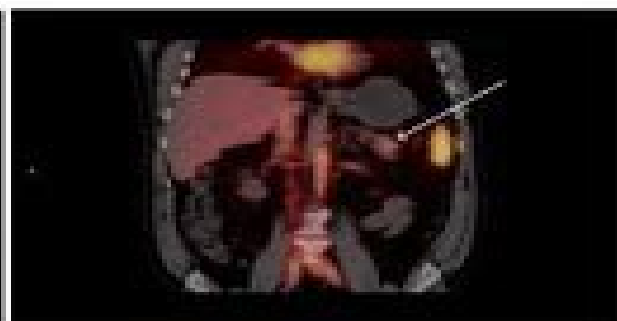


Figure 4  
SPECT/CT axial abdomen image

## Conclusion

SPECT/CT imaging combine with HQRBC Tc-99m-labeled autologous RBCs scintigraphy is an underused modality that is highly specific for detecting splenic trauma or accessory splenic tissue. This imaging procedure would eliminate the need for further invasive procedures including tissue sampling.

# Radionuclide Imaging In Medicine Theory And Practice

**Peter C. Jackson**



## **Radionuclide Imaging In Medicine Theory And Practice:**

*Radionuclide Imaging in Medicine* Peter C. Jackson, 1986      **Basic Sciences of Nuclear Medicine** Magdy M. Khalil, 2021-05-26 This book provides comprehensive and detailed information on the scientific bases of nuclear medicine addressing a wide variety of topics and explaining the concepts that underlie many of the investigations and procedures performed in the field. The book is divided into six sections that cover the physics and chemistry of nuclear medicine besides associated quality assurance quality control procedures dosimetry and radiation biology SPECT and PET imaging instrumentation plus CT imaging technology in hybrid modalities data analysis including image processing reconstruction radiomics image degrading correction techniques along with image quantitation and kinetic modeling. Within these sections particular attention is paid to recent developments and the advances in knowledge that have taken place since release of the first edition in 2011. Several entirely new chapters have been included and the remaining chapters thoroughly updated. Innovations in the ever expanding field of nuclear medicine are predominantly due to integration of the basic sciences with complex technological advances. This excellently illustrated book on the subject will be of interest to not only nuclear medicine physicists and physicians but also clinical scientists radiologists radiopharmacists medical students and technologists.

**Radioiodination: Theory, Practice, and Biomedical Applications** Mrinal K. Dewanjee, 2012-12-06 Among the readily available emitting radionuclides the nuclides of iodine have the greatest versatility in labeling both the hydrophilic and the lipophilic compounds that are used in biology and medicine. Biologically important micromolecules semimacromolecules and macromolecules have been identified which after iodination almost maintain the same molecular configuration and similar biologic specificity as those of the parent molecules. The multiple techniques for iodination and the clinical use of iodinated products have made possible the present status of the development of diagnostic nuclear medicine.  $^{125}\text{I}$  with a half life of 60 days has a crucial role in competitive protein binding studies.  $^{131}\text{I}$  is useful for measuring thyroid uptake for the diagnosis of thyroid carcinoma and metastasis and for therapy.  $^{111}\text{In}$  with a reasonably shorter half life is almost ideal for thyroid workup and for a few useful labeled radiopharmaceuticals. Although  $^{99\text{m}}\text{Tc}$  is used more widely in diagnostic procedures the radionuclides of iodine will always have a major role in biology and medicine. A considerable amount of information is scattered in the literature regarding the chemistry of radioiodination and the mechanism of tracer localization in cells and tissues. Labeled peptides proteins and antibodies are extensively used for protein turnover studies receptor binding and tumor imaging studies and radioimmunoassay. The general trend in the use of tracers in clinical nuclear medicine has been an evolution from  $^3\text{H}$   $^{14}\text{C}$   $^{11}\text{C}$  and  $^{13}\text{N}$  to  $^{125}\text{I}$   $^{131}\text{I}$  and  $^{123}\text{I}$  to  $^{99\text{m}}\text{Tc}$  and  $^{111}\text{In}$ .

**Nuclear Medicine Technology Program**, 1994      **National Library of Medicine Current Catalog** National Library of Medicine (U.S.),

**The Pathophysiologic Basis of Nuclear Medicine** Abdelhamid H. Elgazzar, 2006-11-10 The second edition of this book has been significantly expanded to meet the demands of the increasing new trend of molecular imaging. A separate chapter

on the basis of FDG uptake has been added New to this edition are the more clinically oriented details on scintigraphic studies their strengths and limitations in relation to other modalities It further contains many new images illustrations and tables

Nuclear and Radiochemistry Jens-Volker Kratz,Karl Heinrich Lieser,2013-08-15 The third edition of this classic in the field is completely updated and revised with approximately 30% new content so as to include the latest developments The handbook and ready reference comprehensively covers nuclear and radiochemistry in a well structured and readily accessible manner dealing with the theory and fundamentals in the first half followed by chapters devoted to such specific topics as nuclear energy and reactors radiotracers and radionuclides in the life sciences The result is a valuable resource for both newcomers as well as established scientists in the field

Radiopharmaceutical Chemistry Jason S. Lewis,Albert D. Windhorst,Brian M. Zeglis,2019-04-02 This book is a comprehensive guide to radiopharmaceutical chemistry The stunning clinical successes of nuclear imaging and targeted radiotherapy have resulted in rapid growth in the field of radiopharmaceutical chemistry an essential component of nuclear medicine and radiology However at this point interest in the field outpaces the academic and educational infrastructure needed to train radiopharmaceutical chemists For example the vast majority of texts that address radiopharmaceutical chemistry do so only peripherally focusing instead on nuclear chemistry i e nuclear reactions in reactors heavy element radiochemistry i e the decomposition of radioactive waste or solely on the clinical applications of radiopharmaceuticals e g the use of PET tracers in oncology This text fills that gap by focusing on the chemistry of radiopharmaceuticals with key coverage of how that knowledge translates to the development of diagnostic and therapeutic radiopharmaceuticals for the clinic The text is divided into three overarching sections First Principles Radiochemistry and Special Topics The first is a general overview covering fundamental and broad issues like The Production of Radionuclides and Basics of Radiochemistry The second section is the main focus of the book In this section each chapter s author will delve much deeper into the subject matter covering both well established and state of the art techniques in radiopharmaceutical chemistry This section will be divided according to radionuclide and will include chapters on radiolabeling methods using all of the common nuclides employed in radiopharmaceuticals including four chapters on the ubiquitously used fluorine 18 and a Best of the Rest chapter to cover emerging radionuclides Finally the third section of the book is dedicated to special topics with important information for radiochemists including Bioconjugation Methods Click Chemistry in Radiochemistry and Radiochemical Instrumentation This is an ideal educational guide for nuclear medicine physicians radiologists and radiopharmaceutical chemists as well as residents and trainees in all of these areas

**Steves' Review of Nuclear Medicine Technology** Norman E. Bolus,Amy Byrd Brady,2011 Rev ed of Review of nuclear medicine technology Ann M Steves Patricia C Wells 3rd ed c2004

**Merrill's Atlas of Radiographic Positioning and Procedures - E-Book** Eugene D. Frank,Bruce W. Long,Barbara J. Smith,2013-08-13 With more than 400 projections presented Merrill s Atlas of Radiographic Positioning and Procedures remains the gold standard of radiographic positioning texts Authors

Eugene Frank Bruce Long and Barbara Smith have designed this comprehensive resource to be both an excellent textbook and also a superb clinical reference for practicing radiographers and physicians. You will learn how to properly position the patient so that the resulting radiograph provides the information needed to reach an accurate diagnosis. Complete information is included for the most common projections as well as for those less commonly requested. Comprehensive coverage of anatomy and positioning makes Merrill's Atlas the most in-depth text and reference available for radiography students and practitioners. Essential projections that are frequently performed are identified with a special icon to help you focus on what you need to know as an entry-level radiographer. Full-color presentation helps visually clarify key concepts. Summaries of pathology are grouped in tables in positioning chapters for quick access to the likely pathologies for each bone group or body system. Special chapters including trauma, surgical radiography, geriatrics, pediatrics, and bone densitometry help prepare you for the full scope of situations you will encounter. Exposure technique charts outline technique factors to use for the various projections in the positioning chapters. Projection summary tables at the beginning of each procedural chapter offer general chapter overviews and serve as handy study guides. Bulleted lists provide clear instructions on how to correctly position the patient and body part. Anatomy summary tables at the beginning of each positioning chapter describe and identify the anatomy you need to know in order to properly position the patient, set exposures, and take high-quality radiographs. Anatomy and positioning information is presented in separate chapters for each bone group or organ system, all heavily illustrated in full color and augmented with CT scans and MRI images to help you learn both traditional and cross-sectional anatomy. Includes a unique new section on working with and positioning obese patients. Offers coverage of one new compensating filter. Provides collimation sizes and other key information for each relevant projection. Features more CT and MRI images to enhance your understanding of cross-sectional anatomy and prepare you for the Registry exam. Offers additional digital images in each chapter, including stitching for long-length images of the spine and lower limb. Standardized image receptor sizes use English measurements with metric in parentheses. Depicts the newest equipment with updated photographs and images.

[Integrating Cardiology for Nuclear Medicine Physicians](#) Assad Movahed, Gopinath Gnanasegaran, John Buscombe, Margaret Hall, 2008-11-07. Nuclear cardiology is no longer a medical discipline residing solely in nuclear medicine. This is the first book to recognize this fact by integrating in-depth information from both the clinical cardiology and nuclear cardiology literature and acknowledging cardiovascular medicine as the fundamental knowledge base needed for the practice of nuclear cardiology. The book is designed to increase the practitioner's knowledge of cardiovascular medicine, thereby enhancing the quality of interpretations through improved accuracy and clinical relevance. The text is divided into four sections covering all major topics in cardiology and nuclear cardiology: Basic Sciences and Cardiovascular Diseases, Conventional Diagnostic Modalities, Nuclear Cardiology, and Management of Cardiovascular Diseases.

**Current Catalog** National Library of Medicine (U.S.), 1985. First multi-year cumulation covers six years 1965-70. **Physics for**

**Diagnostic Radiology, Third Edition** Philip Palin Dendy, Brian Heaton, 1999-05-01 Physics for Diagnostic Radiology Second Edition is a complete course for radiologists studying for the FRCR part one exam and for physicists and radiographers on specialized graduate courses in diagnostic radiology It follows the guidelines issued by the European Association of Radiology for training A comprehensive compact primer its analytical approach deals in a logical order with the wide range of imaging techniques available and explains how to use imaging equipment It includes the background physics necessary to understand the production of digitized images nuclear medicine and magnetic resonance imaging Whitaker's Cumulative Book List ,1986 *Nuclear Medicine Radiation Dosimetry* Brian J McParland, 2010-07-03 Complexities of the requirements for accurate radiation dosimetry evaluation in both diagnostic and therapeutic nuclear medicine including PET have grown over the past decade This is due primarily to four factors Growing consideration of accurate patient specific treatment planning for radionuclide therapy as a means of improving the therapeutic benefit development of more realistic anthropomorphic phantoms and their use in estimating radiation transport and dosimetry in patients Design and use of advanced Monte Carlo algorithms in calculating the above mentioned radiation transport and dosimetry which require the user to have a thorough understanding of the theoretical principles used in such algorithms their appropriateness and their limitations increasing regulatory scrutiny of the radiation dose burden borne by nuclear medicine patients in the clinic and in the development of new radiopharmaceuticals thus requiring more accurate and robust dosimetry evaluations An element common to all four factors is the need for precise radiation dosimetry in nuclear medicine which is fundamental to the therapeutic success of a patient undergoing radionuclide therapy and to the safety of the patients undergoing diagnostic nuclear medicine and PET procedures As the complexity of internal radiation dosimetry applied to diagnostic and therapeutic nuclear medicine increases this book will provide the theoretical foundations for enabling the practising nuclear medicine physicist to understand the dosimetry calculations being used and their limitations allowing the research nuclear medicine physicist to critically examine the internal radiation dosimetry algorithms available and under development and providing the developers of Monte Carlo codes for the transport of radiation resulting from internal radioactive sources with the only comprehensive and definitive **Radiation Physics for Nuclear Medicine** Marie Claire Cantone, Christoph Hoeschen, 2011-02-08 The field of nuclear medicine is expanding rapidly with the development of exciting new diagnostic methods and treatments This growth is closely associated with significant advances in radiation physics In this book acknowledged experts explain the basic principles of radiation physics in relation to nuclear medicine and examine important novel approaches in the field The first section is devoted to what might be termed the building blocks of nuclear medicine including the mechanisms of interaction between radiation and matter and Monte Carlo codes In subsequent sections radiation sources for medical applications radiopharmaceutical development and production and radiation detectors are discussed in detail New frontiers are then explored including improved algorithms for image reconstruction biokinetic

models and voxel phantoms for internal dosimetry Both trainees and experienced practitioners and researchers will find this book to be an invaluable source of up to date information

**Merrill's Atlas of Radiographic Positioning and Procedures - 3-Volume Set - E-Book** Jeannean Hall Rollins, Bruce W. Long, Tammy Curtis, 2022-02-10 Textbook and Academic Authors Association TAA McGuffey Longevity Award Winner 2024 Selected for Doody's Core Titles 2024 with Essential Purchase designation in Radiologic Technology Perfect your positioning skills with the leading radiography text and clinical reference Merrill's Atlas of Radiographic Positioning Procedures 15th Edition helps you learn to position patients properly set exposures and produce the clear radiographs needed to make accurate diagnoses Guidelines to both common and uncommon projections prepare you for every kind of patient encounter Anatomy and positioning information is organized by bone group or organ system and coverage of special imaging modalities includes CT MRI sonography radiation therapy and more Written by noted educators Jeannean Hall Rollins Bruce Long and Tammy Curtis Merrill's Atlas is not just the gold standard in imaging it also prepares you for the ARRT exam Comprehensive full color coverage of anatomy and positioning makes Merrill's Atlas the most in depth text and reference available for radiography students and practitioners Guidelines to each projection include a photograph of a properly positioned patient and information on patient position part position central ray angulation collimation KVp values and evaluation criteria Diagnostic quality radiograph for each projection demonstrates the result the radiographer is trying to achieve Coverage of common and unique positioning procedures includes chapters on trauma surgical radiography geriatrics pediatrics and bone densitometry to help prepare you for the full scope of situations you will encounter Numerous CT and MRI images enhance comprehension of cross sectional anatomy and help in preparing for the Registry examination Frequently requested projections are identified with a special icon to help you focus on what you need to know as an entry level radiographer Image receptor and collimation sizes plus other key information are provided for each relevant projection Bulleted lists provide clear instructions on how to correctly position the patient and body part when performing procedures Summary tables provide quick access to projection overviews guides to anatomy pathology tables for bone groups and body systems and exposure technique charts NEW Updated content reflects the advances and continuing evolution of digital imaging technology NEW Revised positioning techniques reflect the latest American Society of Radiologic Technologists ASRT standards and include photos of current digital imaging for the lower limb scoliosis pain management and the swallowing dysfunction NEW Added digital radiographs provide greater contrast resolution for improved visualization of pertinent anatomy

**The Low Back** Leo Gelfand, Raoul D. Magaña, R. R. Merliss, 1962

**Progress in Intelligent Computing Techniques: Theory, Practice, and Applications** Pankaj Kumar Sa, Manmath Narayan Sahoo, M. Murugappan, Yulei Wu, Banshidhar Majhi, 2017-07-12 The book focuses on both theory and applications in the broad areas of communication technology computer science and information security This two volume book contains the Proceedings of 4th International Conference on Advanced Computing Networking and Informatics This

book brings together academic scientists professors research scholars and students to share and disseminate information on knowledge and scientific research works related to computing networking and informatics to discuss the practical challenges encountered and the solutions adopted The book also promotes translation of basic research into applied investigation and convert applied investigation into practice     Trends in Contrast Media Henrik S. Thomsen,Robert N. Muller,Robert F. Mattrey,2012-12-06 The use of contrast media within diagnostic radiology has been firmly established for many years now Radiologic contrast media render immense services in daily clinical practice to innumerable patients all over the world When the new cross sectional modalities such as computed tomography and magnetic resonance imaging were introduced into clinical practice it rapidly became evident that the judicious use of contrast media allows the optimal exploitation of the great diagnostic potential of these revolutionary methods More recently efforts to create specific contrast media for ultrasound imaging have been successful and the first beneficial results of their application in daily practice are now evident The aim of this book is to bring together the results of the tremendous research that has been performed during recent years in order to develop specific contrast media for magnetic resonance imaging and ultrasonography and also to develop safer contrast media for the classical radiologic techniques as well as computed tomography Moreover the book provides a comprehensive overview of the indications for and applications of these new contrast media in clinical radiology Finally risks side effects and complications which may occur with the use of these drugs are covered appropriately The three editors are leading and well known experts in their specific field They have been very successful in ensuring the collaboration of so many internationally known specialists to cover the different topics dealt with in this book



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