

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

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## 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

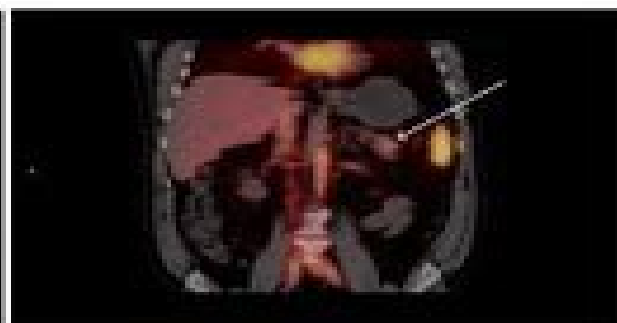


Figure 4  
SPECT/CT axial abdomen image

## 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      **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.  $^{123}\text{I}$  with a reasonably shorter half life is almost ideal for thyroid workup and for a few useful labeled radiopharmaceuticals. Although  $^{125}\text{I}$  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  $^{111}\text{In}$ .

*Nuclear Medicine Technology Program*, 1994      **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.

National Library of Medicine Current Catalog National Library of Medicine (U.S.),      **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 [Current Catalog](#) National Library of Medicine (U.S.),1985 First multi year cumulation covers six years 1965 70 *Whitaker's Cumulative Book List* ,1986 [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** Bruce W. Long,Jeannean Hall Rollins,Barbara J. Smith,2018-11-25 With more than 400 projections Merrill s Atlas of Radiographic Positioning Procedures 14th Edition makes it easier to for you to learn anatomy properly position the patient set exposures and take high quality radiographs This definitive text has been reorganized to align with the ASRT curriculum helping you develop the skills to produce clear radiographic images It separates anatomy and positioning information by bone groups or organ systems using full color illustrations to show anatomical anatomy and CT scans and MRI images to help in learning cross section anatomy Merrill s Atlas is not just the gold standard in radiographic positioning texts and the most widely used but also an excellent review in preparing for ARRT and certification exams 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 Frequently performed essential projections identified with a special icon to help you focus on what you need to know as an entry level radiographer Summary of Pathology table now includes common male reproductive system pathologies Coverage of common and unique positioning procedures includes special chapters on trauma surgical radiography geriatrics pediatrics and bone densitometry to help prepare you for the full scope of situations you will encounter Collimation sizes and other key information are provided for

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**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 Management of Cardiovascular Diseases **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 **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

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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

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

**The Low Back** Leo Gelfand, Raoul D. Magaña, R. R. Merliss, 1962 Nuclear and Radiochemistry Karl Heinrich Lieser, 2008-09-26 This new edition of the best selling handbook gives a complete and concise description of the latest knowledge on nuclear and radiochemistry as well as their applications in the various fields of science It is based on over 40 years experience in teaching courses and research The book is aimed at all researchers seeking sound knowledge about the properties of matter whether chemists physicists medical doctors mineralogists or biologists All of them will find this a valuable source of information Research in radiochemistry includes Study of radioactive matter in nature investigation

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*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 Artificial disc* Mario Brock, Heinz-Michael Mayer, Klaus

Weigel,1991-05-01

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