

# 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

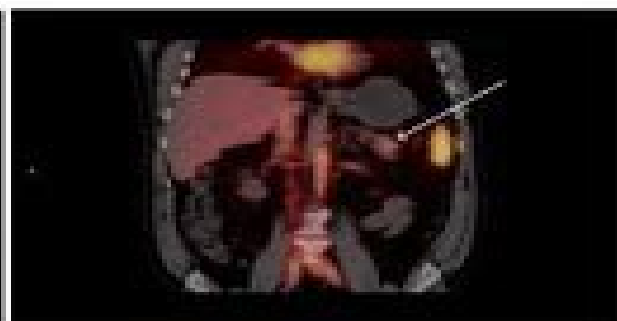


Figure 4  
SPECT/CT axial abdomen image

## 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

**WJ Hussar**



## **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.  $^{111}\text{In}$  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  $^{125}\text{I}$  and  $^{111}\text{In}$ .

**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 *Radiochemistry and Nuclear Chemistry - Volume II* Sandor Nagy, 2009-08-24 Radiochemistry and Nuclear Chemistry theme is a component of Encyclopedia of Chemical Sciences Engineering and Technology Resources in the global Encyclopedia of Life Support Systems EOLSS which is an integrated compendium of twenty one Encyclopedias The content of the Theme on Radiochemistry and Nuclear Chemistry provides the essential aspects and a myriad of issues of great relevance to our world such as Isotope Effects Isotope Separation and Isotope Fractionation Radiometric Dating and Tracing Radiochemical Techniques Radionuclides in Chemical Research Nuclear Methods in Material Research Radiation Chemistry Radiation Biology and Radiation Protection Radiochemistry and Radiopharmaceutical Chemistry for Medicine Chemistry of the Actinide Elements Production And Chemistry Of Transactinide Elements Nuclear Waste Management and the Nuclear Fuel Cycle High intensity Lasers in Nuclear Science Nuclear Forensics Nuclear Processes in Nature Subatomic Particles Nuclear Structure and Stability These two volumes are aimed at the following five major target audiences University and College students Educators Professional practitioners Research personnel and Policy analysts managers and decision makers and NGOs Whitaker's Cumulative Book List, 1986 *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 The Low Back Leo Gelfand, Raoul D. Magaña, R. R. Merliss, 1962 **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

**Nuclear and Radiochemistry** Karl Heinrich Lieser, 2008-09-26 This handbook gives a complete and concise description of the up to date knowledge of nuclear and radiochemistry and applications in the various fields of science I is based on teaching courses and on research for over 40 years The book is addressed to any researcher wishing sound knowledge about the properties of matter be it a chemist a physicist a medical doctor a mineralogist or a biologist They will all find it a valuable source of information about the principles and applications of nuclear and radiochemistry Research in radiochemistry includes Study of radioactive matter in nature investigation of radioactive transmutations by chemical methods chemistry of radioelements etc Applications include Radionuclides in geo and cosmochemistry dating by nuclear methods radioanalysis Mossbauer spectroscopy and related methods behaviour of natural and man made radionuclides in the environment dosimetry and radiation protection All subjects are presented clearly and comprehensibly and in logical sequence Detailed derivations of equations are avoided and relevant information is compiled in tables The recent edition of the multi coloured Karlsruhe Chart of the Nuclides is included Clearly a standard work by an author with extensive experience in research and teaching The Artificial disc Mario Brock, Heinz-Michael Mayer, Klaus Weigel, 1991-05-01

*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

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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

*Soft Tissue Tumors* Fethi Derbel, 2011-11-16 Soft tissue tumors include a heterogeneous group of diagnostic entities most of them benign in nature and behavior Malignant entities soft tissue

sarcomas are rare tumors that account for 1% of all malignancies. These are predominantly tumors of adults but 15% arise in children and adolescents. The wide biological diversity of soft tissue tumors combined with their high incidence and potential morbidity and mortality represent challenges to contemporary researches both at the level of basic and clinical science. Determining whether a soft tissue mass is benign or malignant is vital for appropriate management. This book is the result of collaboration between several authors experts in their fields; they succeeded in translating the complexity of soft tissue tumors and the diversity in the diagnosis and management of these tumors.

**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.

**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.

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