Harvard Medical School/Harvard School of Dental Medicine
Format for the Curriculum Vitae

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Place of Birth: Cambridge, MA

Education

1974	BS Magna cum laude	Physics	University of Massachusetts
1979	MS	Medical Radiological Physics	Harvard School of Public Health
1986	DSc	Medical Radiological Physics	Harvard School of Public Health

Faculty Academic Appointments

1986-1991	Assistant Professor	Radiology	Georgetown University School of Medicine
1991-1994	Assistant Professor	Radiology	Bowman Gray School of Medicine
1994-2003	Associate Professor	Radiology	Wake Forest University School of Medicine
1996-2003	Adjunct Associate Professor	Physics	Wake Forest University
2004-	Associate Professor	Radiology	Harvard Medical School

Appointments at Hospitals/Affiliated Institutions

1980-1982	Research Assistant	Radiology	Brigham and Women's Hospital
1984-1991	Nuclear Medicine Physicist	Radiology	Georgetown University Hospital

1991-2003	PET Physicist	Radiology	Wake Forest University Baptist Medical Center
2003-	Nuclear Medicine Physicist	Radiology	Boston Children's Hospital

Other Professional Positions

1973-1974	Research Assistant	University of Massachusetts
1974-1975	Teaching Assistant	University of Connecticut
1979-1980	Radiological Physics Consultant	Equifax
1980-1984	Research Affiliate	Massachusetts Institute of Technology

Major Administrative Leadership Positions

Local

1991-2003	Head of PET Physics and Computing Group	Wake Forest University Baptist Medical Center
2003-	Director of Nuclear Medicine/PET Physics	Boston Children's Hospital
2009-	Director of Small Animal Imaging Laboratory	Boston Children's Hospital

Committee Service

Local

1996-2002	Medical Radiation Safety Committee	Wake Forest University School of Medicine
	1996-2002	Member
1997-2003	Center of Excellence for Research, Teaching and Learning (summer science experience for high school students)	Wake Forest University
	1997-2003	Faculty
	2002-2003	Board Member
2005-2008	Animal Care and Use Committee	Boston Children's Hospital
	2005-2008	Member
2003-	Radiation Safety Committee	Boston Children's Hospital
	2003-2011	Member
	2011-	Chairman

National and International

1988-1989	Summer science experience for high school students	Center for Excellence in Education McLean, VA
	1988-1989	Faculty
1995-1999	Radioisotope Uniform Source Task Group	American National Standards Institute
	1995-1999	Member
2008-	Medical Physics Group	International Atomic Energy Agency
	2008-	Expert Consultant
2009-	Image Gently Committee	Alliance for Radiation Safety in Pediatric Imaging

	2009-	Member
2011-	Image Wisely Committee	Society of Nuclear Medicine and Molecular Imaging, American College of Radiology, Radiologic Society of North America, American Association of Physicists in Medicine and American Society of Radiologic Technologists Consortium
	2011-	Member

Professional Societies

1981-	Society of Nuclear Medicine and Molecular Imaging	
	1985-	Member, Computer and Instrumentation Council
	1990-1992	Secretary/Treasurer, Computer and Instrumentation Council
	1991	Young Investigator Symposium Coordinator, Computer and Instrumentation Council
	1992-1993, 1996-2000	Member, Executive Committee, Computer and Instrumentation Council
	1997-1999	President, Computer and Instrumentation Council
	1990, 1993-1997	Member, Abstract Review Committee
	1992, 1999	Program Chairman, MidWinter Meeting
	1997-2002	Member, House of Delegates
	2000-2005	Member, Quality Assurance Committee
	2001-2005, 2011-	Member, Finance Committee
	1998-1999	Vice Chairman, Scientific Program Committee
	2000-2005	Associate Chairman, Scientific Program Committee
	2005-2009	Chairman, Scientific Program Committee
	2001-2009	Member, Continuing Education Committee
	2008-2011	General Program Chairman
	2010-	Ethics Committee
	2012-2013	President
	2013-2014	Chairman, Grants and Awards Committee
	2012-	Chairman, Nuclear Medicine Global Initiative
	2012-	Chairman, Dose Optimization Taskforce
	2014-	Historian
	2014-	Member, Medical Internal Radiation Dose (MIRD) Committee

1984-	American Association of Physicists in Medicine	

	1990-1991	Vice Chairman, Nuclear Medicine Committee
	1990-1991	President, Mid-Atlantic Chapter
	1991-1992	Co-Chairman, Local Arrangements Committee
	1994	Program Director, Physics Tutorial for Residents
	2008-	Member, Liaison Committee to Joint Commission
	2011-	Pediatric Imaging Committee
	2011	President, New England Chapter
	2011	Named a Fellow
1994-	American College of Radiology	
	2000-	Member, Nuclear Medicine Accreditation Review Committee
	2012	Named a Fellow
1994-	American Board of Radiology	
	1994-	Diplomate
	2003-2009	Member, Committee for Written Nuclear Medicine Physics Exam

Grant Review Activities

1988-2001	National Cancer Institute	NIH
	1988-2001	Ad Hoc Reviewer
1999-2002	Congressional Mandated Breast Cancer Research Program	DOD
	1999-2002	Panelist
2014	Combat Casualty Care Research Program	DOD
	2014	Ad Hoc Reviewer

Editorial Activities

Ad Hoc Reviewer

Journal of Nuclear Medicine
Journal of Nuclear Medicine Technology
Medical Physics
American Journal of Roentgenology
Journal of Computer Assisted Tomography

Other Editorial Roles

2000-2011	Consulting Editor	Journal of Nuclear Medicine Technology
2011-2012	Editorial Board	Pakistan Journal of Nuclear Medicine
2012-	Editorial Board	Journal of Nuclear Medicine
2014	Guest Editor	Seminars in Nuclear Medicine, Special Issue on Dose Estimation and Risk
2015-	Editorial Board	Nuclear Medicine and Molecular Imaging

Honors and Prizes

1975-1977	Fellowship	US Energy and Development Agency	Academic
1982-1984	Fellowship	US National Cancer Institute	Academic
1994	Service Award	Radiologic Society of North America	Service
2009	Presidential Service Award	Society of Nuclear Medicine	Service
2010	Royal Canadian College Lectureship	Canadian Association of Nuclear Medicine	Lectureship
2011	Caffey Award for Best Scientific Poster	International Pediatric Radiology Symposium	Scientific
2011	Fellow	American Association of Physicists in Medicine	Achievement
2011	Holman-Kaplan Lectureship	New England Chapter of the Society of Nuclear Medicine	Lectureship
2012	Fellow	American College of Radiology	Achievement
2013	Winfield Evans Lectureship	Southwest Chapter of the Society of Nuclear Medicine	Lectureship
2015	William D. Kaplan Lectureship	Brigham and Women's Hospital	Lectureship

Report of Funded and Unfunded Projects

Funding Information

Past

1999-2004 Genotype and Phenotype Heterogeneity in Dyslexia
NIH/NICHHD P01 HD 212887 (F.Wood, PI)
Co-Investigator
The major goals of this research was to evaluate the nature of dyslexia from a scientific, functional and epidemiologic stand point and to correlate these findings

1999-2003 Regional Brain Activation During Cocaine Abstinence
NIH/NIDA 1 R01 DA10230-01A2 (L. Porrino, PI)
Co-Investigator
The major goal of this research was to evaluate changes in brain activation in cocaine abusers during abstinence.

1998-2002 ETACT: A Novel Approach to Scintimammography.
US DOD Idea Grant
PI ($245,000)
The major goal of this grant was to develop a tomographic approach to radioisotope breast imaging based on limited angle tomography

2009-2011 A 7 Tesla MRI Scanner for Small Animal Imaging Research
NIH/NCRR (S. Ted Treves, PI)
Co-Investigator ($2,000,000)
The major goal of this grant was to expand the capability of the small animal imaging laboratory at Children's Hospital Boston to include magnetic resonance imaging further enhancing the on-going research at the institution.

Current

2003-2015 Pediatric Brain Tumor Consortium
NIH
Co-Investigator ($134,336 per year)
The major goal of this research is develop new therapeutic and diagnostic approaches for children with brain tumors. My role is to act as the PET physics consultant, reviewing for quality and performing quantitation on all PET studies submitted to the Consortium.

2012-2016 Dose Reduction in Pediatric Molecular Imaging
NIH/NIBIB
Co-Investigator ($94,280)
The major goal of this research is to develop and validate techniques that can be used to minimize the radiation exposure to pediatric patients undergoing molecular imaging procedures without adversely impacting the diagnostic quality of the images.

Current Unfunded Projects

2009- Dose Reduction in Pediatric Nuclear Medicine
I am collaborating with S. Ted Treves, MD, on a project that seeks to determine the minimum administered activity for a number of nuclear medicine studies through the use of advanced image processing for both planar and tomographic studies. Dr Treves handles the clinical aspects to the project while I provide the dosimetric and image processing expertise, both essential for the success of this project.

2010- Practice of Pediatric Nuclear Medicine at General Hospitals
We are developing a survey for general hospitals within the US inquiring as to how they determined the administered activity for nuclear medicine studies in pediatric patients of different sizes. I am acting as the PI on this project.

Report of Local Teaching and Training

Teaching of Students in Courses

1990	Medical Imaging Graduate Students	Georgetown University Course Director
1998-2003	Physics in Medicine and Biology Undergraduate Students	Wake Forest University Course Co-Director
1994-2002	Small Discussion Group Medical Students	Wake Forest University School of Medicine Tutor and facilitator
1991-2001	Medicine as a Profession Medical Students	Wake Forest University School of Medicine Facilitator
1999-2001	Medical Imaging Graduate Students	Wake Forest University Course Co-Director, Lecturer

Formal Teaching of Residents, Clinical Fellows and Research Fellows (post-docs)

1988-1991	Physics of Diagnostic Radiology	Georgetown University School of Medicine

	Radiology Residents	35 1-hour lectures
1992-2002	Physics of Nuclear Medicine Radiology Residents	Wake Forest University School of Medicine 40 1-hour lectures
1992-2002	Physics of PET Imaging Nuclear Medicine Residents	Wake Forest University School of Medicine 25 1-hour lectures
2003-2004	Physics of Nuclear Medicine Nuclear Medicine Residents	Harvard Medical School 10 1-hour lectures
2005-	Physics of Nuclear Medicine Nuclear Medicine Residents	Harvard Medical School Course Co-Director, 14 1-hour lectures

Clinical Supervisory and Training Responsibilities

2003-	Laboratory Training in Nuclear Medicine Physics for Nuclear Medicine Residents	4 full days per year of laboratory experience in nuclear detection, gamma cameras, SPECT and PET

Formally Supervised Trainees

1986	John Gochoco, MS, Medical Physicist, St Barnabas Medical Center, Elizabeth, New Jersey Master's Thesis Advisor.
1992	Beth Harkness, MS, Nuclear Medicine Physicist, Henry Ford Hospital Master's Thesis Advisor.
1992	Elaine Rovassi, MS, Consulting Medical Physicist, New Jersey Master's Thesis Advisor.
1995	Howard D. Gage, PhD, Assistant Professor of Radiology, Wake Forest University School of Medicine Doctoral Thesis Committee Member.
1997	Amy Garrett, PhD, Research Scientist, Stanford University Doctoral Thesis Committee Member.
2001	Kerry Grow, Medical Physicist, Stanford University Master's Thesis Advisor. Kerry contributed to 2 peer-reviewed published papers during her project.
2003	Carnell Hampton, PhD, Assistant Professor of Radiation Oncology, Wake Forest University School of Medicine Doctoral Thesis Committee Member.
2007	Gethin Williams MD, Radiologist Research collaborator during Dr. Williams' nuclear medicine training. Gethin published a peer-reviewed paper as a result of our collaboration.
2008	Niall Sheehy, MD, Radiologist at St James Hospital Research collaborator during Dr. Sheehy's nuclear medicine training. Niall published 2 peer-reviewed papers as a result of our collaboration.
2009	Katherine Zukotynski, MD, Instructor at Dana Farber Cancer Institute Research collaborator during Dr. Zukotynski's nuclear medicine training. Katherine published 5 peer-reviewed papers as a result of our collaboration.
2013	Tarun Singhal, MD, Resident in Nuclear Medicine Research collaborator with Dr Singhal on several projects involving the molecular imagng of the brain.

Formal Teaching of Peers (e.g., CME and other continuing education courses)

1984	Dosimetry of CT Imaging Georgetown University Hospital	Local talk Washington, DC
1992	Basics of PET Imaging Wake Forest University Baptist Medical Center	Lecture Series Winston-Salem, NC
2001	Unlocking the Secrets of the Brain Wake Forest University	Local talk Winston-Salem, NC
2004-2009	Advances in PET Instrumentation HMS Clinical Nuclear Medicine	Continuing Education Course Boston, MA
2009-	Radiation Dose and Risk in Nuclear Medicine HMS Clinical Nuclear Medicine	Continuing Education Course Boston, MA

Local Invited Presentations

No presentations below were sponsored by outside entities

2004-	Physics of Nuclear Medicine and PET/Invited Lectures for Fellows and Faculty Department of Radiation Oncology/MGH/BWH
2009-	PET Instrumentation/Invited Lectures for Fellows and Faculty Department of Radiology/Boston Children's
2009	Dosimetry of Pediatric PET/CT /Grand Rounds Department of Radiology/Boston Children's
2010	Dosimetry of Pediatric PET/CT /Invited Lecture Department of Radiology/MGH
2011	Dosimetry of CT: CTDI, DLP and ED Joint Program of Nuclear Medicine Research Seminar/HMS
2013	Imaging in the Pediatric Brain Tumor Consortium - Standardization in PET Imaging CIMIT/Catalyst Seminar/HMS
2013	Dose Optimization in Nuclear Medicine – Image Gently, Image Wisely and Beyond Joint Program of Nuclear Medicine Research Seminar/HMS
2013	Radiation Dose Optimization in Pediatric Nuclear Medicine Department of Radiology/Boston Children's Hospital
2015	History of Nuclear Medicine Instrumentation Joint Program of Nuclear Medicine Research Seminar/HMS

Report of Regional, National and International Invited Teaching and Presentations

Invited Presentations and Courses

No presentations below were sponsored by outside entities

Regional

1988	Use of Multi-Head SPECT/Invited Lecture George Washington University, Washington, DC
1991	Physics of SPECT American Association of Physicists in Medicine, Charlottesville, VA
1993	Image Registration University of North Carolina, Chapel Hill, NC
2003	The New Generation of PET Instrumentation

New England Chapter American Association of Physicists in Medicine, Lexington, MA

2003 Imaging in Seizure Disorders
New England/New York Chapters of the Society of Nuclear Medicine, Mystic, CT

2004- Physics of Nuclear Medicine
Massachusetts College of Pharmacy and Health Sciences, Lecturer to undergraduate students in a formal course

2004 How PET Works
New England Chapter of the American Radiological Nurses Association, Boston, MA

2009-2010 Acceptance Testing of Nuclear Medicine Systems
Medical Technology Management Institute, Lecturer in 2-day course

2009 Dosimetry of PET/CT and SPECT/CT
New England Chapter American Association of Physicists in Medicine, Cambridge, MA

2011 Image Registration in Nuclear Medicine Beyond Hybrid Imaging
New England Chapter American Association of Physicists in Medicine, Dedham, MA

2011 Hybrid Imaging in Pediatrics
Society of Nuclear Medicine Northeast Regional Scientific Meeting, Newport, RI

2011 How Should We Communicate Dose and Risk to Our Patients
Society of Nuclear Medicine Northeast Regional Scientific Meeting, Newport, RI

2013 The Appropriate Use of Beta Amyloid Imaging
Society of Nuclear Medicine New England Chapter Meeting, Farmington, CT

2014 Radiation Safety and Dose Optimization
Society of Nuclear Medicine New England Chapter Meeting, Portsmouth, NH

2014 Image Gently/Image Wisely: Working Towards Dose Reduction
Society of Nuclear Medicine New England Chapter Meeting, Stamford, CT

National

1989 SPECT Acceptance Testing
Society of Nuclear Medicine, St. Louis, MO

1991 SPECT State-of-the-Art
Society of Nuclear Medicine, Tampa, FL

1992 Use of Multi-Head SPECT
Society of Nuclear Medicine Great Lakes Chapter, Niagara Falls, NY

1992 Equipping a PET Center
Radiological Society of North America, Chicago, IL

1993 Multi-Head SPECT
University of Buffalo, Buffalo, NY

1993 Equipping a PET Center
Radiological Society of North America, Chicago, IL

1996 PET State-of-the-Art
Radiological Society of North America, Chicago, IL

1997-2002 Nuclear medicine physics for cardiologists
American Society of Nuclear Cardiologists, Lecturer in 5-day course

1997 PET Instrumentation
Society of Nuclear Medicine, San Antonio, TX

1998 Multi-Modality Imaging
Association of Physicists in Medicine, Madison, WI

1999 Dedicated vs Hybrid PET
Society of Nuclear Medicine, Fort Lauderdale, FL

2000 Selecting a PET System
Society of Nuclear Medicine, MidEast Chapter, Rockville, MD
2000 Selecting a PET System
Radiological Society of North America, Chicago, IL
2003 Evaluation of PET Systems
American Association of Physicists in Medicine, San Diego, CA
2003 Pediatric Brain- PET and SPECT
Society of Nuclear Medicine, New Orleans, LA
2003 Acceptance Testing of PET/CT
Radiological Society of North America, Chicago, IL
2004 Recent Advances in PET and PET-CT Scanners
Society of Nuclear Medicine, Anaheim, CA
2004 PET Instrumentation and Radiation Safety
Society of Nuclear Medicine, Philadelphia, PA
2004 Establishing a PET Imaging Program in a Dedicated Children's Hospital
Society of Nuclear Medicine, Philadelphia, PA
2004 PET System Design, Acquisition and Image Reconstruction
American Association of Physicists in Medicine, Pittsburgh, PA
2005 PET/CT Instrumentation
Society of Nuclear Medicine, Tampa, FL
2005 PET Systems: Instrumentation and Data Acquisition
American Association of Physicists in Medicine, Seattle, WA
2005 Establishing a PET Imaging Program in a Dedicated Children's Hospital
University of Washington and Children's Hospital Seattle, Seattle, WA
2006 Advances in PET Technology-New Crystals and Detector Design
American Association of Physicists in Medicine, Orlando, FL
2007 Dosimetry of PET/CT in Children
Society of Nuclear Medicine, Washington, DC
2007 PET Systems: Instrumentation and Data Acquisition
American Association of Physicists in Medicine, Minneapolis, MN
2008 PET/CT Dosimetry
Society of Pediatric Radiology, Scottsdale, AZ
2008 Introduction to PET and PET/CT
Conference of Radiation Control Program Directors, Greensboro, NC
2008 Model QC Program for PET/CT
Conference of Radiation Control Program Directors, Greensboro, NC
2008 Dosimetry of PET/CT and SPECT/CT
Conference of Radiation Control Program Directors, Greensboro, NC
2008 Dose Reduction-Is SPECT Resolution Recovery Ready for Prime Time?
Society of Nuclear Medicine, New Orleans, LA
2008 Low Dose PET/CT for Benign Disease: How Low Can We Take Effective Dose?
Society of Nuclear Medicine, New Orleans, LA
2008 Updates in Pediatric Nuclear Medicine Dosimetry
Society of Nuclear Medicine, New Orleans, LA
2008 PET Basics
American Association of Physicists in Medicine Summer School, Houston, TX
2008 PET/CT and SPECT/CT Dosimetry
American Association of Physicists in Medicine, Houston, TX

2009 Dose Reduction in Pediatric Nuclear Medicine: A Survey of Children's Hospitals
Society of Nuclear Medicine, Clearwater, FL

2009 CT for PET/CT and SPECT/CT: Principles of Dose reduction
Society of Nuclear Medicine, Clearwater, FL

2009 Radiation Dosimetry for Pediatric Patients
High Country Nuclear medicine Meeting, Squaw Valley, CA

2009 How Low Can We Go? To Reduce the Radiation Dose of Pediatric PET/CT and SPECT/CT
MidEast Chapter of the Society of Nuclear Medicine, Ocean City, MD

2009 Resolution Recovery Techniques for Planar and SPECT Imaging
Society of Pediatric Radiology, Carlsbad, CA

2009 PET Basics
Radiological Society of North America, Chicago, IL

2010 Optimizing Doses Without Compromising Study Quality
High Country Nuclear Medicine Meeting, Steamboat Springs, CO

2010 Nuclear Medicine and Radiation Risk
Southwest Chapter of the Society of Nuclear Medicine, Fort Worth, TX

2010 Quality Control, PET, PET/CT, SPECT and SPECT/CT
MidEast Chapter of the Society of Nuclear Medicine, College Park, MD

2010 Dosimetry and Radiation Risk in Pediatric Nuclear Medicine
MidEast Chapter of the Society of Nuclear Medicine, College Park, MD

2010 Activities Leading to Dose Reduction
Society of Pediatric Radiology, Boston, MA

2010 Dose Reduction in CT
Society of Nuclear Medicine, Salt Lake City, UT

2010 The Pediatric Patient and Family: Keep Radiation Exposure as Low as Possible
Society of Nuclear Medicine, Salt Lake City, UT

2010 Dosimetric Aspects of Pediatric PET/CT
Society of Nuclear Medicine, Salt Lake City, UT

2011 Fluorine-18 NaF PET in the Detection of Skeletal Trauma in Children: Technical and Dosimetric Aspects
Society of Nuclear Medicine MidWinter Meeting, Palm Springs CA

2011 Technique of Pediatric PET/CT and SPECT/CT: Review of Basic Physics, Instrumentation and Image Processing of Pediatric Hybrid Imaging
Society of Nuclear Medicine MidWinter Meeting, Palm Springs CA

2011 Minimizing and Communicating Risk in Pediatric Nuclear Medicine
MidEast Chapter of the Society of Nuclear Medicine, Ocean City, MD

2011 Comparison of Ventilation/Perfusion Scans With CTA Dosimetric Considerations
Society of Nuclear Medicine, San Antonio, TX

2011 Minimizing and Communicating Radiation Risk in Pediatric Nuclear Medicine Procedures
Society of Nuclear Medicine, San Antonio, TX

2012 Pediatric Nuclear Medicine: A Physicist's View
Los Angeles Radiologic Society, Pasadena, CA

2012 Dose Reduction: Image Gently, Image Wisely
Los Angeles Radiologic Society, Pasadena, CA

2012 Image Gently/Image Wisely: Ways to Reduce Radiation Exposure
Pittsburgh Chapter of the Society of Nuclear Medicine, Pittsburgh, PA

2012 ^{131}I MIBG Therapy Radiation Protection Considerations

Society of Nuclear Medicine, Miami Beach, FL

2012 Radiation Risk in Clinical Research: Putting it into Perspective
Society of Nuclear Medicine and Molecular Imaging Webinar

2012 SPECT: Acceptance Testing and QC Programs
American Association of Physicists in Medicine Summer School, La Jolla, CA

2012 Estimation Patient Dose: SPECT/PET
American Association of Physicists in Medicine Summer School, La Jolla, CA

2012 Image Gently and Image Wisely in Nuclear Medicine
American Association of Physicists in Medicine, Charlotte, NC

2012 Dose Optimization in Pediatric Nuclear Medicine
North Carolina Health Physics Society, Winston-Salem, NC

2012 Tracking Doses in the Pediatric Population
Radiologic Society of North America, Chicago, IL

2013 Dose Optimization in Nuclear Medicine, 2nd Sino-American Nuclear Medicine Conference, New Orleans, LA

2013 Communicating and Minimizing Radiation Risk in Pediatric Nuclear Medicine, Pacific Northwest Chapter Society of Nuclear Medicine and Molecular Imaging, Portland, OR

2013 Dose Optimization in Nuclear Medicine - Image Gently, Image Wisely and Beyond, Southwest Chapter Society of Nuclear Medicine and Molecular Imaging, Irving, TX

2013 Developing an Institutional ^{131}I MIBG Therapy Program
Society of Pediatric Radiology, San Antonio, TX

2013 Dose Optimization in Pediatric and Adult Nuclear Medicine
Puerto Rico Society of Nuclear Medicine, San Juan, Puerto Rico

2013 Tracking Doses in the Pediatric Population
American Association of Physicists in Medicine, Indianapolis, IN

2013 Tracking Doses in the Pediatric Population
Radiological Society of North America, Chicago, IL

2014 Establishing an ^{131}I MIBG Therapy Program for Treating Pediatric Neuroblastoma
Conference of Radiation Control Program Directors, Atlanta, GA

2014 Radiation Risk: Putting it in Perspective for Patients, Parents and Clinicians
Society of Nuclear Medicine and Molecular Imaging, St. Louis, MO

2014 Resolution Recovery: Applications in Planar and SPECT Imaging
Society of Nuclear Medicine and Molecular Imaging, St. Louis, MO

2014 History of Nuclear Medicine: Instrumentation and Measurements
Society of Nuclear Medicine and Molecular Imaging, St. Louis, MO

2014 Pediatric Neuroendocrine Therapy: Establishing an 131I MIBG Therapy Program for Treating Pediatric Neuroblastoma
Society of Nuclear Medicine and Molecular Imaging, St. Louis, MO

2014 What You Should Know About Radiation and Nuclear Medicine
Society of Nuclear Medicine and Molecular Imaging, St. Louis, MO

2014 SPECT and PET Review
American Association of Physicists in Medicine, Austin, TX

2015 Appropriate Use of Radiation in Everyday Practice
American College of Nuclear Medicine, San Antonio, TX

International

1998 PET Instrumentation
Society of Nuclear Medicine, Toronto, Canada

2000 Basics of PET

	World Congress of Medical Physics, Chicago, IL
2002	Image Registration International Medical Physics Symposium, Havana Cuba
2004	Multi-Modality Approaches to Brain Imaging International Conference on Neurologic Restoration, Havana, Cuba
2005	PET/CT Acceptance Testing Society of Nuclear Medicine, Toronto, Canada
2005	PET/CT Instrumentation: Choosing the right equipment to buy Society of Nuclear Medicine, Toronto, Canada
2009	PET/CT Dosimetry Society of Nuclear Medicine, Toronto, Ontario, Canada
2009	2D and 3D PET and Image Quality in Pediatric Imaging Society of Nuclear Medicine, Toronto, Ontario, Canada
2009	Factors Affecting the Use of SUV in Pediatric PET Society of Nuclear Medicine, Toronto, Ontario, Canada
2010	CT Dosimetry Canadian Association of Nuclear Medicine, Montreal, Canada
2010	Radiation Risk from Pediatric Nuclear Medicine Procedures Congress of the World Federation of Nuclear Medicine/Biology, Cape Town, South Africa
2011	Can Image Processing and Iterative Reconstruction lead to a reduction in Radiation Dose? International Pediatric Radiology Symposium, London, United Kingdom
2011	Radiation Dosimetry and Risk of Myocardial Perfusion Imaging European Association of Nuclear Medicine, Birmingham, United Kingdom
2011	Reducing Dose to Personnel in Pediatric PET/CT IPET 2011 Meeting, International Atomic Energy Agency, Vienna Austria
2012	Paediatric Skeletal Imaging European Association of Nuclear Medicine, Milan, Italy
2013	The Importance of Understanding and Applying Appropriate Dosing Society of Nuclear Medicine and Molecular Imaging, Vancouver, Canada
2014	Dose Optimization in Pediatrics World Federation of Nuclear Medicine and Biology, Cancún, Mexico
2015	Paediatric PET/MR and Dose Optimization 4th PET/MR Workshop, Tübingen, Germany

Report of Clinical Activities and Innovations

Current Licensure and Certification

1994 American Board of Radiology in Medical Nuclear Physics

Practice Activities

1984-1991	Medical Physics	Nuclear Medicine Georgetown University	30 hours per week
1991-2003	Medical Physics	Nuclear Medicine Wake Forest University Baptist Medical Center	30 hours per week
2003-	Medical Physics	Nuclear Medicine	30 hours per week

Clinical Innovations

Implementation of SPECT imaging including quality control and the development of software to review SPECT myocardial perfusion studies (1985)	These methods were the standard for acquiring, processing and reviewing SPECT studies at Georgetown and Wake Forest University. The SPECT myocardial perfusion software became the basis of one of the most popular packages currently used (4DMSPECT)
Clinical implementation of 1st commercially available triple-detector SPECT device (1988)	The implementation of this device required the establishment of multi-detector SPECT quality control procedures. Many of the methods developed by our team, of which I was the senior medical physicist, have become the national standard. We also investigated the appropriate choice in collimators for multi-detector SPECT, and our findings influenced SPECT imaging nationally.
Standard acquisition in nuclear gastric emptying studies (1989)	We investigated the use of the left anterior oblique acquisition of nuclear gastric emptying studies to reduce the effect of varying self-attenuation during the acquisition. This approach was adopted by many institutions nationally.
Multi-modality registration of PET and CT in the thorax. (1995)	We investigated the registration of PET and CT acquired simultaneously and its clinical use, particularly in the thorax. This study and others at the time provided motivation for the development of hybrid PET/CT scanners which by 2005 became the industry standard.
Investigated an approach to limited angle tomography in nuclear medicine referred to as emission tuned aperture computed tomography (ETACT) (2000)	We investigated the possibility of applying techniques similar to mammographic tomosynthesis to nuclear breast imaging (scintimammography).This approach proved to be a bit complicated for routine clinical use and thus was not widely adopted.
Implementing methods of standardization, review and quantitation of brain studies in children with brain tumors (2003-Present)	These methods have been routinely implemented as part of the Pediatric Brain Tumor Consortium, an NIH-funded multi-center research consortium.
Clinical implementation of advanced image processing and reconstruction to reduce radiation dose to children receiving nuclear medicine studies.	Our team at Children's Hospital, of which I am the senior medical physicist, has been investigating these approaches since 2005. We have implemented procedures that have led to a reduction in radiation to less than half of that routinely used without sacrificing image quality by using adaptive planar filtering and iterative reconstruction techniques. This has been applied to renal, skeletal and oncologic imaging. Our results have been widely reported and are being implemented internationally.

Adequacy of low-dose CT for attenuation correction in pediatric PET/CT	We investigated the use of very low-dose CT for attenuation correction of pediatric PET/CT as a function of patient size. The findings of this study have been implemented internationally.
Clinical practice and dose optimization in pediatric nuclear medicine in North America. (2007)	Our team at Children's Hospital, of which I am the senior medical physicist, conducted a survey of dedicated pediatric hospitals in North America regarding their practice of nuclear medicine. I directed the collection and analysis of these data for this project. The results of this survey, which underwent expedited publication as a "special contribution" in the Journal of Nuclear Medicine, indicated that there was a large variation in the practice of nuclear medicine in children, even among the most prestigious pediatric institution in North America. This study provided motivation for the formation of a pediatric nuclear medicine task group involving the Society of Nuclear Medicine, the Society of Pediatric Radiology and the American College of Radiology and launched the first project regarding nuclear medicine of the Image Gently campaign which seeks to keep the radiation dose to children from medical imaging procedures as low as possible. This endeavor led to the publication of the North American consensus guidelines for administered activities in children and adolescent, published by the Journal of Nuclear Medicine in 2011 which have been updated in 2014.
Development of an approach using SPECT to evaluate bone metabolism in the context of mandibular asymmetry. (2010)	Our team at Children's Hospital and Massachusetts General Hospital, of which I am the senior medical physicist, developed a SPECT approach to the evaluation of mandibular asymmetry and acquired mandibular SPECT data on a series of normal patients (i.e. not being scanned for head issues) to establish an age-specific normal range. This approach is now routinely used within our institutions and several others internationally.
Global adoption of standardization of administered activities in pediatric nuclear medicine (2013-Present)	I chaired the first project of the Nuclear Medicine Global Initiative on the standardization of administered activities in pediatric nuclear medicine throughout the world. This initiative involves the national societies of nuclear medicine of the US, Canada, Japan, Korea, China, India, South Africa and Australia as well as the European Association of Nuclear Medicine, the International Atomic Energy Agency, the South American Association for Nuclear Medicine, the World Federation of Nuclear Medicine and Biology and the Asia Oceanic Federation of

	Nuclear Medicine and Biology.
Translation of preclinical research to the clinic	Since 2009, I have served as the Director of the Small Animal Imaging Laboratory at Boston Children's Hospital. I recognize the importance of translational research in developing novel diagnostic and therapeutic approaches to pediatric disease. We have updated and expanded the imaging capability of this core laboratory which includes radiography, computed tomography (CT), positron emission tomography (PET), single photon emission computed tomography (SPECT), ultrasound and magnetic resonance imaging (MRI) specifically designed for the imaging of mice and rats. This is the most comprehensive small animal imaging program at a dedicated pediatric research medical center.

Report of Technological and Other Scientific Innovations

1984	Developed a gas scintillation proportional chamber for nuclear medicine imaging
1986	Development of software for quality control of SPECT clinical data acquisition
1988	Developed quality control program for multi-headed SPECT systems
1995	Multi-modality registration of PET and CT in the thorax
1998	Quantitation in brain activation PET for neuropsychology
2001	Scintimammography with limited angle tomography
2002	Evaluation of total joint arthroplasty with limited angle tomography
2004	Adequacy of quantitation in preclinical imaging
2007	Adequacy of low-dose CT for PET attenuation correction
2008	3D quantitation of brain PET for pediatric brain tumors
2008	Standardization of radiopharmaceutical dose in pediatric nuclear medicine
2011	Dose reduction in pediatric planar nuclear medicine using advanced planar processing

Report of Education of Patients and Service to the Community

Activities

2009-	Alliance for Radiation Safety in Pediatric Imaging/Nuclear Medicine Task Group Member
2011-	Image Wisely dose reduction in adults campaign

Educational Material for Patients and the Lay Community

No presentations below were sponsored by outside entities

Patient educational material

2010	Nuclear Medicine – What Can I do as a Parent?	Contributor and reviewer	Patient educational pamphlet

2010	What Parents Should Know about Imaging	Co-author	Patient educational material on CHB website
2013	What You Should Know About Radiation and Nuclear Medicine	Presenter	Oral present at Society of Nuclear Medicine and Molecular Imaging Annual Meeting
2014	What You Should Know About Radiation and Nuclear Medicine	Presenter	Oral present at Society of Nuclear Medicine and Molecular Imaging Annual Meeting

Report of Scholarship

Publications

Peer reviewed publications in print or other media

Research investigations

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Narrative Report

I am a medical physicist with expertise in nuclear medicine. Throughout my career, I have worked to improve the practice of nuclear medicine through the incorporation of technological advances and current concepts of radiation dosimetry. Since being recruited to Boston Children's Hospital in 2003, I have focused these efforts on pediatric nuclear medicine.

Area of Excellence

My area of excellence is in the realm of clinical expertise and innovation. In particular, my work has involved the development and appropriate utilization of nuclear medicine technology to optimize the radiation dose to patients, particularly children. I am recognized internationally as an expert in nuclear medicine physics as it applies to children.

At the Harvard School of Public Health, I developed a gas scintillation camera for nuclear cardiology (1,5,7,8 in Peer-Reviewed Publications) while evaluating the feasibility of epidemiology of low-level radiation (2,3). Later, as the senior medical physicist working with John Keyes, we brought rotating gamma camera single photon emission computed tomography (SPECT) into routine clinical use (14). In addition, we brought the first commercially available triple-detector SPECT camera to the clinic (21). This involved developing quality control programs and the choice of collimators for multi-detector SPECT, much of which is the basis for how multi-detector SPECT in practiced today (21). I also developed limited angle SPECT for breast imaging (31, 32). In the 1990s, I worked on the feasibility of combining PET and CT leading to the current practice of hybrid PET/CT (23,25,26). More recently, I determined the minimum CT dose necessary for attenuation correction in pediatric PET/CT (38). In all of these endeavors, I concentrated my efforts on bring these technological innovations into routine clinical use, specifically as it applies to pediatric imaging which presents its own unique opportunities and challenges.

Over the past decade, I have applied my expertise to develop approaches for dose optimization in

pediatric nuclear medicine. At HSPH, I also studied epidemiology, radiation biology and radionuclide dosimetry, and I worked on a project evaluating the feasibility of epidemiologic studies on the effects of low-level radiation (2,3). As senior PET physicist within the Pediatric Brain Tumor Consortium (PBTC), I developed analytical methods for brain PET data in children and evaluated the standardization of PET imaging within multi-center clinical trials (40,41,53,58,68,70,71). I have also investigated using image processing methods to reduce dose in pediatric nuclear imaging (43,44,45,53,56,61,62,72).

By combining my understanding of the technical aspects radiation detection, nuclear imaging, tomographic reconstruction and image analysis with my knowledge of radiation dosimetry, radiobiology and the risks associated with exposure to ionizing radiation, I have investigated the optimization of radiation dose in pediatric nuclear medicine. I believe I am the only nuclear medicine physicist working full-time at a pediatric medical research institution, and, as such, I am widely recognized as one of the foremost experts in Pediatric nuclear medicine physics internationally.

Teaching and Education

I have been very active in the dissemination of knowledge in nuclear medicine physics, radiation risk and dosimetry at the local, national and international level. I taught medical physics to residents at Georgetown University. Within the Joint Program of Nuclear Medicine at Harvard Medical School, I am the co-director of a nuclear medicine physics course for residents that consist of 25 lectures and 4 all-day laboratory experiences. In addition, I am routine asked to provide board reviews and guest lectures of nuclear medicine physics and radiation safety for both radiology and medical physics residents. In 1994, I directed nuclear medicine physics tutorials at national meetings. I also co-developed a Basic Science of Nuclear Medicine CD in 2000 that was distributed to every nuclear medicine residency program in the US. I have published continuing education articles and given lectures on optimizing and communication radiation dosimetry and risk.

I am the associate editor of recent editions of 2 standard textbooks: *Nuclear Medicine: the Requisites* and *Pediatric Nuclear Medicine and Molecular Imaging*, both published in 2014.

As Scientific Program Chair of the Society of Nuclear Medicine and Molecular Imaging (SNMMI), I promoted and developed novel educational programs in nuclear medicine and molecular imaging. As President of the Society of Nuclear Medicine and Molecular Imaging (SNMMI) in 2013, I expanded the SNMMI's educational offerings to the developing world including partnering with the International Atomic Energy Agency (IAEA) on a series of webinars made available world-wide. I instituted and acted as chair of the first Nuclear Medicine Global Initiative which involves 13 international organizations involved in nuclear medicine which are looking at the standardization of pediatric administered activities around the world. I am the senior nuclear medicine physicist working with Image Gently and Image Wisely providing guidance on optimizing radiation dose for children and adults. I am a member of the SNMMI Medical Internal Radiation Dosimetry (MIRD) Committee, the SNMMI liaison to both the National Council of Radiation Protection (NCRP) and the Conference of Radiation Control Program Directors (CRCPD) as well as a consultant to the International Atomic Energy Agency (IAEA).

I have worked extremely hard to bolster the teaching mission of Harvard Medical School by providing excellent and thorough training to our students, residents and fellows as well as continuing education of our faculty members. I have also worked diligently on the national and international level to provide essential and practical education, particularly with respect to pediatric nuclear medicine.

Service

I have also been very involved in service to Boston Children's Hospital. Within Radiology, I direct the quality control program for nuclear medicine and aid in the application of sophisticated techniques to challenging nuclear medicine studies. I have served on the Radiation Safety Committee (RSC) for 10 years. Since 2011, I have served as Chair of the Radiation Safety Committee and have worked closely with representatives of all clinical services and research endeavors that utilize ionizing radiation to assure its safe, effective and compliant use. I served on the Boston Children's Hospital Institutional Animal Care and Use Committee (IACUC) from 2005 to 2008. I have served as Director of the BCH Small Animal Imaging Laboratory since 2009 (42,47,48,55,59,63,69). During that time, I have worked closely with BCH Research Operations to provide ultrasound, nuclear imagine (PET and SPEC)T, computed tomography and magnetic resonance imaging capability in rodents and other small animals to basic scientists within the institution.