

DATE: October 22, 2008

CURRICULUM VITAE

Name: Frederic H. Fahey

Education:

1970-1974	BS in Physics	University of Massachusetts
1974	Physics	University of Connecticut
1975-1977	Radiological Science	University of Lowell
1977-1986	MS in Med Radiol Physics	Harvard School of Public Health
	DSc in Med Radiol Physics	

Licensure and Certification:

American Board of Radiology in Medical Nuclear Physics - 1994

Academic Appointments:

1986-1991	Assistant Professor of Radiology, Georgetown University School of Medicine, Washington, District of Columbia
1991-1994	Assistant Professor of Radiologic Sciences, Bowman Gray School of Medicine, Winston-Salem, North Carolina
1994-2003	Associate Professor of Radiologic Sciences, Wake Forest University School of Medicine, Winston-Salem, North Carolina
1996-2003	Adjunct Associate Professor of Physics, Wake Forest University, Winston-Salem, North Carolina
2004-Present	Associate Professor of Radiology, Harvard Medical School, Boston, Massachusetts

Hospital Appointments:

1980-1982	Research Assistant, Department of Radiology, Brigham and Women's Hospital, Boston, Massachusetts
1984-1991	Nuclear Medicine Physicist, Georgetown University Hospital, Washington, District of Columbia
1991-2003	PET Physicist, Radiologic Sciences, Wake Forest University Baptist Medical Center, Winston-Salem, North Carolina
2003-Present	Clinical Medical Physicist, Division of Nuclear Medicine, Children's Hospital, Boston, Massachusetts

Other Professional Positions and Major Visiting Appointments:

- 1973-1974 Research Assistant, Department of Physics, University of Massachusetts, Amherst, Massachusetts
- 1974-1975 Teaching Assistant, Department of Physics, University of Connecticut, Storrs, Connecticut
- 1979-1980 Radiological Physics Consultant, Equifax, Health Systems Division Reading, Massachusetts
- 1980-1984 Research Affiliate, Laboratory of Nuclear Science, Massachusetts Institute of Technology, Cambridge, Massachusetts

Major Administrative Responsibilities

- 1991-2003 Head of PET Physics and Computing Group, Wake Forest University Baptist Medical Center, Winston-Salem, North Carolina
- 2003-Present Director of Nuclear Medicine Physics, Children's Hospital, Boston, Massachusetts

Major Committee Assignments:

- 1996-1999 Medical Radiation Safety Committee, Wake Forest University School of Medicine, Winston-Salem, North Carolina
- 2000-2002 Medical Radiation Safety Committee, Wake Forest University School of Medicine, Winston-Salem, North Carolina
- 2003-Present Medical Radiation Safety Committee, Children's Hospital, Boston, Massachusetts
- 2005-Present Animal Care and Use Committee, Children's Hospital, Boston, Massachusetts

Professional Societies:

- 1981-Present Society of Nuclear Medicine
 - Computer and Instrumentation Council (1985-Present)
 - Review of Abstracts Committee (1990, 1993-1997)

- Secretary/Treasurer, Computer and Instrumentation Council (1990-1992)
- Coordinator, Young Investigators Symposium, Computer and Instrumentation Council (1991)
- Executive Committee, Computer and Instrumentation Council (1992-1993, 1996-2000)
- Program Chairman, Mid-Winter Meeting (1992, 1999)
- President, Computer and Instrumentation Council (1997-1999)
- House of Delegates (1997-2002)
- Quality Assurance Committee (2000-2005)
- Finance Committee (2001-2005)
- Vice Chairman, Scientific Program Committee (1998-1999)
- Associate Chairman, Scientific Program Committee (2000-2005)
- Chairman, Scientific Program Committee (2005-Present)
- Continuing Education Committee (2001-Present)
- General Program Chairman (2008-Present)
- 1984-Present American Association of Physicists in Medicine
 - Vice Chairman, Nuclear Medicine Committee (1990-1991)
 - President, Mid-Atlantic Chapter (1990-1991)
 - Co-Chair, Local Arrangements Committee (1991-1992)
 - Program Director, Physics Tutorial for Residents (1994)
 - Liaison Committee for Joint Commission (2008-Present)
- 1994-Present American College of Radiology
 - Nuclear Medicine Accreditation Physics Review (2000-Present)
- 1994-Present American Board of Radiology
 - Member, Committee for Written Nuclear Medicine Physics Exam (2003-Present)

Community Service:

- 1988, 1992, 1993, 1998, 2000, 2001 National Institutes of Health, Ad Hoc reviewer of scientific grants
- 1988-1989 Center for Excellence in Education, Vienna, VA, summer program mentor
- 1995-1999 American National Standards Institute, task group member for Radioisotope Uniformity Source Standard
- 1997-2003 Wake Forest University, Center of Excellence for Research, Teaching and Learning, summer program mentor
- 1999-2001 Department of Defense Breast Cancer Program, reviewer of idea grants
- 2002-2003 Center of Excellence for Research, Teaching and Learning, board member
- 2008-Present International Atomic Energy Agency, Expert Consultant

Editorial Boards:

- 2000-Present Journal of Nuclear Medicine Technology

Narrative Report:

I am a clinical medical physicist working in nuclear medicine and positron emission tomography (PET). I provide expertise in radiation physics, nuclear medicine instrumentation, emission tomography and image processing.

Early in my career, I developed gas-filled nuclear detectors such as the multi-wire proportional chamber and the gas scintillation proportional chamber, which offered the potential for high-resolution and high-speed imaging for low-energy radiopharmaceuticals. Since then, my research has involved the application of single photon emission computed tomography (SPECT) and positron emission tomography (PET) to neuroscience and oncology. Among other things, I have applied PET to studying subjects with learning disabilities compared to normals, determining the cerebral blood flow when using different anesthetic agents and evaluating brain function in subjects in the first weeks of cocaine abstinence. Recently, I evaluated brain function in older subjects with mild cognitive impairment depending on genomic status (presence of E4 allele) and the effectiveness of treatment.

In oncology, I developed a tomographic approach (known as ETACT) to scintimammography. ETACT requires the acquisition of several images about the object using markers to infer the geometry and thereby reconstruct the data. ETACT is very simple requiring only a standard nuclear camera with pinhole collimation. This approach can be applied in any nuclear medicine clinic without requiring specialized equipment.

I have investigated many technical aspects of nuclear imaging as applied to research and clinical applications. I introduced the use of the left anterior oblique view in nuclear gastric emptying studies, a standard method for reducing the effect of attenuation in these studies. I performed the initial measurements of the first triple-detector SPECT camera and studied the relationship between resolution, sensitivity and image quality for multi-detector SPECT. I developed a retrospective method of registering thoracic CT and PET studies, which until recently was the best method to perform this processing. I have investigated methods for optimal characterization of activation sites in PET brain studies.

Wherever I have worked, I have been an integral part of the clinical nuclear medicine team. I work with the technical staff to develop a quality control program that assures proper operation of each device. I help with the recommendation of new nuclear equipment. I provide radiation dosimetry on all protocols and for certain individual patients. I consult on the technical aspects of all new clinical protocols, and, in some cases, develop algorithms for processing these protocols. In difficult cases, I process the clinical data myself to assure its appropriateness.

I have been very fortunate to have many teaching opportunities with a wide variety of students. I co-taught a course to undergraduates on the Physics of Medicine, facilitated small group discussions for medical students and taught graduate school biomedical engineering courses on medical imaging. I have mentored four masters students and participated in several PhD thesis committees. I have given many lectures to lay

audiences from school children to senior citizens and have worked with summer programs to introduce teenagers to biomedical research. I am very active with the Society of Nuclear Medicine on ways to improve continuing medical education. I developed a CDROM in the Basic Science of Nuclear Medicine that was distributed to every radiology residency, nuclear medicine fellowship and nuclear medicine technologist training program in the country. Teaching at all levels is extremely important to me and, frankly, it is what makes working in an academic medial center worthwhile for me.

Research Support (as PI or co-PI only):

Past Funding:

1998-2002 DOD Idea Grant F. Fahey, PI ETACT: A Novel Approach to Scintimammography

Recent Research Activities:

Dosimetry and image quality in PET/CT and SPECT/CT, Principal Investigator

Quantitation of FDG PET in pediatric brain tumors, Collaborator

Use of SPECT and PET to evaluate mandibular asymmetry in children, Collaborator

Development of Emission Tuned Aperture Computed Tomography (ETACT), Principal Investigator

Use of TACT to evaluate total joint replacement, Principal Investigator

Effect of cholinesterase inhibitors on cerebral glucose metabolism in patients at risk for Alzheimer's dementia, Collaborator

Genotype and phenotype of learning disabilities, Collaborator

Characterization and optimization of PET systems for small animal imaging, Principal Investigator

Teaching Activities:

1. Local Contributions
 - a. Georgetown University
 - i. Graduate
 1. 1988-1991, Physics of diagnostic radiology, course director, 6 radiology residents, 200 hours/year
 2. 1990, Medical imaging, course director, 2 graduate students, 45 hours/year
 - ii. Continuing Medical Education
 1. 1984, Dosimetry of CT imaging, lecturer, 2 hours
 - iii. Advisory and Supervisory
 1. 1986, Masters thesis advisor, J. Gochoco, Medical Physicist, St Barnabas Hospital, NJ
 2. 1992, Masters thesis advisor, B. Harkness, Medical Physicist, Henry Ford Hospital, MI
 3. 1992, Masters thesis advisor, E. Rovassi, Consulting Medical Physicist, NJ
 - b. Wake Forest University
 - i. Undergraduate
 1. 1998-2003, Physics in Biology and Medicine, co-teacher, 6 physics undergraduates, 20 hours/year
 2. 1992, Basics of positron emission tomography, lecturer, 50 physics students and faculty, 3 hours
 3. 1994-2002, Small discussion group, tutor and facilitator, 6 medical students, 90 hours/year
 4. 1999-2001, Medicine as a profession, facilitator, 6 medical students, 20 hours/year
 5. 2001, PET: Unlocking the secrets of the brain, 50 physics students and faculty, 3 hours
 - ii. Graduate
 1. 1992-2002, Physics of nuclear medicine, course director and lecturer, 7 radiology residents, 40 hours/year
 2. 1992-2002, Physics of PET, 6 nuclear medicine fellows and others, 25 hours/year
 3. 1999-2001, Medical imaging, 5 biomedical engineering graduate students, 150 hours/year
 - iii. Continuing Medical Education
 1. 1997-2002, Nuclear medicine physics for cardiologists, 20 cardiology residents, fellows and faculty, 4 hours
 - iv. Advisory and Supervisory
 1. 2001, Masters thesis advisor, K. Grow, Medical Physicist, Stanford University
 2. 1997, Doctoral thesis committee, Amy Garrett, neuroscientist Univ Cal Davis

3. 2001, Doctoral thesis committee, Timothy Persons, imaging specialist, National Security Council,
 4. 2003, Doctoral thesis committee, Carnell Hampton, medical physicist
 - v. Teaching Leadership
 1. 1993, Research advisor, Jeffrey Yu MD, radiologist
 2. 2001, Research advisor, Michael Meltsner, medical physics graduate student,
 3. 2000, Advisor, Mark Hyatt, radiology resident
 - c. Massachusetts College of Pharmacy and Health Sciences
 - i. Undergraduate Education
 1. 2004-Present, Physics of nuclear medicine, co-lecturer, 20 nuclear medicine technology students, 20 hours/year
 - d. Harvard Medical School
 - i. Graduate Education
 1. 2005-Present, Physics of nuclear medicine, course co-director, 6 nuclear medicine fellows, 40 hours/year
 2. 2003-2004, Physics of nuclear medicine, lecturer, 6 nuclear medicine fellows, 40 hours/year
2. Regional, National and International Contributions
- i. Invited Lectures
 1. 1988, lecture, "Use of Multi-Head SPECT", George Washington University, Washington, DC
 2. 1989, lecture, "SPECT Acceptance Testing", Society of Nuclear Medicine, St. Louis, Missouri
 3. 1991, lecture, "SPECT State-of-the-Art", Society of Nuclear Medicine, Tampa, Florida
 4. 1991, lecture, "Physics of SPECT", American Association of Physicists in Medicine, Mid Atlantic Chapter, Charlottesville, Virginia
 5. 1992, lecture, "Use of Multi-Head SPECT". Society of Nuclear Medicine, Great Lakes Chapter, Niagara Falls, New York
 6. 1992, lecture, "Equipping a PET Center", Radiological Society of North America, Chicago, Illinois
 7. 1993, lecture, "Multi-Head SPECT", University of Buffalo, Buffalo, New York
 8. 1993, lecture, "Image Registration", University of North Carolina, Chapel Hill, NC
 9. 1993, lecture, "Equipping a PET Center", Radiological Society of North America, Chicago, Illinois
 10. 1996, lecture, "PET State-of-the-Art", Radiological Society of North America, Chicago, Illinois
 11. 1997, lecture, "PET Instrumentation", Society of Nuclear Medicine, San Antonio, Texas

12. 1997, lecture, "PET Instrumentation", American Association of Physicists in Medicine, Milwaukee, Wisconsin
13. 1998, lecture, "PET Instrumentation", Society of Nuclear Medicine, Toronto, Canada
14. 1998, lecture, "Multi-Modality Imaging", American Association of Physicists in Medicine, Madison, Wisconsin
15. 1999, lecture, "Dedicated vs Hybrid PET", Society of Nuclear Medicine, Fort Lauderdale, Florida
16. 2000, lecture, "Basics of PET", World Congress of Medical Physics, Chicago, Illinois
17. 2000, lecture, "Selecting a PET System", Society of Nuclear Medicine, MidEast Chapter, Rockville, Maryland
18. 2001, lecture, "Selecting a PET System", Radiological Society of North America, Chicago, Illinois
19. 2002, lecture, "Image Registration", Cuban Medical Physics Society, Havana, Cuba
20. 2003, lecture, "Evaluation of PET Systems", American Association of Physicists in Medicine, San Diego, California
21. 2003, lecture, "Pediatric Brain- PET and SPECT", Society of Nuclear Medicine, New Orleans, Louisiana
22. 2003, lecture, "The New Generation of PET Instrumentation", New England Chapter of the American Association of Physicists in Medicine, Lexington, Massachusetts
23. 2003, lecture, "Imaging in Seizure Disorders", New England/New York Chapters of the Society of Nuclear Medicine, Mystic, Connecticut
24. 2003, lecture, "Acceptance Testing of PET/CT", Radiological Society of North America, Chicago, Illinois
25. 2004, lecture, "Recent Advances in PET and PET-CT Scanners", MidWinter Symposium of the Society of Nuclear Medicine, Anaheim, California
26. 2004, lecture, "Multi-Modality Approaches to Brain Imaging", International Conference on Neurologic Restoration, Havana, Cuba
27. 2004, lecture, "PET Instrumentation and Radiation Safety", Society of Nuclear Medicine, Philadelphia, Pennsylvania
28. 2004, lecture, "Establishing a PET Imaging Program I a Dedicated Children's Hospital", Society of Nuclear Medicine, Philadelphia, Pennsylvania
29. 2004, lecture, "PET System Design, Acquisition and Image Reconstruction", American Association of Physicists in Medicine, Pittsburgh, Pennsylvania.
30. 2004, "How PET Works", New England Chapter of the American Radiological Nurses Association, Boston, Massachusetts

31. 2005, "PET/CT Instrumentation", MidWinter Symposium of the Society of Nuclear Medicine, Tampa, Florida
32. 2005, "PET/CT Instrumentation: Choosing the right equipment to buy", Society of Nuclear Medicine, Toronto, Canada
33. 2005, "PET/CT Acceptance Testing", Society of Nuclear Medicine, Toronto, Canada
34. 2005, "PET Systems: Instrumentation and Data Acquisition", American Association of Physicists in Medicine, Seattle, Washington
35. 2005, "Establishing a PET Imaging Program in a Dedicated Children's Hospital", University of Washington and Children's Hospital Seattle, Seattle, Washington
36. 2006, "Advances in PET Technology-New Crystals and Detector Design", American Association of Physicists in Medicine, Orlando, Florida.
37. 2007, "Dosimetry of PET/CT in Children", Society of Nuclear Medicine, Washington, DC
38. 2007, "PET Systems: Instrumentation and Data Acquisition", American Association of Physicists in Medicine, Minneapolis, Minnesota
39. 2008, "PET/CT Dosimetry", Society of Pediatric Radiology, Scottsdale, Arizona
40. 2008, "Introduction to PET and PET/CT", Conference of Radiation Control Program Directors, Greensboro, North Carolina
41. 2008, "Model QC Program for PET/CT", Conference of Radiation Control Program Directors, Greensboro, North Carolina
42. 2008, "Dosimetry of PET/CT and SPECT/CT", Conference of Radiation Control Program Directors, Greensboro, North Carolina
43. 2008, "Dose Reduction-Is SPECT Resolution Recovery Ready for Prime Time?", Society of Nuclear Medicine, New Orleans, Louisiana
44. 2008, "Low Dose Low Dose PET/CT for Benign Disease How Low Can We Take Effective Dose?", Society of Nuclear Medicine, New Orleans, Louisiana
45. 2008, "Updates in Pediatric Nuclear Medicine Dosimetry", Society of Nuclear Medicine, New Orleans, Louisiana
46. 2008, "PET Basics", American Association of Physicists in Medicine Summer School, Houston, Texas
47. 2008, "PET/CT and SPECT/CT Dosimetry", American Association of Physicists in Medicine, Houston, Texas

- ii. Leadership Roles
 - 1. Society of Nuclear Medicine 1992 MidWinter Symposium, program director
 - 2. Society of Nuclear Medicine 1999 MidWinter Symposium, program director
- 3. Curriculum Offerings and Educational Program Development
 - a. Physics symposium for residents on emission tomography, program developer, program director and lecturer
 - b. Nuclear medicine instrumentation for cardiologists, program developer, program director and lecturer
 - c. Basic Science in Nuclear Medicine CD project, Co-director and lecturer

Clinical Activities:

- 1984-1991 I served as the clinical nuclear medicine physicist at Georgetown University Hospital. As such, I directed the quality control of all of the nuclear counting and imaging equipment. I performed acceptance and routine testing on all equipment. I consulted with respect to the physical aspects of all new clinical protocols that were developed during my tenure. I also developed several software applications that were routinely used for various clinical applications.
- 1991-2003 I served as the clinical PET physicist at Wake Forest University Baptist Medical Center. As such, I helped to bring their PET Center online. I helped design the PET Center computer network and consulted with respect to the physical aspects on all the clinical protocols that were developed. I directed the quality control of all PET imaging equipment as well as assist with the radiation safety program in the PET Center. Also, I assisted in the processing of certain clinical studies such as with the image registration of PET brain studies to MR for tumor patients.
- 2003-Present I am currently the Director of Nuclear Medicine Physics and PET at Children's Hospital. I direct the quality assurance programs for all nuclear counting and imaging equipment within the Division of Nuclear Medicine which will include the PET scanner when it is delivered at the end of 2003. I will play a principal role as Children's Hospital brings the new technology of positron emission tomography online. I work with the technical staff to implement an effective and efficient program that assures proper operation of all nuclear equipment. I provide consultation on radiation dosimetry for all clinical and research protocols and calculate dosimetry individual patients in special cases. I consult on all technical aspects of all new protocols and develop the computer algorithms to be used. I perform the computer processing on certain difficult cases.

Bibliography:

Original Reports

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2. Dreyer NA, Loughlin JE, Friedlander ER, Clapp RW, Fahey FH. Choosing populations to study the health effects of low-dose ionizing radiation. *American Journal of Public Health* 1981; 71:1247-1252.
3. Dreyer NA, Loughlin JE, Fahey FH, Harley NH. The feasibility of epidemiologic studies of cancer in residents near the Rocky Flats plant. *Health Physics* 1982; 42:65-68.
4. Ziessman HA, Fahey FH, Lee TC, Eastman RC, Goldstein HA. Thallium-technetium functional imaging of the thyroid and parathyroid: a case report. *Clin Nucl Med* 1985; 10:865-867.
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6. Ziessman HA, Fahey FH, Gochoco JM. Impact of radiocontaminants in commercially available iodine-123: dosimetric evaluation. *J Nucl Med* 1986; 27:428-432.
7. Fahey FH, Zimmerman RE, Judy PF, Lanza RC. Detection efficiency of a high-pressure gas scintillation proportional chamber. *Med Phys* 1987; 14:115-123.
8. Lanza RC, Rideout W, Fahey F, Zimmerman RE. Gas scintillators for imaging low energy isotopes. *IEEE Trans Nucl Sci* 1987; NS-14:406-409.
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13. Ziessman HA, Collen MJ, Fahey FH, Ciarleglio CA, Maher KA, Cattau EL, Fleischer DE, Lewis JH, Benjamin SB. The effect of the Garren-Edwards gastric bubble on solid and liquid gastric emptying. *Clin Nucl Med* 1988; 13:586-589.
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