CURRICULUM VITAE

Signature: _____ Date: 1 May 2015

Eric C. Frey

I. Demographic Information

A. Current Appointments:

12/1/2007-present
Professor of Radiology
Russell H. Morgan Department of Radiology and Radiological Science, School of Medicine
Johns Hopkins University, Baltimore, Maryland

11/1/2009
Professor of Oncology
Stanley Kimmel Cancer Center
Johns Hopkins University, Baltimore, Maryland
Department of Environmental Health Science, School of Public Health
Baltimore, Maryland

B. Personal Data:

Business Address: The Russell H. Morgan Department of Radiology and Radiological Science
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C. Education and Training:

Degree	Year	Institution	Discipline
B.S., *Magna Cum Laude*	1981	Davidson College, Davidson, NC	Physics
Ph.D.	1989	University of North Carolina at Chapel Hill	Physics
Postdoctoral Training	1988-1990	University of North Carolina at Chapel Hill	Biomedical Engineering

D. Professional Experience:

Position	Institution	Dates
Microelectronics Fellow, Teaching Asst., Research Assit.	Dept. of Physics, University of North Carolina at Chapel Hill	8/1981-10/1988
Summer Intern	Varian/Extrion in Gloucester, MA	5-9/1985
Consultant	General Ionex Corporation, Newburyport, MA	2/1986-5/1987
Postdoctoral Fellow	Dept.of Radiology, Univ. of North Carolina at Chapel Hill	10/1988-7/1990
Research Associate	Dept.of Biomed. Eng., Univ. of North Carolina at Chapel Hill	7/1990-1/1992
Research Assistant Professor	Dept.of Biomed. Eng. and Dept. of Radiology, Univ. of North Carolina at Chapel Hill	1/1992-7/1996
Assistant Professor (Tenure Track)	Dept.of Biomed. Eng. and Dept. of Radiology, Univ. of North Carolina at Chapel Hill	7/1996-7/2001
Associate Professor (Tenured)	Dept.of Biomed. Eng. and Dept. of Radiology, Univ. of North Carolina at Chapel Hill	7/2001-7/2002
Adjunct Associate Professor	Dept.of Biomed. Eng. and Dept. of Radiology, Univ. of North Carolina at Chapel Hill	7/2002-7/2006
Visiting Associate Professor	Dept. of Radiology, Johns Hopkins University	7/2002-5/2003
Associate Professor	Dept. of Radiology, Johns Hopkins University	5/2003-12/1/2007
Associate Professor	Department of Environmental Health Sciences, School of Public Health, Johns Hopkins University	5/2003-12/1/2007
Professor	Dept. of Radiology, Johns Hopkins University	12/1/2007-present
Professor	Department of Environmental Health Sciences, School of Public Health, Johns Hopkins University	11/1/2009-present
Professor	Stanley Kimmel Cancer Center, Johns Hopkins University	11/1/2009-present
Professor	Department of Electrical and Computer Engineering, Johns Hopkins University	12/1/2010-present

II. RESEARCH ACTIVITIES

A. Publications

In the following † means that the person was a student and * means a postdoc under my direct supervision at the time the work was performed.
Prior to 2005 author order reflects the level of contribution. After 2005, the final author position reflects that the research was conducted under my supervision and support. An article with a postdoc (*) or student (†) as the first author indicates that I was the senior author, even if not listed in the last position.

1. Peer Reviewed Scientific Articles

1. **E.C. Frey**, N.R. Parikh, M.L. Swanson, W.K. Chu, "Oxidation kinetics and Ge segregation during the of oxidation of Si containing Ge," Materials Research Society Symposium Proceedings, 105:277-282, 1987.
2. M.L. Swanson, N.R. Parikh, G.S. Sandhu, **E.C. Frey**, Z.H. Zhang, and W.K. Chu, "Depth Oscillations of Planar Channeling yields in InP and GaP for lattice location applications," Materials Research Society Symposium Proceedings, vol 144:409-414, 1988.
3. M.L. Swanson, N.R. Parikh, **E.C. Frey**, and T. Wichert, "Ion channeling and perturbed angular-correlation (PAC) studies of in-as atom pairs in silicon," Nucl Instrum Meth B, 33(1-4): 591-594, 1988.
4. J.C. Austin, M.L. Swanson, W.C. Hughes, C.T. Kao, L.M. Slifkin, H.C. Hofsass, and **E.C. Frey**, "Perturbed-angular-correlation measurements of trivalent indium defects in silver-chloride," Phys Rev B, 42(13): 7699-7705, 1990.
5. **E.C. Frey** and B.M.W. Tsui, "Parameterization of the scatter response function in spect imaging using Monte Carlo simulation," IEEE Trans Nucl Sci, 37(3): 1308-1315, 1990.
6. N.R. Parikh, **E.C. Frey**, H.C. Hofsass, M.L. Swanson, R.G. Downing, W.K. Chu, and T.Z. Hossain, "Neutron depth profiling by coincidence spectrometry," Nucl Instrum Meth B, 45(1-4): 70-74, 1990.

7. **E.C. Frey** and B.M.W. Tsui, "Spatial properties of the scatter response function in SPECT," IEEE Trans Nucl Sci, 38(2): 789-794, 1991.
8. B.M.W. Tsui, X.D. Zhao, **E.C. Frey**, and G.T. Gullberg, "Comparison between ML-EM and WLS-CG algorithms for SPECT image-reconstruction," IEEE Trans Nucl Sci, 38(6): 1766-1772, 1991.
9. **E.C. Frey**, B.M.W. Tsui, and J.R. Perry, "Simultaneous acquisition of emission and transmission data for improved Tl-201 cardiac SPECT imaging using a Tc-99m transmission source," J Nucl Med, 33(12): 2238-2245, 1992.
10. **E.C. Frey**, Z.W. Ju†, and B.M.W. Tsui, "A fast projector-backprojector pair modeling the asymmetric, spatially varying scatter response function for scatter compensation in SPECT imaging," IEEE Trans Nucl Sci, 40(4): 1192-1197, 1993.
11. **E.C. Frey** and B.M.W. Tsui, "A practical method for incorporating scatter in a projector-backprojector for accurate scatter compensation in SPECT," IEEE Trans Nucl Sci, 40(4): 1107-1116, 1993.
12. **E.C. Frey**, N. Yu, B. Patnaik, N.R. Parikh, M.L. Swanson, and W.K. Chu, "Transition between ge segregation and trapping during high-pressure oxidation of Ge_xSi_{1-s}/Si," J Appl Phys, 74(7): 4750-4755, 1993.
13. B.M.W. Tsui, X.D. Zhao, Z.J. Cao, and **E.C. Frey**, "Reconstruction methods for quantitative brain SPECT," IEEE Trans Nucl Sci, 40(2): 214-220, 1993.
14. F.J. Beekman, **E.C. Frey**, C. Kamphuis, B.M.W. Tsui, and M.A. Viergever, "A new phantom for fast determination of the scatter response of a gamma-camera," IEEE Trans Nucl Sci, 41(4): 1481-1488, 1994.
15. Z.J. Cao, **E.C. Frey**, and B.M.W. Tsui, "A scatter model for parallel and converging beam SPECT Based on the Klein-Nishina formula," IEEE Trans Nucl Sci, 41(4): 1594-1600, 1994.
16. **E.C. Frey** and B.M.W. Tsui, "Modeling the Scatter Response Function in Inhomogeneous Scattering Media for SPECT," IEEE Trans Nucl Sci, 41(4): 1585-1593, 1994.
17. B.M.W. Tsui, **E.C. Frey**, X. Zhao, D.S. Lalush, R.E. Johnston, and W.H. McCartney, "The importance and implementation of accurate 3d compensation methods for quantitative SPECT," Phys Med Biol, 39(3): 509-530, 1994.
18. B.M.W. Tsui, X.D. Zhao, **E.C. Frey**, and W.H. McCartney, "Quantitative single-photon emission computed-tomography - basics and clinical considerations," Semin Nucl Med, 24(1): 38-65, 1994.
19. B.M.W. Tsui, X.D. Zhao, G.K. Gregoriou, D.S. Lalush, **E.C. Frey**, R.E. Johnston, and W.H. McCartney, "Quantitative cardiac SPECT Reconstruction with reduced image degradation due to patient anatomy," IEEE Trans Nucl Sci, 41(6): 2838-2844, 1994.
20. **E.C. Frey** and B.M.W. Tsui, "A comparison of Gd-153 and Co-57 as transmission sources for simultaneous TCT and Tl-201 SPECT," IEEE Trans Nucl Sci, 42(4): 1201-1206, 1995.
21. Z.W. Ju†, **E.C. Frey**, and B.M.W. Tsui, "Distributed 3-D iterative reconstruction for quantitative SPECT," IEEE Trans Nucl Sci, 42(4): 1301-1309, 1995.
22. J. Li, B.M.W. Tsui, A. Welch, **E.C. Frey**, and G.T. Gullberg, "Energy Window optimization in simultaneous Tc-99m Tct and Thallium-201 SPECT Data-Acquisition," IEEE Trans Nucl Sci, 42(4): 1207-1213, 1995.
23. D.J. Kadrmas†, **E.C. Frey**, and B.M.W. Tsui, "An SVD investigation of modeling scatter in multiple energy windows for improved SPECT images," IEEE Trans Nucl Sci, 43(4): 2275-2284, 1996.
24. F.J. Beekman, C. Kamphuis, and **E.C. Frey**, "Scatter compensation methods in 3D iterative SPECT reconstruction: A simulation study," Phys Med Biol, 42(8): 1619-1632, 1997.
25. D.J. Kadrmas†, **E.C. Frey**, and B.M.W. Tsui, "Analysis of the reconstructibility and noise properties of scattered photons in Tc-99m SPECT," Phys Med Biol, 42(12): 2493-2516, 1997.
26. **E.C. Frey**, B.M.W. Tsui, and G.T. Gullberg, "Improved estimation of the detector response function for converging beam collimators," Phys Med Biol, 43(4): 941-950, 1998.
27. D.J. Kadrmas†, **E.C. Frey**, S.S. Karimi†, and B.M.W. Tsui, "Fast implementations of reconstruction-based scatter compensation in fully 3D SPECT image reconstruction," Phys Med Biol, 43(4): 857-873, 1998.
28. D.J. Kadrmas†, **E.C. Frey**, and B.M.W. Tsui, "Application of reconstruction-based scatter compensation to thallium-201 SPECT: Implementations for reduced reconstructed image noise," IEEE Trans Med Imaging, 17(3): 325-333, 1998.
29. B.M.W. Tsui, **E.C. Frey**, K.J. LaCroix, D.S. Lalush, W.H. McCartney, M.A. King, and G.T. Gullberg, "Quantitative myocardial perfusion SPECT," J Nucl Cardiol, 5(5): 507-522, 1998.
30. B.M.W. Tsui, D.E. Wessell, X.D. Zhao, W.T. Wang, D.P. Lewis, and **E.C. Frey**, "Imaging characteristics of scintimammography using parallel-hole and pinhole collimators," IEEE Trans Nucl Sci, 45(4): 2155-2161, 1998.
31. S.D. Wollenweber, B.M.W. Tsui, D.S. Lalush, **E.C. Frey**, and G.T. Gullberg, "Evaluation of myocardial defect detection between parallel-hole and fan-beam SPECT using the Hotelling trace," IEEE Trans Nucl Sci, 45(4): 2205-2210, 1998.
32. D.J. Kadrmas†, **E.C. Frey**, and B.M.W. Tsui, "Simultaneous technetium-99m/thallium-201 SPECT imaging with model-based compensation for cross-contaminating effects," Phys Med Biol, 44(7): 1843-1860, 1999.

33. S.D. Wollenweber, B.M.W. Tsui, D.S. Lalush, **E.C. Frey**, K.J. LaCroix, and G.T. Gullberg, "Comparison of Hotelling observer models and human observers in defect detection from myocardial SPECT imaging," IEEE Trans Nucl Sci, 46(6): 2098-2103, 1999.
34. K.J. LaCroix, B.M.W. Tsui, **E.C. Frey**, and R.J. Jaszczak, "Receiver operating characteristic evaluation of iterative reconstruction with attenuation correction in Tc-99m-sestamibi myocardial SPECT images," J Nucl Med, 41(3): 502-513, 2000.
35. D.S. Lalush, **E.C. Frey**, and B.M.W. Tsui, "Fast maximum entropy approximation in SPECT using the RBI-MAP algorithm," IEEE Trans Med Imaging, 19(4): 286-294, 2000.
36. L.R. MacDonald, B.E. Patt, J.S. Iwanczyk, B.M.W. Tsui, Y.C. Wang, **E.C. Frey**, D.E. Wessell, P.D. Acton, and H.F. Kung, "Pinhole SPECT of mice using the LumaGEM gamma camera," IEEE Trans Nucl Sci, 48(3): 830-836, 2001.
37. H.W.A.M. de Jong, W.T. Wang, **E.C. Frey**, M.A. Viergever, and F.J. Beekman, "Efficient simulation of SPECT down-scatter including photon interactions with crystal and lead," Med Phys, 29(4): 550-560, 2002.
38. Y. Du†, **E.C. Frey**, W.T. Wang†, C. Tocharoenchai, W.H. Baird, and B.M.W. Tsui, "Combination of MCNP and SimSET for Monte Carlo simulation of SPECT with medium- and high-energy photons," IEEE Trans Nucl Sci, 49(3): 668-674, 2002.
39. S. Sankaran†, **E.C. Frey**, K.L. Gilland, and B.M.W. Tsui, "Optimum compensation method and filter cutoff frequency in myocardial SPECT: A human observer study," J Nucl Med, 43(3): 432-438, 2002.
40. W.T. Wang†, **E.C. Frey**, B.M.W. Tsui, C. Tocharoenchai, and W.H. Baird, "Parameterization of Pb X-ray contamination in simultaneous Tl-201 and Tc-99m dual-isotope imaging," IEEE Trans Nucl Sci, 49(3): 680-692, 2002.
41. M. Ljungberg, K. Sjogreen, X.W. Liu, E. Frey, Y. Dewaraja, and S.E. Strand, "A 3-dimensional absorbed dose calculation method based on quantitative SPECT for radionuclide therapy: Evaluation for I-131 using Monte Carlo simulation," J Nucl Med, 43(8): 1101-1109, 2002.
42. **E.C. Frey**, K.L. Gilland, and B.M.W. Tsui, Application of task-based measures of image quality to optimization and evaluation of three-dimensional reconstruction-based compensation methods in myocardial perfusion SPECT. IEEE Transactions on Medical Imaging, 21(9): 1040-50, 2002.
43. Y.S. Gur, T.H. Farncombe, P.H. Pretorius, H.C. Gifford, M.V. Narayanan, **E.C. Frey**, D. Gagnon, and M.A. King, Comparison of scatter compensation strategies for myocardial perfusion imaging using Tc-99m labeled sestamibi. IEEE Transactions on Nuclear Science, 49(5): 2309-14, 2002.
44. M.K. O'Connor, B. Kemp, F. Anstett, P. Christian, E.P. Ficaro, E. Frey, M. Jacobs, J.N. Kritzman, R.A. Pooley, and M. Wilk, "A multicenter evaluation of commercial attenuation compensation techniques in cardiac SPECT using phantom models," J Nucl Cardiol, 9(4): 361-76, 2002.
45. T.H. Farncombe, H.C. Gifford, M.V. Narayanan, P.H. Pretorius, **E.C. Frey**, and M.A. King, Assessment of scatter compensation strategies for Ga-67 SPECT using numerical observers and human LROC studies. Journal of Nuclear Medicine, 45(5): 802-812, 2004.
46. M. Ljungberg, **E.C. Frey**, K. Sjogreen, X.W. Liu, Y. Dewaraja, and S.E. Strand, 3D absorbed dose calculations based on SPECT: Evaluation for 111-In/90-Y therapy using Monte Carlo simulations. Cancer Biotherapy and Radiopharmaceuticals, 18(1): 99-107, 2003.
47. M.V. Narayanan, P.H. Pretorius, S.T. Dahlberg, J.A. Leppo, N. Botkin, J. Krasnow, W. Berndt, **E.C. Frey**, and M.A. King, Evaluation of scatter compensation strategies and their impact on human detection performance Tc-99m myocardial perfusion imaging. IEEE Transactions on Nuclear Science, 50(5): 1522-1527, 2003.
48. Y. Du†, **E.C. Frey**, W.T. Wang, and B.M.W. Tsui, Optimization of acquisition energy windows in simultaneous Tc-99m/I-123 brain SPECT. IEEE Transactions on Nuclear Science, 50(5): 1556-1561, 2003.
49. X Song†, **E.C. Frey**, W.T. Wang, Y. Du†, and B.M.W. Tsui, Validation and evaluation of model-based crosstalk compensation method in simultaneous Tc-99m stress and Tl-201 rest myocardial perfusion SPECT. IEEE Transactions on Nuclear Science, 51(1): 72-79, 2004.
50. X. He†, **E.C. Frey**, J.M. Links, K.L. Gilland, W.P. Segars, and B.M.W. Tsui, A mathematical observer study for the evaluation and optimization of compensation methods for myocardial SPECT using a phantom population that realistically models patient variability. IEEE Transactions on Nuclear Science, 51(1): 218-224, 2004.
51. Y. Qi, B.M.W. Tsui, K.L. Gilland, **E.C. Frey**, and G.T. Gullberg, Evaluation of Parallel and Fan-Beam Data Acquisition Geometries and Strategies for Myocardial SPECT Imaging. Nuclear Science, IEEE Transactions on, 51(3): 667-72, 2004.
52. W.P. Segars, B.M.W. Tsui BM, **E.C. Frey**, Johnson GA, Berr SS , "Development of a 4-D digital mouse phantom for molecular imaging research," Mol Imaging Biol, May-Jun;6(3): 149-59, 2004.
53. C. Tocharoenchai, Benjamin BMW, Frey EC, Wang WT, "Effect of Attenuation Correction on Lesion Detection using a Hybrid PET System", Journal of the Medical Association of Thailand, 88(1): 96-102, 2005.
54. X. Song†, W.P. Segars, Y. Du†, B.M.W. Tsui, **E.C. Frey**, "Fast modelling of the collimator-detector response in Monte Carlo simulation of SPECT imaging using the angular response function," Phys Med Biol, Apr 21;50(8): 1791-804, 2005.

55. Y. Du†, B.M.W. Tsui and **E.C. Frey**, "Partial volume effect compensation for quantitative brain SPECT imaging," IEEE Trans Med Imag, 24 (8): 969-976, 2005.
56. B. He†, Y. Du†, X. Song†, W.P. Segars and **E.C. Frey**, "A Monte Carlo and physical phantom evaluation of quantitative In-111 SPECT," Phys Med Biol, 50(2005): 4169-4185, 2005.
57. W.T. Wang†, **E.C. Frey**, B.M.W. Tsui, D.S. Lalush, and C. Tocharoenchai, "Optimization of acquisition parameters for simultaneous ^{201}Tl and ^{99m}Tc dual-isotope myocardial imaging, IEEE Trans Nucl Sci, 52(5): 1277-1235, 2005.
58. X. He†, J.M. Links, X. Song†, B.M.W. Tsui, and **E.C. Frey**, "Comparison of penetration and scatter effects on defect contrast for GE and Siemens LEHR collimators in myocardial perfusion SPECT – a simulation study," IEEE Trans Nucl Sci, Oct, 52(5): 1359-1364, 2005.
59. Y. Du†, B.M.W. Tsui, **E.C. Frey**, "Model-based compensation for quantitative ^{123}I brain SPECT imaging," Phys Med Biol, 2006, Vol. 51(5): 1269-1282, 2006.
60. X. He†, C.E. Metz, B.M.W. Tsui, J.M. Links, **E.C. Frey**, "Three-class ROC analysis — a decision theoretic approach," IEEE Trans Med Imag, May, 25(5): 571-581, 2006.
61. X. He†, J.M. Links, K.L. Gilland, B.M.W. Tsui, **E.C. Frey**, "Comparison of 180-degree and 360-degree acquisition for myocardial perfusion SPECT with compensation for attenuatin, detector response, and scatter: Monte Carlo and mathematical observer results," J Nucl Cardiol, May-Jun; 13(3): 345-53, 2006.
62. X. He†, **E.C Frey**, "Three-class ROC analysis — the equal error utility assumption and the optimality of three-class ROC surface using the ideal observer," IEEE Trans Med Imag, Aug; 25(8), 979-986, 2006.
63. B. He† and **E.C. Frey**, "Comparison of Conventional, Model-Based Quantitative Planar, and Quantitative SPECT Image Processing Methods for Organ Activity Estimation Using In-111 Agents," Phys Med Biol, Aug 21;51(16):3967-81, 2006.
64. X. He † and **E.C.Frey**, "An Optimal Three-Class Linear Observer Derived From Decision Theory", IEEE Trans Med Imag, Jan, 26(1):77-83, 2007.
65. H. Song, B. He†, Prideaux A, Y. Du*, **E.C. Frey**, W. Kasecamp, P.W. Ladenson, R.L. Wahl, and G. Sgouros, "Lung dosimetry for radioiodine therapy treatment planning in the case of diffuse lung metastases," J Nucl Med, Dec; 47(12), 1985-1994, 2006.
66. H. Song, Y. Du*, G. Sgouros G, A. Prideaux, **E.C. Frey**, R.L. Wahl, "Therapeutic potential of ^{90}Yttrium and ^{131}Iodine-labeled anti-CD20 monoclonal antibody in treating non-Hodgkin's lymphoma patients with pulmonary involvement: a Monte Carlo-based dosimetric analysis," J Nucl Med, Jan; 48(1): 150-7, 2007.
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68. J. Xu, C. Liu; Y. Wang, **E.C. Frey**, B.M.W. Tsui, "Quantitative Rotating Multisegment Slant-Hole SPECT Mammography With Attenuation and Collimator-Detector Response Compensation," *IEEE Trans Med Imag* , 26(7): 906-916, 2007.
69. A.R. Prideaux, H. Song, R.F. Hobbes, B. He, **E.C. Frey**, P.W. Ladenson, R.L. Wahl, G. Sgouros, "Three-Dimensional Radiobiologic Dosimetry: Application of Radiobiologic Modeling to Patient-Specific 3-Dimensional Imaging-Based Internal Dosimetry," J Nucl Med, 48(6): 1008-1016, 2007.
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71. W. P. Segars, M. Mahesh, T. J. Beck, **E. C. Frey**, and B. M. W. Tsui, "Realistic CT simulation using the 4D XCAT phantom," Med Phys 35(8): 3800-3808, 2008, PMC2809711.
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73. X. He and **E.C. Frey**, "The meaning and use of the volume under a three-class ROC surface (VUS)," IEEE Trans Med Imag, 27(5): 577-588, 2008, PMC2654215.
74. X. He, X.Y. Song, and **E.C. Frey**, "Application of Three-Class ROC Analysis to Task-Based Image Quality Assessment of Simultaneous Dual-Isotope Myocardial Perfusion SPECT (MPS)," IEEE Trans Med Imag, 27(11): 1556-1567, 2008, PMC2668219.
75. G. Sgouros, **E. Frey**, R. Wahl, B. He, A. Prideaux, and R. Hobbs, "Three-dimensional imaging-based radiobiological dosimetry," Semin Nucl Med, 38(5): 321-334, 2008, PMC2597292.
76. B. He, Y. Du, W.P. Segars, R.L. Wahl, G. Sgouros, H. Jacene, and **E.C. Frey**, "Evaluation of quantitative imaging methods for organ activity and residence time estimation using a population of phantoms having realistic variations in anatomy and uptake," Med Phys, 36(2): 612-619, 2009, PMC2848525.
77. X. He and **E.C. Frey**, "The Validity of Three-Class Hotelling Trace (3-HT) in Describing Three-Class Task Performance: Comparison of Three-Class Volume Under ROC Surface (VUS) and 3-HT," IEEE Trans Med Imag, 28(2): 185-193, 2009, PMC2760394.
78. Y. Du and **E. C. Frey**, "Quantitative Evaluation of Simultaneous Reconstruction with Model-Based Crosstalk Compensation for Tc-99m/I-123 Dual Isotope Simultaneous Acquisition Brain SPECT", Med Phys, 36(6): 2021-2033, 2009, PMC2736700.

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80. X. He and **E.C. Frey**, "ROC, LROC, FROC, AFROC – an Alphabet Soup", Journal of American College of Radiology, 6(9): 652-655, 2009.
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82. P. Descourt, T. Carlier, Y. Du, X. Song, I. Buvat, **E.C. Frey**, M. Bardies, B.M.W. Tsui, and D. Visvikis, "Implementation of angular response function modeling in SPECT simulations with GATE," Phys Med Biol, 55(9): N253-266, 2010, PMC2992948.
83. G.S. Mok, Y. Du, Y. Wang, **E.C. Frey**, and B.M. Tsui, "Development and validation of a Monte Carlo simulation tool for multi-pinhole SPECT," Mol Imaging Biol, 12(3): 295-304, 2010, .
84. B. He and **E.C. Frey**, "The Impact of 3D Volume-of-Interest Definition on Accuracy and Precision of Activity Estimation in Quantitative SPECT and Planar Processing Methods," Phys Med Biol, 55(12): 3535-3544, 2010, PMC2992950.
85. B. He, and **E.C. Frey**, "Effects of shortened acquisition time on accuracy and precision of quantitative estimates of organ activity," Med Phys, 37(4): 1807-1815, 2010, PMC2864672.
86. R.F. Hobbs, S. Baechler, S Senthamizhchelvan, A.R. Prideaux, C.E. Esaias, M. Reinhardt, **E.C. Frey**, D.M. Loeb, and G Sgouros, "A gamma camera count rate saturation correction method for whole-body planar imaging," Phys Med Biol, 55(3):817-31, 2010, PMC2844671.
87. R.F. Hobbs, S. Baechler, R.L. Wahl, B. He, H. Song, C.E. Esaias, **E.C. Frey**, H Jacene, and G. Sgouros, "Arterial wall dosimetry for non-Hodgkin lymphoma patients treated with radioimmontherapy," J Nucl Med, 51(3): 368-75, 2010, PMC2967028.
88. X. He, J.M. Links, and **E.C. Frey**, "An investigation of the trade-off between the count level and image quality in myocardial perfusion SPECT using simulated images: the effects of statistical noise and object variability on defect detectability," Phys Med Biol, 55(17): 4949-61, 2010, PMC 2995921.
89. K. Taguchi, **E.C. Frey**, X.L. Wang†, J.S. Iwanczyk, and W.C. Barber, "An analytical model of the effects of pulse pileup on the energy spectrum recorded by energy resolved photon counting x-ray detectors," Med Phys, 37(8): 3957-3969, 2010, PMC2917451.
90. N. Song†, B. He and **E.C. Frey**, "Effect of volume-of-interest misregistration on Quantitative Planar processing,", Physics in Medicine and Biology, 55(18): 5483-5497, 2010, PMC3004535.
91. X. Wang†, D. Meier, S. Mikkelsen, G.E. Maehlum, D.J. Wagenaar, B.M. Tsui, B.E. Patt, and **E.C. Frey**, "MicroCT with energy-resolved photon-counting detectors," Phys Med Biol, 56(9): 2791-816, 2011, PMC3095970.
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71. X. Wang, J. Xu, K. Taguchi, B.E. Patt, D.J. Wagenaar, and E.C. Frey Enhanced discrimination of calcified and soft arterial plaques using computed tomography with a multi-energy-window photon counting x-ray detector, Proc. SPIE 7258, 72583W (2009).
72. K. Taguchi, E.C. Frey, X. Wang, J.S. Iwanczyk, and W.C. Barber, "An analytical model of the effects of pulse pileup on the energy spectrum recorded by energy resolved photon counting x-ray detectors," Proc. SPIE 7622, 76221C (2010).
73. X. Wang, D. Meier, P. Oya, G. E. Maehlum, D. J. Wagenaar, B. M. W. Tsui, B. E. Patt, and E. C. Frey, "Microcomputed tomography with a second generation photon-counting x-ray detector: contrast analysis and material separation," Proc. SPIE 7622, 76221B (2010).
74. X. He and E.C. Frey, "Binary ROC curve and three-class 2-D ROC surface," Proc. SPIE 7627, 762710 (2010).

B. Book Chapters, Monographs

The following 2 book chapters were published in a book as part of the proceedings of the 1995 Meeting on Fully Three Dimensional Reconstruction in Radiology and Biology. A full peer review was performed prior to acceptance.

1. B.M.W. Tsui, X.D. Zhao, E.C. Frey and G.T. Gullberg, "Characteristics of reconstructed point response in three-dimensional spatially variant detector response compensation in SPECT," in *Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine*, P. Grangeat and J.-L. Amans, Editors, (Kluwer Academic Publishers), pp 149-162, 1996.
2. E.C. Frey, Z.W. Ju and B.M.W. Tsui, "An investigation of two approximation methods for improving the speed of 3D iterative reconstruction-based scatter compensation," in *Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine*, P. Grangeat and J.-L. Amans, Editors, (Kluwer Academic Publishers), pp 177-196, 1996.
3. E.C. Frey and B.M.W. Tsui, "Collimator-detector response compensation in SPECT," in *Quantitative Analysis in Nuclear Medicine Imaging*, H. Zaidi, editor (Springer), Chapter 5, pp 141-166, 2005.
4. B.M.W. Tsui and E.C. Frey "Analytic image reconstruction in emission computed tomography," in *Quantitative Analysis in Nuclear Medicine Imaging*, H. Zaidi, editor (Springer), Chapter 3, pp 82-106, 2005.
5. E.C. Frey, "SPECT/CT for dosimetry calculations," in *Hybrid SPECT/CT Tumor Imaging*, (Editors S.J. Goldsmith and O. Israel, editors, Chapter 10, pp. 157-178, (Taylor and Francis), 2006.
6. *Quantitative Nuclear Medicine Imaging: Concepts, Requirements and Methods*, IAEA Human Health Reports No. 9. IAEA, Vienna, 2014. One of 4 authors of document, listed as one of 8 contributors to drafting and review.
7. E.C. Frey and M.A. Lodge, 'Nuclear Medicine Imaging Devices', in *Nuclear Medicine Physics: A Handbook for Teachers and Students*, IAEA, Vienna, 2014, pg 312-397.

C. Other Publications

1. E.C. Frey and B.M.W. Tsuim "Evaluation of Workstations for SPECT Reconstruction," Computer and Instrumentation Council Newsletter, The Society of Nuclear Medicine, Vol 9, No. 1, 1991.

III. Extramural Sponsorship

A. Current

Title	Dates	Sponsor/ Grant#	Current/ Total Direct Costs	Role/ %Effort	PI
Quantitative SPECT for Targeted Radionuclide Therapy	9/14/11-7/31/16	NIH R01 CA109234	$257,331 $1,286,927	PI 30%	E.C. Frey
End-to-End Optimization of SPECT Instrumentation, Acquisition, and Reconstruction	1/1/2013-12/31/2016	NIH/NIBIB R01 EB 016231	$225,000 $900,000	P.I. (Multi-PI) 25%	E.C. Frey
Multi-Modality Quantitative Imaging for Evaluation of Response to Cancer Therapy	9/19/11-8/31/16	NIH/NCI U01 CA 140204	$499,574	coP.I. (Multi-PI) 15%	R.L. Wahl, E.C. Frey, M. Jacobs
Dose Reduction in Pediatric Molecular Imaging	9/1/11-8/31/16	NIH/NIBIB R01 EB 013558	$370,530	coP.I. (Multi-PI) 20%	G. Sgouros, E.C. Frey
Dose Response in Radionuclide Therapy	5/1/06-4/30/11	NIH/NCI R01 CA 116477	$241,058 $1,187,255	Invest 7%	G. Sgouros
Inflammation, Cardiac Sympathetic Innervation and Arrhytmic Sudden Death	9/2/11-6/30/13	NIH/NHLBI R21 HL 106586	$150,000 $300,000	Invest 3%	R. George

B. Pending

Title	Dates	Sponsor/ Grant#	First Year/ Total Direct Costs	Role/ %Effort	PI

C. Past Grants

Title	Dates	Sponsor/ Grant#	Total Direct Costs	Role/ %Effort	PI
High Speed Iterative Reconstruction methods for Quantitative SPECT Imaging	12/1/91-11/30/94	Whitaker Foundation	$157,100	P.I. 40%	E.C. Frey
Optimal Use of Energy Information for Improved SPECT	5/1/95-4/30/01	NIH R29-CA63465	$350,000	P.I. 50%	E.C. Frey
An SVD Investigation of the use of Multiple Energy Windows	6/1/95-6/1/96	North Carolina Supercomputer Center	120 hours time on Cray YMP	PI 0%	E.C. Frey
An SVD Investigation of Noise Propagation and Scatter Modeling in SPECT	1/1/96-12/31/96	North Carolina Supercomputer Center	$8,000 student stipend plus 100 hours time on Cray T-90	PI 0%	E.C. Frey
SVD and Noise Analysis of Dual Isotope SPECT	3/1/97-2/28/98	North Carolina Supercomputer Center	50 hours computer time on Cray T-90	PI 0%	E.C. Frey
Simultaneous Dual Isotope SPECT w/Cross-talk Correction	2/1/99-1/30/03	NIH/NIBIB R01 HL-61616	$813,859	P.I. 35%	E.C. Frey
Medical Image Presentation	10/1/88-6/30/91	NIH P01-CA47982	Total costs for project $345,241	Postdoc. Fellow 25%	PPG Director: S.M. Pizer, Proeject P.I.: B.M.W. Tsui
Improved Heart Imaging using SPECT with Convergent Hole Collimators	10/1/88-6/30/91	Univ. of Utah/NIH R01-HL39792	Total Subcontract $159,451	Postdoc. Fellow 25%	P.I. of Subcontract: B.M.W. Tsui
Evaluation of Corrective Image Reconstruction Methods in SPECT	10/1/88-11/30/89	NIH 1R01-CA39463	$402,501	Postdoc. Fellow 50%	B.M.W. Tsui
Evaluation of Corrective Image Reconstruction Methods in SPECT	12/1/89-7/31/95	NIH 2R01-CA39463	$1,160,300	Investigator 25-50%	B.M.W. Tsui

Improved Heart Imaging using SPECT with Convergent Hole Collimators	7/1/91-6/30/94	Univ. of Utah/NIH R01-HL39792	Total Subcontract $214,872	Investigator 10-25%	P.I. of Subcontract: B.M.W. Tsui
Improved Heart Imaging using SPECT with Convergent Hole Collimators	7/1/94-6/30/99	Univ. of Utah/NIH R01-HL39792	Total Subcontract $406,511	Investigator 10-25%	P.I. of Subcontract: B.M.W. Tsui
Evaluation of Corrective Image Reconstruction Methods in SPECT	8/1/95-7/31/98	3R01-CA39463	$690,975	Investigator 10-25%	B.M.W. Tsui
Improved Scintimammography for Breast Cancer Diagnosis	4/01/97-3/31/02	R01-HL-39792	$250,829	Investigator 5-15%	B.M.W. Tsui
Evaluation of Corrective Image Reconstruction Methods in SPECT	8/1/98-4/30/02	4R01-CA39463	$936,290	Investigator 10-25%	B.M.W. Tsui
Comprehensive Validation of Cardiac SPECT Reconstruction	2/01/02-12/31/06	1 R01 HL68575	$278,719	Investigator 10%	J.M. Links
Corrective In-111 Capromab Pendetide SPECT Image Reconstruction Methods for Improved Detection of Recurrent Prostate Cancer	2/1/02-5/19/06	U.S. Army CDMRP	$73,487	Investigator 5%	B.M.W. Tsui
Patient Specific Dosimetry and Radiobiological Modeling of Targeted Radionuclide Therapy	12/15/04-12/15/05	DOE	$226,611	Investigator 15%	G. Sgouros
Simultaneous Dual Isotope SPECT w/Cross-talk Correction	2/1/03-1/31/08	NIH/NIBIB R01 EB 00288	$1,125,000	P.I. 30%	E.C. Frey
Simulation Tools for Dynamic CT	9/22/05-8/31/08	NIH R01 EB 001838	$733,553	Invest. 5%	W.P. Segars
SPECT Mammography using rotating slant hole collimator	8/1/03-7/31/07	NIH/NIBIB R01 EB 001983	$1,000,000	Invest. 5%	B.M.W. Tsui
High Resolution SPECT for Molecular Imaging	9/30/04-8/31/08	NIH R01 EB 001558	$1,546,513	Invest. 10%	B.M.W. Tsui
Next Generation MicroCT	4/1/2008-3/31/2010	Gamma Medica Ideas SBIR Phase 2 Subcontract	$162,186	P.I. 5%	E.C. Frey (of subcontract) D. Wagenaar
Quantitative SPECT for Targeted Radionuclide Therapy	3/1/06-9/13/11	NIH R01 CA109234	$1,451,240	P.I. 20%	E.C. Frey
Corrective Image Reconstruction Methods for ECT	7/1/02-3/31/07	NIH/NIBIB R01 EB 000168	$1,392,415	Invest. 10%	B.M.W. Tsui
Dose Response in Radionuclide Therapy	5/1/06-4/30/11	NIH R01 CA 116477	$1,187,255	Invest 7%	G. Sgouros
Corrective Image Reconstruction Methods for ECT	3/31/07-6/31/13	NIH R01 EB 000168		Invest 10%	B.M.W. Tsui
Simultaneous Dual Isotope SPECT w/Cross-talk Correction	5/1/08 2/29/2014	NIH/NIBIB R01 EB 00288	$431,508 $1,666,391	P.I. 30%	E.C. Frey

D. Past Industrial Contracts

Title	Dates	Sponsor/ Grant#	Total Direct Costs	Role/ %Effort	PI
Study of the Effects of Truncation in a Small Field of View Gamma Camera on Diagnostic Quality of Myocardial Perfusion SPECT	12/1/98-5/1/99	Digirad Corporation	29167	P.I. 2%	E.C. Frey
Implementation and Evaluation of Iterative Detector Response, Attenuation, and Scatter Compensation for Myocardial Perfusion SPECT	1/18/99-7/1/2002	ELGEMS (subsidiary of GE Medical Systems)	$34,602	P.I. 3%	E.C. Frey

IV. EDUCATIONAL ACTIVITIES

A. Teaching

1. Classroom instruction

a) Classroom instruction

BME 100: Introduction to Biomedical Engineering, lecture on SPECT 1 lecture per year, 1994-2002.

BME 107: Information, Modulation, Transmission and Noise, 3 lectures on practical aspects of networks and network protocols (Spring 1996, 1997, Fall 1998).

BME 141 & 142: Medical Imaging I & II, Lectures on various topics including Fourier transforms, interactions of radiation with matter, atomic physics, production of x-rays, screen-film radiography, ultrasound, nuclear medicine, computed tomography, XCT, and SPECT. Averaged teaching 1/3rd of course (Fall and spring semesters from spring 1989 through spring 2002).

BME 252: Advanced Digital Nuclear Imaging, Lectures on radiation detection and measurement, gamma camera design, collimator design and scatter compensation, positron emission tomography , averaged teaching 50% of course (Fall 1997, 1999).

BME 253, Advanced Medical Image Processing, Lectures on computed tomography theory, 3D computed tomography (Spring 1996, 1998, 2000, 2002 taught portion of course on 3D image reconstruction theory).

BME 256, High Resolution Nuclear and X-Ray Imaging, Taught half of course on micro-computed tomography (Fall 2002).

BME 230, Advanced Numerical Methods for Biomedical Engineering. Topics include: numerical linear algebra, matrix inversion, interpolation, linear and nonlinear curve fitting, etc. Developed, directed and taught entire course. (Fall 1993, Spring 1995, Fall 1996, Fall 1998, Fall 2000).

ECE 520.434/BME580.473, Modern Biomedical Imaging Instrumentation and Techniques. Johns Hopkins University. Taught two 1.25 hour lectures on interactions of radiation with matter and two on single photon emission computed tomography in Spring 2009-2013. Also taught two 1.25 hour lectures on computed tomography in Spring 2012-2013.

Taught lectures on Gama Cameras (two 1 hour lectures, 2002-2011) and Image Quality (one 1 hour lecture, 2009-11) in lecture series for nuclear medicine fellows, Division of Nuclear Medicine, Department of Radiology, Johns Hopkins University.

2. Mentoring (pre and postdoctoral):

a) High School Students

M. Rivers, served as preceptor, Research Apprentice Program, UNC-CH, summer 1999, present position unknown.

b) Undergraduate Students

S. A. Sawyer, preceptor for summer pre-graduate research experience program, project entitled *A Simulation of Truncation Effects in Myocardial Perfusion SPECT Performed with a Small Field-of-View Camera*, UNC-CH, 1998, present position: Ph.D. Candidate at UNC-CH Department of Biomedical Engineering (received 2 year graduate school fellowship).

H. Ponek, Point Loma Nazarene College, Dept of Physics, co-preceptor for AAPM Summer Research Internship, May-August 2012, co-advisor for honors thesis *Assessing the Reliability of Quantitative Imaging of Sm-153*, submitted April 2013.

c) Visiting Graduate Students

W. Kool, Groningen University, Netherlands, June-August 1997, present position, clinical medical physicist.

H. deJong, Utrecht University, Netherlands, March-May 2000. Present position: faculty at University of Amsterdam.

Devakumar Devhadras, Christian Medical College of Vellore, India, March-July 2004. Present position, Ph.D. student and clinical medical physicist, CMC Vellore.

T. Ekjeen, Mahidol University, Thailand, March 2011-December 2012, present position, instructor, Mahidol University, Thailand.

d) Postdoctoral Fellows and Research Associates

W.H. Baird, July 1999-present (50% support.) Present Position, teaching faculty at College of Charleston, Charleston, S.C.

K.J. LaCroix, February 1999-February 2000 (50% support.) Present position: part time consultant on research grants.

Y. Du, August 2004-2009 (100% support), present position, Assistant Professor, Johns Hopkins University, Department of Radiology.

Xin He, January 2006-2009 (100% support), Instructor at Johns Hopkins University, Department of Radiology until she voluntarily left JHU in November 2010. Currently a fellow at the FDA.

Bin He, September 2006-2008 (100% support), currently position : Assistant Professor, Weill Cornell Medical College, Department of Radiology.

N. Anizan, July 2012-present (100% support).

X. Rong, January 2013-March 2013 (100% support).

T. Mauxion, August 2013-present (100% support).

A.K. Jha, August 2013-present (100% support).

E. Vicente, May 2014-present (100% support).

M. Ghaly, October 2014-present (100% support).

e) Masters Degrees (advisor)

Z.-W. Ju, *A Fast Distributed Iterative Reconstruction Library for Quantitative SPECT*, UNC-CH, 1995. Present position: software engineer (present employer unknown).

S.S. Karimi, *Resolution Recovery of SPECT Images using Fan Beam Collimators*, UNC-CH, 1997. Present position: software engineer at Analogic Corporation.

A.E. Lamphier, *Investigation of a new simultaneous iterative reconstruction algorithm in simultaneous dual isotope Tc-99m HMPAO and I-123 IBZM brain SPECT*, UNC-CH, 1998. Present Position: Agent with FBI.

X.Y. Song, advisor, *Validation and Evaluation of Model-Based Scatter Response Compensation for Myocardial SPECT, 2000*. Present Position: Scientist, Phillips Medical Ssytems, Nuclear Medicine Division.

S.A. Sawyer, *Performance Evaluation of a Small Field-of-View Camera for Mycoardial Perfusion SPECT using a Channelized Hotelling Observer*, UNC-CH, 2002, unknown

f) Ph.D. Degrees (advisor) (Present Position may not be up to date).

Dan J. Kadrmas, *Application of Reconstruction-Based Scatter Compensation to Single- and Dual-Isotope SPECT Imaging*, UNC-CH, 1998. Present position: Professor, University of Utah.

Wen-Tung Wang, *Improvements of Simultaneous Tl-201 and Tc-99m Myocardial SPECT Imaging*, UNC-CH, 2001. Present position: Senior Research Associate, Laboratory of Diagnostic Radiology Research, National Institutes of Health.

Joni Keller, *Network Service Management: Preparing the Internet for Telemedicine*, UNC-CH, 2004. Present position: Manager, Network Systems and Services, Information Technology Service, UNC-CH.

Yong Du, *SPECT Brain Imaging of the Dopaminergic System in Parkinsonism using I-123 and Tc-99m Labeled Agents*, UNC-CH, 2004. Present position: Assistant Professor, Department of Radiology, Johns Hopkins University.

Xiyun Song, *Evaluation and Optimization of a Model-Based Crosstalk Compensation Method in Simultaneous Rest Tl-201 and Stress Tc-99m Myocardial Perfusion SPECT*, UNC-CH, 2004, Present Position, Scientist, Phillips Medical Systems, Nuclear Medicine Division.

Xin He, *3-Class ROC Analysis* ,UNC-CH, 2005, Present Position: Scientist at US Food and Drug Administration, Cener for Devices and Radiological Health. Previously Instructor, Johns Hopkins University, Division of Medical Imaging Physics.

Bin He, August 2001-August 2006, *Development and Validation of In Vivo Quantitative Imaging Methods for Targeted Radiotherapy Treatment Planning*, Present Position: Assistant Professor, Weill Cornell Medical College, NY, NY.

Xialoan Wang, August 2005-January 2011, *Investigation of the Utility of Energy Resolved Photon-Counting X-Ray Detectors for Small Animal Computed Tomography*, Department of Electrical and Computer Engineering, Johns Hopkins University. Present Position: Research Scientist, Toshiba Medical Systems, Chicago, IL.

Na Song, January 2006-January 2011, *Development and Validation of Quantitative Imaging Methods for Patient-Specific Targeted Radionuclide Therapy Dosimetry*. Department of Electrical and Computer Engineering, Johns Hopkins Universit. Present Position: Medical Physicist, Montefiore Medical Center and Assistant Professor, Albert Einstein College of Medicine, Yeshiva University, New York, NY.

Lishui Cheng, March 2009-October 2012. *Development and Validation of SPECT Image Reconstruction Methods for Improved Dose Volume Histogram Estimates in Three Dimensional Dosimetry for Targeted Radionuclide Therapy*. Present Position: Medical Imaging Systems Scientist, GE Global Research Laboratory, Nishkayuna, NY.

Xing Rong, August 2008-January 2013, *Development and Evaluation of Quantitative Y-90 Bremsstrahlung SPECT Methods*, Present Position: Scientist, Siemens Medical Systems, Hoffman Estates, IL.

Tawatchai Ekjeen, March 2011-April 2013, Faculty of Medical Technology, Mahidol University, Thailand, *Improving Detectability of Tc-99m MIBI Parathyroid SPECT Imaging for Chronic Renal Failure Patients with Hyperparathyroidism,* Present Position: Instructor, Mahidol University, Thailand, Faculty of Medical Technology.

Michael Ghaly, August 2008-September 2014, Department of Electrical and Computer Engineering, Johns Hopkins University. *Rigorous Task-Based Optimization of Instrumentation, Acquisition Parameters and Reconstruction Methods for Myocardial Perfusion SPECT*. Present Position, Postdoctoral Research Fellow, Johns Hopkins University.

g) Current Ph.D. Advisees.

Xin Li, November 2010-present, Department of Electrical and Computer Engineering, Johns Hopkins University.

Jakir Hossain, March 2009-present, Department of Electrical and Computer Engineering, Johns Hopkins University.

Jianting Yue, January 2012-present, Department of Electrical and Computer Engineering, Johns Hopkins University.

Yifeng Dong, February 2013-present, Department of Electrical and Computer Engineering, Johns Hopkins University.

Fahtma El Sahabi, December 2013-present, Department of Electrical and Computer Engineering, Johns Hopkins University.

Nathan Crookston, August 2014-present, Department of Electrical and Computer Engineering, Johns Hopkins University.

Ye (Gary) Li, August 2014-present, Department of Electrical and Computer Engineering, Johns Hopkins University.

h) Awards to Advisees

Journal paper #39 received an Alavi–Mandell Award from the Society of Nuclear Medicine in 2002 in recognition of publication by a student senior author. I was the advisor of this student for this work and paper.

Second prize in the Computer and Instrumentation Council's Young Investigator Competition at the 49th Society of Nuclear Medicine Annual Meeting: X. He, E. C. Frey, W. P. Segars, K. L. Gilland, B. M. W. Tsui, "An improved phantom population for evaluation of myocardial perfusion SPECT imaging," Journal of Nuclear Medicine, 43(5), pp. 9p-10p, 2002

First prize in the Computer and Instrumentation Council's Young Investigator Competition at the 51st Society of Nuclear Medicine Annual Meeting, June: X. He, E. C. Frey, J. M. Links, and B. M. Tsui, "Three-class ROC analysis and three-class Hotelling observer for dual-isotope myocardial perfusion SPECT (MPS) optimization and evaluation," Journal of Nuclear Medicine, 45(5), 42p, 2004.

Third prize in the Computer and Instrumentation Council's Young Investigator Competition at the 52nd Annual Society of Nuclear Medicine Conference in Toronto, Candada.", Y. Du, E.C. Frey, and B. M. W. Tsui, "Simultaneous reconstruction and model-based crosstalk compensation in I123/Tc99m dual-isotope brain SPECT," presented at 52nd SNM annual meeting in Toronto, Canada, June 2005, J. Nucl. Med. 46(5), 51P 2005.

Finalist Student Paper Awards, 2013 SPIE Medical Imaging Conference, Orlando, FL, M. Ghaly, J.M. Links, Y. Du, E.C. Frey, "Model mismatch and the ideal observer in SPECT", Paper 8673-19.

3. Thesis Committees

a) Current Ph.D. Committees, Advisor

b) Current Ph.D. Committees, Member

c) Past Ph.D. Committees, Member

D.W. Wilson, Noise and Resolution Properties of FB and ML-EM Reconstructed Images, UNC-CH, 1994.

B.E. Billard, Quantifying Changes in Depolarization and Repolarization Wafefronts during Acute Myocardial Ischemia, UNC-CH, 1997.

D. Lewis, Slice Selective Excitation of Stationary and Flowing Material in MRI, UNC-CH, 1997.

K. LaCroix, Evaluation of an Attenuation Compensation Method with Respect to Defect Detection in Tc-99m-MIBI Myocardial SPECT Images, UNC-CH, 1997.

M. McAuliffe, Segmentation Method Based on Object Width-Dependent use of Scale, UNC-CH, 1998.

D.E. Wessell, Rotating Slant Hole SPECT, UNC-CH, 1999.

C. Tocharoenchai, Optimization and Evaluation of Camera-Based PET System, UNC-CH, 2001.

P. Segars, Development and Application of the new dynamic NURBS-Based Cardiac Torso (NCAT) Phantom, UNC-CH, 2001.

J.R. Cummings, Development and Applications of Magneto-Optical Scanning Probe Microscopy, UNC-CH, 2002.

Y. Wang, Development and Application of High-Sensitivity and High-Resolution 3D SPECT Imaging Techniques using Two Different Collimator Designs, UNC-CH, 2004.

S. Chen, Johns Hopkins University, 2011.

Kanyalak Wiyaporn, external examiner, Faculty of Medical Technology, Mahidol University, Thailand, *Optimization of Imaging Parameters for Myocardial PET (Positron Emission Tomography) Imaging,* Present Position: Instructor, Mahidol University, Thailand, Faculty of Medical Technology, 2013.

d) Past Masters Committees, Member

J. Li, *An Observer Evaluation Study of Restoration Filters for Defect Detection in Cardiac SPECT*, UNC-CH, 1994.

K. Lacroix, *An Investigation of the Use of Single-Energy X-ray CT Images for Attenuation Compensation in SPECT*, UNC-CH, 1994.

P. Popli, *Comparison of Short- and Full-scan Fan-beam Myocardial SPECT Images with and without Non-uniform Attenuation Compensation*, UNC-CH, 1998.

Y.W. Yang, *An Evaluation of Non-uniform Attenuation Correction for Tc-99m HMPAO SPECT Brain Imaging using Asymmetric Fan Beam Collimators, UNC-CH*, 1998.

W.T. Wang, *An Evaluation of an Analytical Collimator-Detector Response Compensation Method in SPECT*, UNC-CH, 1999.

M. K. Jatko, *A Java Application for Performing Observer Studies on Motion Medical Images*, UNC-CH, 2000.

A.J. Dimeo, *A Monte Carlo Investigation of Dual-Planar Circular-Orbit Cone-Beam Single-Photon Emission Computed Tomography*, UNC-CH, 2000.

S. Sayeram, *Compensation for the Collimator-Detector Response in Tumor SPECT using ^{111}In-Labeled Radiopharmaceuticals*, UNC-CH, 2002.

V.K. Ramshesh, *A Monte Carlo Model of Cardiac Optical Mapping with Multiphoton Excitation*, UNC-CH, 2002.

4. Training Grants

Title	Dates	Agency	Total Direct	Role	P.I.
Biomedical Engineering for Functional Genomics	8/1/01-5/02 (grant terminated by sponsor upon Departure of PI from UNC)	Whitaker Foundation Special Opportunity (training-oriented grant)	$1,395,618 (amount of original award, total not spent due to early termination)	Participant, helped develop curriculum, write grant, teach courses	B.M.W. Tsui

V. Editorial Activities:

A. Journal peer review activities

Reviewed papers for of papers for: IEEE Transactions on Nuclear Science, Physics in Medicine and Biology, IEEE Transactions on Medical Imaging, Medical Physics, Journal of Nuclear Medicine, International Journal of Biomedical Imaging, Radiology.

Associate Editor, Medical Physics.

Guest Editor, Special Edition on X-ray MicroComputed Tomography, Journal of X-ray Science and Technology, October 2004.

B. ORGANIZATIONAL ACTIVITIES

1. Institutional Administrative

Biomedical Engineering Admissions/Recruitment Committee (January 2000-July 2002)

Biomedical Engineering Curriculum Committee (July 2001-July 2002)

Biomedical Engineering Computer Committee (Member, July 1990-1992, Chairman January 1996-July 2002, supervisor of BME system administrator, 1995-2002).
Biomedical Engineering Comprehensive Exam Committee (1990-2002, Chairman July 1994-January 1996).
Acting system administrator for Department of Biomedical Engineering workstation computer facilities, 4/94-6/95.

2. Professional Societies

a) Memberships

Member, American Physical Society, 1981-present.
Senior Member, Insitute for Electonrics and Electrical Engineers, 1990-present (Senior Member since 2005).
Member, American Association for Physicists in Medicine, 1989-present.
Member, Society for Nuclear Medicine (now Society for Nuclear Medicine and Molecular Imaging), 1990-present.
Member, Society for Industrial and Applied Mathematics, 1995-2008.
Member, International Society for Optical Engineering (SPIE), 2000-present.
Member, European Association for Nuclear Medicine, 2006-present.

b) Committees

Elected Member, Advisory Committee, IEEE Nuclear and Plasma Sciences Society, January 2007-present. This committee oversees the IEEE Nuclear and Plasma Sciences Society. This includes several IEEE journals including IEEE Transactions on Nuclear Science, IEEE Transactions on Plasma Sciences, and has partial ownership of IEEE Transactions on Medical Imaging. It also oversees a number of conferences which are run by various technical committees including the Nuclear Medical and Imaging Sciences Technical Committee (See below).
Nulcear Medical and Imaging Sciences Technical Committee of the IEEE Nuclear and Plasma Sciences Society, January 2001-December 2003. This committee is elected by members of the IEEE NPSS who identify themselves as interested in nuclear and medical imaging sciences. It oversees the IEEE Medical Imaging Conference.
Secretary Treasurer, Executive Committee of Computer and Instrumentation Council of Society of Nuclear Medicine (term July 2002-July 2004). The council had ~400 members at the time and was the third largest council in the Society of Nuclear Medicine.
Site Selection Committee, 2005 IEEE Nuclear Science Symposium and Medical Imaging Conference.
Advisory Committee of the IEEE Nuclear and Plasma Sciences Society, 1/1/2007-12/31/2009. This committee is elected by members of the IEEE Nuclear and Plasma Sciences Society and oversees the activities of this society. This includes sponsorship of several conferences including the IEEE Medical Imaging Conference, the journals IEEE Transactions on Nuclear Science and IEEE Transactions on Plasma Science, and joint sponsorship of the journal IEEE Transactions on Medical Imaging. The society has ~3000 members.
Scientific Advisory Committee, Radiological Society of North America Annual Meeting, 2011-2013. Responsible for reviewing physics abstracts for RSNA meeting, primarily in x-ray CT and nuclear medicine.
Clinical Trials Network SPECT Committee of Society of Nuclear Medicine and Molecular Imaging, September 2014-present
Member of Quantitative Imaging Biomarker Alliance (QIBA) SPECT Profile Writing Group, September 2014-present.

3. Conference

a) Conference Organizer

Deputy Program Chair, 2001 IEEE Medical Imaging Conference, San Diego, CA, November 4-10, 2001.
Program Chair, 2007 IEEE MedicalImaging Conference, Honolulu, HI, November 2007.
Image Generation Subchair, 2007, 2008, 2009 Society of Nuclear Medicine Annual Meeting.

b) Moderator

1991, 2002 World Congress on Nuclear Medicine and Biology
1993, 1996, 1997, 2000, 2002, 2003, 2004, 2005, 2006 Society of Nuclear Medicine Meeting
1996, 2002, 2006 IEEE Medical Imaging Conference

c) Scientific Committee

1993,1996-2009 Society of Nuclear Medicine Meeting.
1994-2010 IEEE Medical Imaging Conference.
2002, 2004-2007 IEEE International Symposium on Biomedical Imaging

2010-3 Radiological Society of North America, Physics Subcommittee of Scientific Program Committee.

4. Advisory Committees, Review Groups

a) NIH Study Sections

Ad hoc member of NIH study section reviewing diagnostic radiology SBIR and STTR grants, 3/1994, 7/1994, 3/1995, 3/1996.

Reviewer for NIH/NCI ad hoc study section reviewing R-21, SBIR and STTR grants on Molecular Imaging 6/2002, 11/2002, 11/2003, 4/2004, 10/2005.

Panel member for site visit reviewing NIBIB Research Resource Grant supporting the Center for Gamma Ray Imaging at the University of Arizona, February 2004 and February 16-17 2009.

Ad hoc member of NIH Radiation Therapeutics and Biology Study Section, 6/14-6/15 2007, 3/11-12 2008, 1/26-27 2009, 9/21-22 2009; outside written reviews, 10/16-17 2008.

Outside written review for ZRG1 DTCS Study Section, May 2010.

Panel member for panel reviewing NIBIB program project grant, 1/20/2010.

Outside written review for 2013/10 ZRG1 SBIB-V (82) Pediatric and Fetal Applications, May 2013.

b) Other Agencies

Outside consultant for Whitaker Foundation Research Grants: 12/2001 and 12/2002.

Panel Member for NSF Bioengineering Review Panel for SBIR/STTR grants, 4/10/2003.

Panel Member for NSF Bioengineering Review Panel for Phase II SBIR grants, 9/28/2004.

Member of consultant panel advising International Atomic Energy Agency on development of standards for nuclear medicine image quantitation and preparing technical document on quantitative nuclear medicine. March 3-7, 2008; October 29-29, 2009; June 14, 2009; November 30-December 4, 2009; and October 14-15, 2010.

Dutch Techonolgy Foundation, written review of grant for program Cardiac Risk Management by Advanced Medical Image Analysis (CARISMA), October 2010.

5. Consultantships

M. O'Connor, Mayo Clinic, Rochester, MN, May 12-13, 1999, advised on compensation for image degrading factors in cardiac SPECT.

M. A. King, University of Massachusetts Medical Center, Worcester, MA, September 30-Ocbober 1, 1999 and August 31-Sept 1, 2000, January 2002, advised on scatter compensation methods for cardiac and Ga-67 SPECT.

D.J. Kadramas and E.V. DiBella, University of Utah, Salt Lake City, Utah, September 14-15, 2000, advised on collimator modeling using Monte Carlo simulation.

K. Koral, University of Michigan, October 9-17 2005, advised on NIH grant resubmission.

T. Lewellen, University of Washingtion, Feb 20-21, 2008. Advised on Monte Carlo Simulation and Quantitative Imaging.

S. Palm, International Atomic Energy Agency, Division of Health, Section on Dosimetry and Medical Radiation Physics, member of consultants meeting advising IAEA on quantitative nuclear medicine imaging, Vienna, Austria, 3/3-7/2008.

S. Palm, International Atomic Energy Agency, Division of Health, Section on Dosimetry and Medical Radiation Physics, member of consultants meeting advising IAEA on quantitative nuclear medicine imaging, Vienna, Austria, 10/28-29/2008.

S. Palm, International Atomic Energy Agency, Division of Health, Section on Dosimetry and Medical Radiation Physics, member of consultants meeting advising IAEA on quantitative nuclear medicine imaging, Toronto, Canada, 6/14/2009.

S. Palm, International Atomic Energy Agency, Section on Dosimetry and Medical Radiation Physics, consultant on IAEA Coordinated Research Project on quantitative nuclear medicing imaging, Vienna, Austria,11/30-12/4 2009.

T. Lewellen, University of Washington, July 28-29, 2010. Advised on Monte Carlo Simulation and Quantitative Imaging.

S. Palm, International Atomic Energy Agency, Division of Health, Section on Dosimetry and Medical Radiation Physics, member of consultants meeting advising IAEA on quantitative nuclear medicine imaging, Vienna, Austria, 10/14-15/2010.

S. Palm, International Atomic Energy Agency, Division of Health, Section on Dosimetry and Medical Radiation Physics, consultant on IAEA Coordinated Research Project on quantitative nuclear medicing imaging, Vienna, Austria, 5/9-13 2011.

G.L. Poli, International Atomic Energy Agency, , Division of Health, Section on Dosimetry and Medical Radiation Physics, member of consultants meeting advising IAEA on quantitative nuclear medicine imaging, Vienna, Austria, June 3-7, 2013.

G.L. Poli, International Atomic Energy Agency, , Division of Health, Section on Dosimetry and Medical Radiation Physics, member of consultants meeting advising and analyzing data from IAEA coordinated research project on on quantitative nuclear medicine imaging, Vienna, Austria, November 18-21, 2013.

BTG Inverventional Medicine, Consensus panel on advanced dosimetry methods for TheraSphere, Camberley, UK, September12, 2014.

C. RECOGNITION

1. Invited Continuing Education, Short Course, and Workshop Talks

1. "An Overview of Scatter Compensation Methods in SPECT," 1998 Society of Nuclear Medicine Midwinter Meeting, March 2-3, 1998, Las Vegas, Nevada.
2. "Compensation for Physical Image Degrading Factors in SPECT using Iterative Reconstruction Techniques," 1999 Society of Nuclear Medicine Meeting, June 6-10, 1999, Los Angeles, CA..
3. "Iterative Reconstruction-Based Compensation for Scatter and Detector Response Blurring in SPECT" 1999 Society of Nuclear Medicine Meeting, June 6-10, 1999, Los Angeles, CA.
4. "Simulation Tools for Single-Photon Nuclear Medicine Imaging,", part of short course at 2001 IEEE Medical Imaging Conference.
5. Organized Short Course entitled *Principles and Recent Advances in Emission Computed Tomography* at 2001 IEEE Medical Imaging Conference.
6. "SPECT/CT for Determining Radioantibody Dosimetry," lecture at CME course *The Role of PET/CT and SPECT/CT Imaging in Medical, Radiation, Surgical and Nuclear Oncology*, held at Johns Hopkins University, March 2004.
7. "Evolution: A Framework for Advanced SPECT Reconstruction with Compensation for Image Degrading Factors", 2006 SNM Midwinters Meeting, Phoenix AZ, Feb 11-12, 2006.
8. "Evolution: A Framework for Advanced SPECT Reconstruction with Compensation for Image Degrading Factors," lecture to be given in CE course entitled Clinica Implementation of Advanced Image Processing Techniques at the 2006 Society of Nuclear Medicine Annual Meeting, San Diego, CA, June 2006.
9. "Obtaining Reliable Quantitative SPECT/CT Data," lecture in CME course entitled *PET/CT and SPECT/CT to Plan and Monitor the Treatment of Cancer*, held at Johns Hopkins University, October 27-28, 2006.
10. "Application of task-based assessment of image quality in nuclear medicine imaging," lecture in short course at the IEEE Medical Imaging Conference, San Diego, CA, October 31, 2006.
11. "Application of task-based assessment of image quality in nuclear medicine imaging," lecture in short course at the IEEE Medical Imaging Conference, Honolulu, HI, October 30, 2007.
12. "Computed tomography using photon counting x-ray detectors with energy binning capability", presented in workshop entitled *Multi-energy x-ray and CT imaging: Where we are and where we will go?* At 2008 SPIE Medical Imaging Conference, San Diego, CA, 19 Feb 2008.
13. "Quantitative SPECT for Molecular Imaging Applications," lecture given in CE Course entitled *PET and SPECT Quantitation* at 2008 Society of Nuclear Medicine Midwinter Meeting, Newport Beach, CA, 17 Feb 2008.
14. "Quantitative 3D SPECT," lecture given in CE Course entitled *MIRD I: Accuracy and Precision in Internal Dose Assessments: Quantitative Imaging*, at 2008 Society of Nuclear Annual Meeting, New Orleans, LA, 15 June 2008.
15. "Quantitative SPECT for Molecular Imaging Applications" lecture given in CE course entitled *SPECT and PET Quantitation*, at 2008 Society of Nuclear Annual Meeting, New Orleans, LA, 15 June 2008.
16. "Quantitative SPECT/CT for Cancer Therapy Applications," lecture given in tutorial at IEEE Biomedical Circuits and Systems Conference, November 20, 2008, Baltimore, MD.
17. "Generation of Optimal Quantitative SPECT/CT Images," lecture given at CME course *Advances in Whole Body Fusion Imaging: PET/CT and SPECT/CT*, March 13-14, 2009, Johns Hopkins University, Baltimore, MD.
18. "Quantitative Imaging in SPECT/CT," lecture given in categorical seminar *Technical Aspects of Clinical Applications of SPECT/CT and PET/CT*, 2009 Society of Nuclear Medicine Meeting, Toronto, Canada, June 13-17, 2009.
19. "Summary of Image Generation Papers," review of papers in Image Generation track given in Instrumentation and Data Analysis Basic Science Summary Session, 2009 Society of Nuclear Medicine Meeting, Toronto, Canada, June 13-17, 2009.

20. "Application of Deformable Phantoms to Imaging Simulations," lecture given in refresher course at 3rd International Symposium on Radionuclide Therapy and Radiopharmaceutical Dosimetry, Toronto, Canada, June 13-17, 2009.
21. "Quantitative SPECT/CT Studies: State-of-the-Art," lecture given at CME course *Improving Patient Outcomes with Quantitative Nuclear Medicine,* March 11-12, 2010, Johns Hopkins University.
22. "Quantitative PET and SPECT Imaging for Targeted Radionuclide Therapy Treatment Planning", lecture given at CE course at American Association of Physicists in Medicine Meeting, in Joint Imaging and Therapy Symposium: Targeted Radionuclide Therapy, Vancouver, BC, Canada, August 3, 2011.
23. "SPECT: Physics Principles and Equipment Design", CE lecture given at American Association of Physicists in Medicine Summer School, San Diego, CA, June 28, 2012.
24. "SPECT: New Applications and Technologies", CE lecture given at American Association of Physicists in Medicine Summer School, San Diego, CA, June 28, 2012.
25. "Quantitative SPECT Imaging and Reconstruction Techniques" in CME Session *Quantitative SPECT for Dosimetry in Radionuclide Therapy*, 2013 Annual Meeting of Society for Nuclear and Molecular Imaging, Vancouver, Canada, June 11, 2013.
26. "Image Reconstruction for SPECT/CT Imaging: Attenuation Correction, Scatter Correction, Resolution Recovery, and Noise Reduction" in CME Session *Clinical SPECT/CT: Technology and Reconstruction*, Society of Nuclear Medicine Midwinters Meeting, Palm Springs, CA, January 9, 2014.
27. "End-to-End Optimization of Instrumentation, Acquisition, and Reconstruction in Single-Photon Emission Computed Tomography (SPECT)", in session Task-Based Design of Imaging Systems, Gordon Research Conference Image Science: Accelerating the Pace of System Design and Task-Based Evaluation, Easton, MA, June 8-13 2014.
28. "Applications of Iterative Reconstruction for Dose Reduction and Reduced Acquisition Time**,"** in session *Iterative Reconstruction and System Modeling: Impact on Administered Dose, Imaging Time, and Image Quality*, Society of Nuclear Medicine and Molecular Imaging Mid-Winters Meeting, San Antonio, TX, January 22-25, 2015.

2. Invited Lectures

1. September 1993, Davidson College, Department of Physics, "An Introduction to Medical Imaging Physics and Single-Photon Emission Computed Tomography."
2. July 1995, University of Utrecht, Netherlands, Imaging Sciences Institute, "Model-based Scatter Compensation for SPECT".
3. August 1997, Emory University, Division of Nuclear Medicine, Department of Radiology, "Iterative Reconstruction Based Scatter Compensation for Myocardial Perfusion SPECT.
4. August 2000, Florida International University, Department of Biomedical Engineering, "Introduction to SPECT and Compensation for Image Degrading Factors".
5. November 15, 2004, Memorial Sloan Kettering Cancer Center, Division of Nuclear Medicine, "Dual Isotope SPECT in Cardiac Imaging".
6. February 10, 2006, University of Arizona, Center for Gamma Ray Imaging, "Task-based Evaluation of Iterative SPECT Reconstruction with Compensation for Image Degrading Factors."
7. October 6, 2006, Lund University, Sweden, Department of Medical Radiation Physics, "SPECT Reconstruction with Compensation for Image Degrading Factors."
8. Feb 21, 2008, University of Washington, Department of Radiology, "Computed tomography using photon counting x-ray detectors with energy binning capability."
9. July 29, 2010, University of Washington, Department of Radiology, "Quantitative Imaging for Targeted Radionuclide Therapy Dosimetry."
10. October 4, 2010, Memorial Sloan Kettering Cancer Center, Division of Nuclear Medicine, Department of Radiology, "Reliable Quantitative SPECT for Targeted Radionuclide Therapy Treatment Planning: Introduction, Recent Progress and Future Directions," Division CME lecture.
11. October 24, 2011, Memorial Sloan Kettering Cancer Center, Division of Nuclear Medicine, Department of Radiology, "Quantitative Bremsstrahlung Imaging and Applications in Radioembolization of Hepatic Malignancies," Divison CME lecture.
12. March 18, 2013 Memorial Sloan Kettering Cancer Center, Divison of Nuclear Medicine, Department of Radiology, "Principles and Applications of Quantitative SPECT", Division CME lecture.
13. "Quantitative SPECT/CT Studies: State of the Art", June 5, 2013, International Atomic Energy Agency, Division of Human Health, Section of Dosimetry and Medical Radiation Physics, Vienna, Austria.

3. Visiting Professor

1. Faculty of Medical Technology, Mahidol University, April 8-22 2005.

4. Awards

1. 1981 Phi Beta Kappa
2. 2012 Distinguished Investigator Award from Academy of Radiology Research and thus membership in the Council of Distintuished Investigators.

D. OTHER PROFESSIONAL ACCOMPLISHMENTS

1. Doctoral Dissertation

E.C. Frey, *Ge Redistribution and Oxidation Kinetics during the Oxidation of Ge-doped Si*, Doctoral dissertation, University of North Carolina, Chapel Hill, NC, 1989.

2. Licensed Intellectual Property

Licensed a software package for iterative SPECT reconstruction that includes compensation for image-degrading factors to GE Healthcare in 2003. This was released as part of GE's Xeleris software platform in June 2005 under the name "Evolution for Bone." Has subsequently been released as part of application "Evolution for Cardiac" and "Evolution Toolkit." More than 1.4 million dollars in royalties and more than 2500 copies of this package have been sold.

3. Abstracts

116 published abstracts from 1988-2006.

4. Presentations at Scientific Meetings

110 presentations from 1988-2006.