September 25, 2015

CURRICULUM VITAE

Kalpana M. Kanal, Ph.D., DABR, FAAPM, FACR, FSCBTMR

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Personal Data: United States Citizen.

Education:
Mithibhai College, University of Mumbai,
Mumbai, India, Physics, B.S., 1988
University of Texas at Arlington,
Arlington, TX, Physics, M.S., 1991
University of Texas Health Science Center at San Antonio,
San Antonio, TX, Diagnostic Medical Physics, Ph.D., 1996

Postgraduate Training:

Residency: Mayo Clinic, Rochester, MN
Clinical Medical Physics Residency in Diagnostic Radiology, 1998

Faculty Positions:

Lecturer, Department of Radiology
University of Washington, Seattle, WA 2003 – 2006
Assistant Professor, Department of Radiology
University of Washington Medical Center, Seattle, WA, 2006 – 2011
Adjunct Assistant Professor, Department of Oral Medicine
University of Washington, Seattle, WA, 2006 – Present
Associate Professor, Department of Radiology
University of Washington, Seattle, WA, 2011 – Present
Affiliate Faculty, Harborview Injury Prevention Center (HIPRC)
University of Washington, Seattle, WA, 2011 – Present
Director, Diagnostic Physics Section, Department of Radiology
University of Washington, Seattle, WA, 2012 – Present

Hospital Positions:

Clinical Medical Physicist, Department of Radiology
University of Minnesota, Minneapolis, MN, 1998 – 2000
Medical Physicist, Department of Radiology
University of Washington, Seattle, WA, 2000 - 2003

Honors:

Clinical Imaging Residency Fellowship Award (first given), American Association of Physicists in Medicine, Mayo Clinic, Rochester, MN, 1996 – 1998

First prize, Scientific Poster Exhibit, Symposium for Computer Applications in Radiology, **Kanal KM**, Hangiandreou NJ, Sykes A, Eklund HE, Araoz PA, Leon JA et. al. Evaluation of the Accuracy of a Continuous Speech Recognition Software System in Radiology. Philadelphia, PA, 2000

Cum Laude award, Scientific Presentation, Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, **Kanal KM**, Stewart BK, Kolokythas O, Shuman WP. Development of a Noise Index Table Demonstrating Interrelationships Among Noise Level, Reconstruction Slice Thickness, and Radiation Dose in 64-slice CT. Phoenix, AZ, 2006

Certificate of Merit, Scientific Electronic Education Exhibit, The Radiological Society of North America, Annual Meeting, Modica MJ, **Kanal KM**, Ramos M, Gunn ML. The Morbidly Obese Trauma Patient: Imaging Challenges and Solutions. Chicago, IL, 2009

Certificate of Merit, Scientific Electronic Education Exhibit, The Radiological Society of North America, Annual Meeting, Wieseler KM, Bhargava P, **Kanal KM**, Vaidya S, Stewart BK, Sadro CT, Dighe MK. Imaging during Pregnancy: Exam Appropriateness. Chicago, IL, 2009

Fellow, Society of the Computed Body Tomography and Magnetic Resonance, 2012

Fellow, American Association of Physicists in Medicine, 2013

Fellow, American College of Radiology, 2014

Board Certification:

American Board of Radiology, 1999

Diplomate of the American Board of Radiology (DABR) Specialty: Diagnostic Radiological Physics

Professional Organizations:

Society of Computer Applications in Radiology (SCAR), 1996 – 2002

American College of Radiology (ACR), 1999 – present

American Association of Physicists in Medicine (AAPM), 1999 – present

Society of Computed Body Tomography and Magnetic Resonance (SCBT-MR), 2006 – present

Radiological Society of North America (RSNA), 2012 – present

Society of Computed Body Tomography and Magnetic Resonance (SCBT-MR), Fellow, 2012 – present

Teaching Responsibilities:

Instruction in first and second year radiology technologist's course, "Radiologic Science for Technologists" in the Radiology Technology School. Department of Radiology, University of Minnesota and VA Hospital, Minneapolis, MN, 1998 – 2000

Fluoroscopy Credentialing booklet and exam now implemented through the OMSA office. We have provided the credentialing booklet executive summary, and exam offered to all physicians in the UW Medicine system wishing to be credentialed to use fluoroscopy. University of Washington, Seattle, WA, 2001 – present

Instruction in radiation safety as needed provided to the Department of Radiology or other departments: Surgeons, Radiology Technologists and Nurses http://depts.washington.edu/diagphys/, University of Washington, Seattle, WA, 2001 – present

Course Director, Diagnostic Radiology Imaging Physics Course: Radiology resident instruction in the physics of diagnostic radiology and board exam review instruction. Website: http://courses.washington.edu/radxphys/PhysicsCourse.html. Department of Radiology, University of Washington, Seattle, WA, 2004 – present

Lecturer, Dental Student Physics lectures as part of the Oral M 520 course, Introduction to Oral Radiology offered each Fall, https://www.dental.washington.edu/intranet/index.htm, Department of Oral Medicine, Dental School, University of Washington, Seattle, WA, 2006 – 2009

Lecturer, Medical Student Clerkship, Quarterly Medical Student Clerkship Physics lectures as part of the Medical Student Radiology Education Lecture Series, https://catalysttools.washington.edu/workspace/assterad/10506/53286, Department of Radiology, University of Washington, Seattle, WA, 2006 – present.

Editorial Responsibilities:

Reviewer: American Journal of Roentgenology, 2006 – present
Associate Editor (as requested): Medical Physics 2007 – present
Reviewer: Medical Physics Journal 2007 – present
Reviewer: RadioGraphics 2007 - present

Special National Responsibilities:

Scientific Exhibit Review Panel Member, The Society of Computer Applications in Radiology, 2000

Symposium Coordinator, Mammography 2000: Changing Technologies, Changing Requirements, University of Minnesota, 2000

Member, Education and Training of Medical Physicists, American Association of Physicists in Medicine, 2005 – 2007

Member, Physics Panel for question submissions for the Physics Section of the 2006 Diagnostic Radiology In-Training (DXIT) examination, 2005 – 2008

Course Director, Digital Mammography, Radiological Society of North America Annual Meeting, 2006

Member, Blue Ribbon Panel on Radiation Dose in Medicine, American College of Radiology, 2006

Session Moderator, AAPM/RSNA Physics Tutorial on Equipment Selection, 2006

Member, Subcommittee on Digital Mammography, Committee on Mammography Accreditation, American College of Radiology, 2006-2007

Course Director, The Physics and Technology of Breast Imaging CME course, American Association of Physicists in Medicine Annual Meeting, July 2007 - July 2009

CT Accreditation Physics Reviewer, American College of Radiology, 2007 – present

Session Moderator, CT and MRI session, American College of Medical Physics Annual Meeting, May 2008
Vice-Chair, Imaging Physics Curricula Subcommittee (Subcommittee under the Committee – Medical Physics Education of Physicians), 2008 – 2009
Member, American Board of Radiology Core Exam, Reproductive/Endocrine Committee, 2009 – present
Member, American Association of Physicists in Medicine, Medical Physics Education of Physicians, 2009 – present
Chair, American Association of Physicists in Medicine Imaging Physics Curricula Subcommittee (Subcommittee under the Committee – Medical Physics Education of Physicians), 2009 – present
Member, CAMPEP committee, American Association of Physicists in Medicine, 2011 – 2012
Member, American College of Radiology Dose Index Registry Committee, 2011 – present
Member, Communications Committee, Society of the Computed Body Tomography and Magnetic Resonance, 2012 – present
Session Moderator, Radiation Dose in X-Ray and CT Scientific Session, American Association of Physicists in Medicine Annual Meeting, Charlotte, NC, 2012
Chair, American Board of Radiology Resident Core Exam (Physics), 2012 - present
Diagnostic Medical Physics Examiner, American Board of Radiology, 2013
Vice Chair, American College of Radiology CT Dose Index Registry, May 2013 - May 2014
Medical Physics Councilor, American College of Radiology Annual Meeting and Leadership Conference, 2013 and 2014
Member, American Association of Physicists in Medicine Task Group TG246 on Patient Dose from Diagnostic Radiation Task Committee, 2013 - present
Chair, American College of Radiology CT Dose Index Registry, June 2014 -present
Member, American Association of Physicists in Medicine, Women's Professional Subcommittee, 2014
Member, American Association of Physicists in Medicine Awards and Honors Committee 2014
Member, American Association of Physicists in Medicine Summer School Scholarships Committee 2014

Special Local Responsibility:

Local Arrangements Committee, American Association of Physicists in Medicine Summer School: Accreditation Programs and the Medical Physicist, University of Washington, 2001
Member, Radiation Safety Committee, University of Washington, 2002 – 2011
Member, Education Committee, Department of Radiology, University of Washington, 2004 – present
Chair, Faculty Council on Education Technology, University of Washington 2004 – 2006
Member, Faculty Executive Committee, University of Washington, 2004 - 2006
Local Arrangements Committee, American Association of Physicists in Medicine, Annual Meeting, Seattle, WA, 2005
Senator (Radiology), Faculty Senate, University of Washington, 2005 – 2006
Chair, Radiation Safety Committee, University of Washington, November 2011 – present
Member, Radiology Radiation Safety Committee, Dept. of Radiology, University of Washington, 2011 – present
Member, WA State DOH CT Regulations Advisory Committee, 2013 – present
Board Member, WA State Radiological Society, 2014 - present

Member, Safe Imaging Advisory Council, 100K Children, Washington State Hospital Association, 2015

Research Funding:

(1) Status: ***Completed***
Role: Co-Investigator
Support Source: National Cancer Institute
Title: Digital Mammography Imaging Screening Trial
Duration: 10/2001 – 10/2003
Total Direct Costs: $798K
Brief Description: To compare the diagnostic performance of digital mammography and screen-film mammography, in a prospectively enrolled screening cohort of asymptomatic women, across all digital mammography machine types.

(2) Status: ***Completed***
Role: Co-Investigator (uncompensated)
Principal Investigator: Sudhakar Pipavath, MD
Support Source: General Electric Company
Title: Phase 1: A feasibility study to assess pulmonary vasculature and perfusion using dual energy radiography and digital tomosynthesis of the chest.
Duration: 9/2009 – 6/1/2013
Total Direct Costs: $37,835
Brief Description: The hypothesis is that digital chest radiography with dual energy and tomosynthesis can prove to be an alternative low radiation tool to assess pulmonary vasculature and perfusion.

(3) Status: ***Completed***
Role: Co-Investigator (uncompensated)
Principal Investigator: Sudhakar Pipavath, MD
Support Source: General Electric Company
Title: Quantification of lung fibrosis using Digital Tomosynthesis and Dual Energy of the chest
Duration: 9/2009 – 6/1/2013
Total Direct Costs: $43,728
Brief Description: The hypothesis is that digital tomosynthesis and Dual Energy can prove to be an alternative low radiation modality to assess and quantify pulmonary fibrosis.

(4) Status: ***Completed***
Role: Co-Investigator (uncompensated)
Principal Investigator: Monica Vavilala, MD
Support Source: Washington State Department of Health
Title: Development of Educational Content for Radiation Dose Reduction for Head CT Imaging in WA State
Duration: 4/2010 – 2/2011
Total Direct Costs: $5000
Brief Description: To develop educational curriculum that can be used by trauma centers in WA State to achieve optimize pediatric head CT imaging and reduce radiation dose

(5) Status: ***Completed***
Role: Co-Investigator
Principal Investigator: Monica Vavilala, MD
Support Source: National Institutes of Neurological Diseases and Stroke
Title: Improving Indo-US Traumatic Brain Injury (TBI) Outcomes
Duration: 09/2011- 08/2013
Total Direct Costs: $275,000
Brief Description: To develop strategies for collaboratively improving Indo - US TBI Outcomes.

(6) Status: ***Completed***
Role: Investigator (uncompensated)
Principal Investigator: Kalpana M. Kanal, PhD
Support Source: RSNA, AUR, APDR, SCARD Radiology Education Research Development Grant
Title: Use of Pediatric CT Protocols among Children with Head Trauma in U.S. Hospitals
Duration: 7/1/2012 – 6/30/2013
Total Direct Costs: $10,000
Brief Description: To examine national variation in the use of pediatric trauma head CT protocols and to examine hospital-level factors associated with the adoption of child-specific head CT protocols.

Bibliography:

Manuscripts in Refereed Scientific Journals

1. Ray AK, **Kanal KM**, Howard IA. A Correlation Study of Large Potassium Cationic Clusters. *Physica Status Solidi (b)*, 167(2):465-475, 1991.
    a. Impact factor: 1.61
    b. Citations: 2

2. Ray AK, Howard IA, **Kanal KM**. Structure and binding in small neutral and cationic boron clusters. *Physical Review B*, 45(24):14247-14255, 1992.
    a. Impact factor: 3.66
    b. Citations: 77

3. **Kanal KM**, Ray AK and Howard IA. A Correlation Study of Large Potassium Neutral Clusters. *Physica Status Solidi (b)*, 171(1):131-140, 1992.
    a. Impact factor: 1.61
    b. Citations: 2

4. Fullerton GD, Zimmerman RJ, **Kanal KM**, Floyd J, Cameron IL. Method to improve the accuracy of membrane osmometry measures of protein molecular weight. *Journal of Biochemical and Biophysical Methods*, 26(4):299-307, 1993.
    a. Impact factor: 1.81
    b. Citations: 8

5. **Kanal KM**, Fullerton GD, Cameron IL. A study of the molecular sources of nonideal osmotic pressure of bovine serum albumin solutions as a function of pH. *Biophysical Journal*, 66(1):153-160, 1994.
    a. Impact factor: 3.97
    b. Citations: 33

6. Zimmerman RJ, **Kanal KM**, Sanders J, Cameron IL, Fullerton GD. Osmotic pressure method to measure salt induced folding/unfolding of bovine serum albumin. *Journal of Biochemical and Biophysical Methods*, 30(2-3):113-131, 1995.
    a. Impact factor: 1.81
    b. Citations: 14

7. Cameron IL, **Kanal KM**, Keener CR, Fullerton GD. A mechanistic view of the non-ideal osmotic and motional behavior of intracellular water. *Cell Biology International*, 21(2):99-113, 1997.
    a. Impact factor: 1.64
    b. Citations: 59

8. **Kanal KM**, Kofler JM, Groth DS. Comparison of selected ultrasound performance tests using conventional and magnified field of view. *Medical Physics*, 25 (5):642-647, 1998.
    a. Impact factor: 3.01
    b. Citations: 8

9. O'Connor MK., **Kanal KM**, Gebhard MW and Rossman PJ. Comparison of four motion correction techniques in SPECT imaging of the heart: A cardiac phantom study. *Journal of Nuclear Medicine*, 39(12):2047-2034, 1998.
    a. Impact factor: 5.56
    b. Citations: 56

10. McCollough CH, **Kanal KM**, Lannuti N, Ryan K. Experimental determination of section sensitivity profiles and image noise in electron beam computed tomography. *Medical Physics*, 26 (2):287-295, 1999.
    a. Impact factor: 3.01
    b. Citations: 12

11. **Kanal KM**, Hangiandreou NJ, Sykes AG, et. al. Evaluation of the accuracy of a continuous speech recognition software system in radiology. *Journal of Digital Imaging*, 14 (1):30-37, 2001.
    a. Impact factor: 1.20
    b. Citations: 8

12. Langer SG and **Kanal KM**. Spreadsheets for Automated Data Collection, Analysis, and Report Generation for Diagnostic Medical Physics: Publicly Available on the World Wide Web. *Journal of Digital Imaging*, 15 (2):98-105, 2002.
    a. Impact factor: 1.20
    b. Citations: 3

13. Fullerton GD, **Kanal KM** and Cameron IL. Osmotically unresponsive water fraction on proteins: Non-ideal osmotic pressure of bovine serum albumin as a function of pH and salt concentration. *Cell Biology International*, 30 (1):86-92, 2006.
    a. Impact factor: 1.64
    b. Citations: 25

14. Cameron IL, **Kanal KM** and Fullerton GD. Role of protein conformation and aggregation in pumping water in and out of a cell. *Cell Biology International*, 30 (1):78-85, 2006.
    a. Impact factor: 1.64
    b. Citations: 13

15. Fullerton GD, **Kanal KM** and Cameron IL. On the osmotically unresponsive water compartment in cells. *Cell Biology International*, 30 (1):74-77, 2006.
    a. Impact factor: 1.64
    b. Citations: 20

16. Yaffe MJ, Bloomquist AK, Mawdsley GE, Pisano ED, Hendrick RE, Fajardo LL, Boone JM, **Kanal KM**, et. al. Quality control for digital mammography: Part II recommendations from the ACRIN DMIST trial. *Medical Physics*, 33 (3):737-752, 2006.
    a. Impact factor: 3.01
    b. Citations: 53

17. Stewart BK, **Kanal KM**, Perdue J, Mann FA. Computed Radiography Dose Data Mining and Surveillance as an Ongoing Quality Assurance Improvement Process. *American Journal of Roentgenology*, 189:7-11, 2007.
    a. Impact factor: 2.74
    b. Citations: 12

18. ***Kanal, KM**, Stewart BK, Kolokythas O, and Shuman WP. Impact of Operator-Selected Image Noise Index and Reconstruction Slice Thickness on Patient Radiation Dose in 64-MDCT. *American Journal of Roentgenology*, 189:219-225, 2007.
    a. Impact factor: 2.74
    b. Citations: 53

19. Hendrick RE, Cole EB, Pisano ED, Acharyya S, Marques H, Cohen M, Jong RA, Mawdsley G, **Kanal KM**, et al. Accuracy of Soft-Copy Digital Mammography versus That of Screen-Film Mammography according to Digital Manufacturer: ACRIN DMIST Retrospective Multireader Study. *Radiology*, 247 (1):38-48, 2008.
    a. Impact factor: 6.21
    b. Citations: 33

20. Russell M, Anzai Y, **Kanal KM**, Rebeles FC, Fink J. Balancing Radiation Dose and Image Quality: Clinical Applications of Neck Volume CT. *American Journal of Neuroradiology*, 29: 727-731, 2008.
    a. Impact factor: 3.68
    b. Citations: 28

21. Nishikawa RM, Acharyya S, Gastonsis C, Pisano ED, Cole E, Marques HS, D'Orsi C, Farria D, **Kanal KM**, et al. Comparison of Softcopy and Hardcopy Reading for Full-Field Digital Mammography. *Radiology*, 251(1):41-49, April 2009.
    a. Impact factor: 6.21
    b. Citations: 14

22. Raelson C, **Kanal KM**, Vavilala M, Rivara F, Kim L, Stewart BK, Cohen W. Radiation Dose and Excess Risk of Cancer in Children Undergoing Neuroangiography. *American Journal of Roentgenology*, 193:2352, 2009.
    a. Impact factor: 2.74
    b. Citations: 18

23. *King M, **Kanal KM**, Relyea-Chew A, Bittles M, Vavilala M, Hollingworth W. Radiation exposure from pediatric head CT: a bi-institutional study. *Pediatric Radiology*, 39:1059-1065, 2009.
    a. Impact factor: 1.65
    b. Citations: 48

24. Gunn ML, **Kanal KM**, Kolokythas O, Anzai Y. Radiation Dose to the Thyroid Gland and Breast From Multidetector Computed Tomography of the Cervical Spine: Does Bismuth Shielding With and Without a Cervical Collar Reduce Dose? *Journal of Computer Assisted Tomography*, Nov-Dec; 33(6):987-90, 2009.
    a. Impact factor: 1.6
    b. Citations: 14

25. Liu F, **Kanal KM**, Stewart BK, Lehman CD. Effects of Lesion Positioning on Digital Magnification Mammography Performance. *Academic Radiology*, Jun; 17 (6): 791-4, 2010.
    a. Impact factor: 2.08
    b. Citations: 2

26. *Wieseler KM, Bhargava P, **Kanal KM**, Vaidya S, Stewart BK, Dighe MK. Imaging in Pregnant Patients: Examination Appropriateness. *RadioGraphics*, Sep-Oct; 30:1215-1229, 2010.
    a. Impact factor: 2.73
    b. Citations: 63

27. Nikoloff E, Mahesh M, Heintz P, **Kanal KM**, Rzeszotarski MS, Schueler B. Physics Instruction for Radiology Residents in the Era of the New ABR Examination Process. *Journal of American College of Radiology*, Nov; 7(11):900-904, 2010.
    a. Impact factor: 2.28
    b. Citations: 8

28. ***Kanal KM**, Vavilala MS, Raelson C, Mohan A, Cohen W, Jarvik J, Rivara FP, Stewart BK. Variation in Pediatric Head CT Imaging Protocols in Washington State. *Journal of American College of Radiology*, April; 8:242-250, 2011.
    a. Impact factor: 2.28
    b. Citations: 17

29. Modica MJ, **Kanal KM,** Gunn M. The Obese Emergency Patient: Imaging Challenges and Solutions. *RadioGraphics*, May-Jun; 31:811-823, 2011.
    a. Impact factor: 2.73
    b. Citations: 23

30. Taneja R, Dighe M, **Kanal KM**, Mitsumori L, Dubinsky T and Richardson M. Utility of Multiplanar and Three-Dimensional Reconstructions From Computed Tomography Performed for Maternal Indications for Visualizing Fetal Anatomy and Estimating Gestational Age. *Journal of Computer Assisted Tomography,* July/August; 35(4):446-453, 2011.
    a. Impact factor: 1.6
    b. Citations: 2

31. **Kanal KM**, Chung JH, Wang J, Bhargava P, Kohr JR, Shuman WP, Stewart BK. Image Noise and Liver Lesion Detection With MDCT: A Phantom Study. *American Journal of Roentgenology*, August; 197:437-221, 2011.
    a. Impact factor: 2.74
    b. Citations: 9

32. Sadro C, Bernstein MP, **Kanal KM.** Imaging of Trauma: Part 2, Abdominal Trauma and Pregnancy-A Radiologist's Guide to Doing What Is Best for the Mother and Baby. *American Journal of Roentgenology, December 199:1207-1219, 2012.*
    a. Impact factor: 2.74
    b. Citations: 13

33. **Kanal KM**, Krupinski E, Berns EA, Geiser WR, Karellas A, Mainiero MB, Martin MC, Patel SB, Rubin DL et. al. ACR-AAPM-SIIM Practice Guideline for Determinants of Image Quality in Digital Mammography. *Journal of Digital Imaging*, February 26(1):10-25, 2013.
    a. Impact factor: 1.20
    b. Citations: 11

34. Peterson EC, **Kanal KM**, Dickinson RL, Stewart BK, Kim LJ. Radiation-Induced Complications in Endovascular Neurosurgery: Incidence of Skin Effects and the Feasibility of Estimating Risk of Future Tumor Formation. *Neurosurgery*, 72:566-572, 2013.
    a. Impact factor: 3.03
    b. Citations: 9

35. Robinson T, Robinson J and **Kanal KM**. Implementation of the ACR Dose Index Registry at a Large Academic Institution: Early Experience. *Journal of Digital Imaging*, 26(2):309-315, 2013.
    a. Impact factor: 1.20
    b. Citations: 7

36. Hsi RS, Zamora D, **Kanal KM**, Harper JD. Severe Obesity is Associated With 3-Fold Higher Radiation Dose Rate During Ureteroscopy. *Urology*, 82(4):780-785, 2013.
    a. Impact factor: 2.13
    b. Citations: 5

37. Hsi RS, Dearn J, Dean M, Zamora D, **Kanal KM**, Harper JD, Merguerian P. Effective and Organ Specific Radiation Doses from Videourodynamics in Children. *Journal of Urology, 190(4):1364-1370*, 2013.
    a. Impact factor: 3.75
    b. Citations: 3

38. Graves J, **Kanal KM**, Rivara FP, Jarvik JG, Vavilala MS. Dose Reduction Efforts for Pediatric Head CT Imaging in Washington State Trauma Centers: Follow-Up Survey Results. *Journal of the American College of Radiology*, 11(2):161-168, 2014.
    a. Impact factor: 2.28
    b. Citations: 2

39. Prabhu S, **Kanal KM**, Bhargava P, Vaidya S, Dighe MK. Ultrasound Artifacts: Classification, Applied Physics With Illustrations and Imaging Appearances. *Ultrasound Quarterly*, 30(2):145-157, 2014.
    a. Impact factor: 1.40
    b. Citations: 0

40. Shuman WP, Green DE, Busey JM, Mitsumori LM, Choi E, Koprowicz KM, **Kanal KM**. Dual Energy Liver CT: Effect of Monochromatic Imaging on Lesion Detection, Conspicuity, and Contrast-to-Noise Ratio of Hypervascular Lesions on Late Arterial Phase. *American Journal of Roentgenology*, 203:601–606, 2014.
    a. Impact factor: 2.74
    b. Citations: 3

41. Dickinson RL, Zamora DA, **Kanal KM**, Stewart BK. Estimated Skin Dose Look-Up Tables and Their Effect on Dose Awareness in the Fluoroscopy-Guided Imaging Suite. *American Journal of Roentgenology*, 203:630–636, 2014.
    a. Impact factor: 2.74
    b. Citations: 1

42. Graves J, **Kanal KM**, Vavilala MS, Applegate KE, Jarvik JG, Rivara FP. Hospital-Level Factors Associated With Use of Pediatric Radiation Dose-Reduction Protocols for Head CT: Results From a National Survey. *Journal of the American College of Radiology*, 11:717-724, 2014.
    a. Impact factor: 2.28
    b. Citations: 1

43. **Kanal KM**, Chung JH, Wang J, Bhargava P, Gunn M, Warren B, Stewart, BK, Shuman WP. Impact of Incremental Increase in CT Image Noise on Detection of Low-contrast Hypodense Liver Lesions. *Academic Radiology*, 21:1223-1239, 2014.
    a. Impact factor: 2.08
    b. Citations: 0

44. Shuman WP, Chan KT, Busey JM, Mitsumori LM, Choi E, Koprowicz KM, **Kanal KM**. Standard and Reduced Radiation Dose Liver CT Images: Adaptive Statistical Iterative Reconstruction versus Model-based Iterative Reconstruction—Comparison of Findings and Image Quality. *Radiology*, 273 (3):793-800, 2014.
    a. Impact factor: 6.21
    b. Citations: 2

45. Ingraham CR, Johnson GE, Easterling TR, **Kanal KM**, Valji K, Padia SA. Transjugular Intrahepatic Portosystemic Shunt Placement During Pregnancy: A Case Series of Five Patients. *Cardiovascular and Interventional Radiology Journal*, 2015. Published online January 24, 2015.
    a. Impact factor: 1.97
    b. Citations: 1

46. *__Kanal KM__, Graves J, Vavilala MS, Applegate KE, Jarvik JG, Rivara FP. Variation in Computed Tomography Pediatric Head Exam Radiation Dose: Results from a National Survey. *American Journal of Roentgenology,* 204 (3): W293-W301, 2015.
    a. Impact factor: 2.74
    b. Citations: 0

47. Marin JR, Sengupta D, Bhargavan, M, **Kanal KM,** Mills, AM, Applegate, KE. Variation in Pediatric Cervical Spine Computed Tomography Radiation Dose Index in the United States. *Academic Emergency Medicine.* Accepted for publication, August 2015.
    a. Impact factor: 2.20
    b. Citations: 0

Peer Reviewed Web-Based Publication:

1. Stewart BK, **Kanal KM**, Chew FS. Magnetic Resonance: Image Quality/Bioeffects/Safety – Web-Based Educational Physics Module for Radiology Residents. RSNA/AAPM Online Physics Modules, 2009. http://physics.rsna.org/default.asp

2. **Kanal KM**, Stewart BK, Gunn ML. CT Image Quality and Protocols – Web-Based Educational Physics Module for Radiology Residents. RSNA/AAPM Online Physics Modules, 2009. http://physics.rsna.org/default.asp

3. **Kanal KM**, Vavilala MS. Radiation Dose Reduction in Pediatric Head CT Imaging – Web-Based Educational Module for CT technologists 2012. http://depts.washington.edu/hiprc/Education%20and%20Training/CTModule.html

Book Chapters

1. Cross N, Zamora DA and **Kanal KM**. Basics of CT physics. In Body CT: The Essentials, McGraw Hill, 2015.

2. Zamora DA, Cross N and **Kanal KM**. CT Dose. In Body CT: The Essentials, McGraw Hill, 2015.

Non-Referred Publications:

1. **Kanal KM** and Stewart BK. Digital's narrowing divide – Mammography. *Enterprise Imaging and Therapeutic Radiology Management*, 19 (5): 26-28, May 2009.

2. Wieseler KM, Bhargava P, **Kanal KM**, Vaidya S, Stewart BK, Dighe MK. Imaging during Pregnancy: Exam Appropriateness. Response to Invited Commentary, *RadioGraphics*, Sep-Oct; 1230:1233, 2010.

3. Wieseler KM, Bhargava P, **Kanal KM**, Vaidya S, Stewart BK, Dighe MK. Imaging during Pregnancy: Exam Appropriateness. Response to Invited Commentary, *RadioGraphics*, May-Jun; 891:892, 2011.

Scientific Abstracts:

1. **Kanal KM**, Ray AK, Howard IA. "A correlation study of large potassium neutral and cationic clusters" presented at the American Physical Society Annual Meeting, Cincinnati, OH, May 1990.

2. **Kanal KM**, Ray AK, Howard IA. "A study of molecular sources of nonideal osmotic pressure of bovine serum albumin solutions as a function of pH" presented at the Biophysics Society Annual Meeting, New Orleans, LA, March 1994.

3. **Kanal KM**, Fullerton GD, Cameron IL. "Change in MR imaging contrast as a function of protein conformation" presented at the American Association of Physicists in Medicine, Annual Meeting, Boston, MA, July 1995.

4. **Kanal KM**, McCollough CH, Lannuti N, Ryan K. "Analysis of slice sensitivity profiles and image noise in electron beam CT" presented at the American Association of Physicists in Medicine, North Central Chapter Meeting, Minneapolis, MN, October 1996.

5. **Kanal KM**, Kofler J and Groth D. "Comparison of selected ultrasound performance tests using conventional and magnified field of view" presented at the American Association of Physicists in Medicine, Annual Meeting, Milwaukee, WI, July 1997.

6. **Kanal KM**, O'Connor MK., Gebhard MW and Rossman PJ. "Comparison of four motion correction techniques in SPECT imaging of the heart: A cardiac phantom study" presented at The Radiological Society of North America, Annual Meeting, Chicago, IL, December 1997.

7. **Kanal KM**, Hangiandreou NJ, Sykes A, Eklund HE, Araoz PA, Leon JA et. al. "Evaluation of the accuracy of a continuous speech recognition software system in radiology" presented at The Society for Computer Applications in Radiology, Annual Meeting, Philadelphia, PA, June 2000. ***This scientific exhibit won first prize***.

8. Stewart BK, **Kanal KM**, Perdue J. "Computed radiography dose data mining and surveillance as an ongoing quality assurance improvement process" presented at The American Association of Physicists in Medicine (AAPM) Annual Meeting in July 2005.

9. **Kanal KM**, Stewart BK, Willis P. "Quality Assurance Methodology to Monitor Patient Dose in Interventional Radiography" presented at The American Association of Physicists in Medicine (AAPM) Annual Meeting in July 2005.

10. Yaffe MJ, Bloomquist AK, Mawdsley GE, Pisano ED, Hendrick RE, Fajardo LL, Boone JM, **Kanal KM**, et. al. "Development of a Standardized Quality Control Program for Digital Mammography using Results from the ACRIN DMIST Trial" presented at the Radiological Society of North America Annual Meeting, Chicago, IL, November 2005.

11. **Kanal KM**, Stewart BK, Kolokythas O, and Shuman WP. "Development of a Noise Index Table Demonstrating Interrelationships among Noise Level, Reconstruction Slice Thickness, and Radiation Dose in 64-slice CT" presented at the 9th annual course of the Society of Computed Body Tomography and Magnetic Resonance, Phoenix, AZ, April 2006. ***This presentation won the Cum Laude Monetary ($2500) Award for excellent scientific presentation***.

12. Kinahan PE, Kohlmyer S, **Kanal KM**, Stewart BK, Kolokythas O, Warren B et. al. "64 slice Triple rule-out Cardiac CT: Impact of ECG-based Current Modulation and Lowered Heart Rate on Patient Radiation Dose" for the American Roentgen Ray Society, Annual Meeting, Vancouver, BC, May 2006.

13. Russell MT, Fink JR, Rebeles F, **Kanal KM**, Ramos M, Anzai Y. "Balancing radiation dose and image quality: Clinical applications of Neck Volume CT" for the Annual American Society of Head and Neck Radiology Meeting, Phoenix, AZ, September 2006.

14. Nishikawa RM, Acharyya S, Marques H, Cole EB, Gatsonis C, Pisano ED, D'Orsi C, Maidment A, Mahoney M, **Kanal KM** et. al. "Comparison of Softcopy and Hardcopy Reading of Full-Field Digital Mammograms: A DMIST Reader Study Conducted by the American College of Radiology Imaging Network (ACRIN)" for The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2006.

15. Henderick RE, Pisano ED, Cole EB, Cohen MA, Jong RA, **Kanal KM**, et. al. "ACRIN DMIST Retrospective Multi-reader Study Comparing the Accuracy of Softcopy Digital and Screen-Film Mammography by Digital Manufacturer" for The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2006.

16. Relyea-Chew A, Hollingworth W, **Kanal KM**. "Radiation Dose From Head CT In Pediatric Patients With Blunt Head Injury" for The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2006.

17. **Kanal KM**, Stewart BK, Kolokythas O, and Shuman WP. "Development of a Noise Index Table Demonstrating Interrelationships Among Noise Level, Reconstruction Slice Thickness, and Radiation Dose in 64-slice CT" for The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2006.

18. Shuman WP, Branch KR, May J, Mitsumori LM, Kohlmyer S, **Kanal KM** et al. "Prospective Gating Versus Retrospective Gating of 64 Channel Cardiac CT: Comparison of patient dose, number of unevaluable coronary artery segments, and image quality" for The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2007.

19. Gunn ML, **Kanal KM**, Kolokythas O, Anzai Y. "Radiation dose to the thyroid gland and breast from MDCT of the cervical spine: Does bismuth shielding with and without a cervical collar reduce dose" The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2008.

20. **Kanal KM**, Gunn ML, Shuman WP, Kolokythas O. "To determine the degree of breast dose reduction when bismuth shields are applied concurrently with automated tube current modulation on a 64 channel CT scanner" The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2008.

21. Chung JH, **Kanal KM**, Wang J, Bhargava P, Gunn ML, Shuman WP. Optimal Noise Index in the Evaluation of Subtle Liver Lesions: Phantom and Clinical Evidence, Scientific presentation, The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2009.

22. Kohr J, Green D, **Kanal KM**, Gunn ML. Effect of Body Mass Index on Radiation Dose with Automatic Tube Current Modulation, Society of Computed Body Tomography and Magnetic Resonance, SCBT-MR Annual Course, San Diego, CA, March 2010.

23. Gunn ML, **Kanal KM**, Stewart BK, CT Artifacts in the Obese Patient. American Roentgen Ray Society, Annual Meeting, San Diego, CA, May 2010.

24. Dickinson RL, **Kanal KM,** Cohen W, Stewart BK. Implementation of a Quality Assurance Program for Vascular & Interventional Radiography (VIR): Methodology for Flagging Patient Cases based on Time and Dose Analysis. American Association of Physicists in Medicine, Annual Meeting, Philadelphia, PA, July 2010.

25. **Kanal KM,** Gunn ML, Dickinson RL, Stewart BK. Computed Tomography Dose Data Mining and Surveillance as an ongoing Quality Assurance Improvement Process. American Association of Physicists in Medicine, Annual Meeting, Philadelphia, PA, July 2010.

26. Peterson E, **Kanal KM**, Stewart BK, Dickinson R, Kim L. Radiation Exposure during Neuroendovascular Surgery: Analysis by Procedure Type, Rate of Soft Tissue Injury, and Estimated Cancer Risk. Congress of Neurological Surgeons, Annual Meeting, San Francisco, CA, October 2010.

27. Dickinson R, **Kanal KM**, Zamora D, Stewart BK. Analysis of Distribution of Procedure Time and Dose in Interventional Radiology: Setting Thresholds for Case Review. American Association of Physicists in Medicine, Annual Meeting, Vancouver, BC, July 2011.

28. Sandstorm C, Linnau KF, Lam P, **Kanal KM**, Gunn M. Reduction in Breast Radiation Dose during Abdominal CT using Breast Displacement. European Congress of Radiology, Vienna, Austria, March 2012.

29. Kinahan PE, Pierce LA, **Kanal KM**, Macdonald LR. Method and impact of attenuation correction on quantitative accuracy for the PET/X breast imaging scanner. Society of Nuclear Medicine, Annual Meeting, Miami Beach, FL, June 2012.

30. Zamora D, **Kanal KM**, Dickinson R, Shuman WP, Stewart BK. Integration of recent NEMA (MITA) XR-25 CT dose-check standard into clinical practice. Association of Physicists in Medicine, Annual Meeting, Charlotte, NC July 2012.

31. Zamora D, Dickinson R, **Kanal KM**, Stewart BK. Implementation of dose monitoring in a cardiology department with independent medical reporting systems. Association of Physicists in Medicine, Annual Meeting, Charlotte, NC July 2012.

32. Dickinson R, **Kanal KM**, Zamora D, Stewart BK. Air Kerma to Estimated Entrance Skin Dose Look-Up Tables: a tool to Improve Dose Awareness in the Angiography Suite. Association of Physicists in Medicine, Annual Meeting, Charlotte, NC July 2012.

33. Stewart BK, Zamora D, Dickinson R, Rohrmann C, **Kanal KM**. Implementation of fluoroscopy dose mining and analysis process for continuous quality assurance. Association of Physicists in Medicine, Annual Meeting, Charlotte, NC July 2012.

34. **Kanal KM**, Zamora D, Price C, Robinson J, Shuman WP. The ACR CT Dose Index Registry: Implementation Challenges and Preliminary Data. Association of Physicists in Medicine, Annual Meeting, Charlotte, NC July 2012.

35. **Kanal KM**, Dickinson R, Zamora D, Cohen W, Valji K, Stewart BK. Establishing a follow-up process for angiographic patients receiving an estimated entrance skin dose in excess of 5 Gy. Association of Physicists in Medicine, Annual Meeting, Charlotte, NC July 2012.

36. **Kanal KM**, Shuman WP, Chung JH, Wang J, Stewart BK. Impact of Incremental Increase in CT Image Noise on Detection of Low Contrast Hypodense Liver Lesions. The 35th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Boston, MA, October 2012.

37. Lee AY, Elojeimy S, Linnau KF, **Kanal KM**, Gunn ML. Effect of Trauma Backboards on Radiation Dose and Image Quality. The Radiological Society of North American, Annual Meeting, Chicago, IL, November 2012.

38. Zamora D, **Kanal KM**, Dickinson R, Shuman WP, Stewart BK. Clinical Implementation of the NEMA (MITA) XR-25 CT dose-check standard. The Radiological Society of North American, Annual Meeting, Chicago, IL, November 2012.

39. Dickinson R, **Kanal KM**, Zamora D, Stewart BK. Estimated Entrance Skin Dose Look-Up Tables and Their Effect on Real-Time Dose Awareness in the Angiography Suite. The Radiological Society of North American, Annual Meeting, Chicago, IL, November 2012.

40. **Kanal KM**, Zamora D, Price C, Robinson J, Shuman WP. The American College of Radiology (ACR) CT Dose Index Registry (DIR): Implementation Challenges and Preliminary Data. The Radiological Society of North American, Annual Meeting, Chicago, IL, November 2012.

41. Shuman W, Green D, Busey J, Mitsumori L, **Kanal KM**, Choi E, Koprowicz K. Spectral Dual Energy CT for Evaluating Hypervascular Liver Lesions in the Late Arterial Phase: Focal Lesion Conspicuity and Radiation Dose. American Roentgen Ray Society, Annual Meeting, Washington, DC, April 2013.

42. Kinahan PE, Zeng C, Pierce LA, **Kanal KM**, MacDonald LR. Attenuation Correction Using a Single-View Mammogram for a 3D PET Scanner. The 12th International Meeting on Fully Three-Dimensional Image Reconstruction in Radiology and Nuclear Medicine, Lake Tahoe, CA, June 2013.

43. Zeng C, Pierce LA Pierce, **Kanal KM**, MacDonald LR, Kinahan PE. Quantitative assessment of response to breast cancer therapy using a combined PET/X-ray scanner. Annual Meeting for Biomedical Engineering Students, Seattle, WA, September, 2013.

44. **Kanal KM**, Graves JM, Vavilala MS, Applegate KE, Jarvik JG, Rivara FP. Variation in the CT pediatric head exam radiation dose in USA: Preliminary results from an ongoing survey of US hospitals. The International Conference in Medical Physics, Brighton, UK, September 2013.

45. Stewart BK, **Kanal KM**, Dickinson RL, Zamora D. Implementation of a Radiation Exposure Monitoring System for Surveillance of Multi-Modality Radiation Dose Data. The American Association of Physicists in Medicine, Annual Meeting, Austin, TX, July 2014.

46. Zamora D, Robinson J, **Kanal KM**. Targeted CT Dose Reduction Using a Novel Dose Metric and the ACR Dose Index Registry: Application to Thoracic CT Angiography. The Radiological Society of North American, Annual Meeting, Chicago, IL, November 2014.

47. Zamora D, Robinson J, **Kanal KM**. A Novel Method of ACR Dose Index Registry Report Interpretation: Population Dose Reduction for Thoracic CT Angiography. The American Association of Physicists in Medicine Annual Meeting, Anaheim, CA, July 2015.

Scientific <u>Electronic</u> Education Exhibits:

1. Gunn ML, Gross JA, **Kanal KM**. "64 and 16 channel MDCT adaptive tube current modulation: does CT scout order affect radiation dose" The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2008.

2. **Kanal KM**, Bhargava P, Stewart BK. "Physics Case of the Day – Bismuth Shielding" The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2008.

3. Wieseler KM, Bhargava P, **Kanal KM**, Vaidya S, Stewart BK, Sadro CT, Dighe MK. Imaging during Pregnancy: Exam Appropriateness. The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2009. ***This poster got the Certificate of Merit Award***

4. Modica MJ, **Kanal KM**, Ramos M, Gunn ML, The Morbidly Obese Trauma Patient: Imaging Challenges and Solutions, The Radiological Society of North America, Annual Meeting, Chicago, IL, December 2009. ***This poster got the Certificate of Merit Award***.

5. Prabhu S, Dighe MK, **Kanal KM**, Bhargava P, Vaidya S. Artifacts in ultrasound – physics and illustration with cases. The Radiological Society of North America, Chicago, IL, November 28-December 3, 2010.

6. Dickinson RL, **Kanal KM**, Stewart BK. Long-term Monitoring of MRI and CT Quality Control Programs: Evaluation of Imaging System Stability and Performance. The Radiological Society of North America, Annual Meeting, Chicago, IL, November 2010.

7. Zamora D, **Kanal KM**, Dickinson R, Stewart BK. Initiation of Fluoroscopy Time and Dose Data Mining and Surveillance for Continuous Quality Assurance Improvement Process. The Radiological Society of North America, Annual Meeting, Chicago, IL, November 2011.

8. Zamora D, **Kanal KM**, Dickinson R, Shuman WP, Stewart BK. Clinical Implementation of the NEMA (MITA) XR-25 CT dose-check standard. The Radiological Society of North American, Annual Meeting, Chicago, IL, November 2012.

Scientific <u>Poster</u> Education Exhibits:

1. **Kanal KM**, Stewart BK, Willis P. Quality Assurance Methodology to Monitor Patient Dose in Interventional Radiology, The American Association of Physicists in Medicine, Annual Meeting, Seattle, WA, August 2005.

2. Branch K, Shuman WP, **Kanal KM**, Alessio A, Caldwell J, Earls JP. Reduction in Estimated Lifetime Cancer Incidence and Mortality Using Cardiac Prospective ECG Triggered CT Compared to Retrospective Gated CT, The American College of Cardiology, Annual Meeting, Atlanta, GA, March 2010.

3. Dickinson RL, **Kanal KM,** Cohen W, Stewart BK. Implementation of a Quality Assurance Program for Vascular & Interventional Radiography (VIR): Methodology for Flagging Patient Cases based on Time and Dose Analysis. American Association of Physicists in Medicine, Annual Meeting, Philadelphia, PA, July 2010.

4. **Kanal KM**, Dickinson RL, Zamora D, Stewart BK. The New ABR Exam: What Have We Done to Change the Way We Teach Physics to Residents? American Association of Physicists in Medicine, Annual Meeting, Vancouver, BC, July 2011.

5. Kinahan PE, **Kanal KM**, MacDonald LM. X-Ray Based Attenuation Correction for a Dual-Modality PET/mammography Scanner. IEEE Nuclear Science Symposium and Medical Imaging Conference, Valencia, Spain, October 2011.

6. Graves J, Kanal KM, Vavilala M. Pediatric Radiation Dose from Head CT Exam in Washington State (2007-2012): Improvements and Ongoing Efforts. Washington State Public Health Association conference, Wenatchee, WA, October, 2012.

7. Hsi RS, Dearn J, Dean M, Zamora D, **Kanal KM**, Harper JD, Merguerian P. "Effective and Organ Specific Doses from Videourodynamics in Children". American Urology Association Annual Meeting 2013.

8. Hsi RS, Zamora D, **Kanal KM**, Harper JD. "Dependence of Fluoroscopy Dose Rate on Obesity and Body Density during Ureteroscopy". American Urology Association Annual Meeting 2013.

9. **Kanal KM**, Hoff MN, Dickinson RL, Zamora D, Stewart BK. ABR Diagnostic Radiology Core Exam: Was Our Redesigned Physics Course Successful in Teaching Physics to Radiology Residents? American Association of Physicists in Medicine, Annual Meeting, Austin, TX, July 2014.

10. **Kanal KM,** Pedroza F, Zamora D, Moirano J, Robinson J. Effect of Automatic Tube Voltage Selection and Reconstruction Method on CT Dose Reduction. The American Association of Physicists in Medicine Annual Meeting, Anaheim, CA, July 2015.

Visiting Faculty:

1. All India Institute of Medical Sciences, New Delhi India. *Talk given*: Radiation dose and dose reduction in CT: New initiatives of FDA, October 2011.

2. University of New Mexico, Albuquerque. *Talk given*: Dose Reduction in Pediatric CT, October 2012.

International Invited Lectures:

1. Dose Reduction in CT Using ASIR, General Electric Dose Reduction Symposium, Abbotsford, British Columbia, Canada, June 2010.

2. Radiation Protection in Interventional Radiology, International Workshop on Radioprotection for Interventionists and Other Non-Radiologists Physicians jointly organized by PSG College of Technology, Coimbatore, India and Northshore University Health System, USA, January 2011.

3. Pediatric CT, Amrita Institute of Medical Sciences, Cochi, India, December 2012.

4. Radiation Protection in Interventional Radiology, International Workshop on Radioprotection for Interventionists and Other Non-Radiologists, Physicians jointly organized by PSG College of Technology, Coimbatore, India, University of Washington, Seattle, WA and Northshore University Health System, USA, December 2012.

5. Estimation and Reporting of Patient Skin Dose from Displayed Air Kerma and Follow-up of the Patient, Philips Customer Service Center, Eindhoven, Netherlands, August 2013.

6. Patient Doses in CT, The 36th Annual Conference of the Association of Medical Physicists of India, (AMPICON), Thiruvananthapuram, Kerala, India, November 2015.

National Invited Lectures:

1. The Academy of Molecular Imaging, Annual Conference, CT and PET/CT for NMTs: System Components, Operation, Image Formation, and Image Quality. Orlando, FL, March 20, 2005.

2. The Academy of Molecular Imaging, Annual Conference, CT and PET/CT for NMTs: System Components, Operation, Image Formation, and Image Quality, Orlando, FL, March 21, 2006.

3. Radiological Society of North America Annual Meeting, The AAPM/RSNA Physics Tutorial on Equipment Selection: Digital Mammography, Overview of Quality Control in Digital Mammography, Chicago, IL, November 2006.

4. Annual American Roentgen Ray Society Meeting, ARRS Instructional Course on Competencies, Practice Based Learning: Safety Issues in Radiology – CT Dose Control, Orlando, FL, May 2007.

5. Imaging in Molecular Medicine – Joint Conference by AMI, RSNA, SNM and SMI, CT Scanner Anatomy, Image Formation and Image Quality, Providence, RI, September 2007.

6. American College of Medical Physics Annual Meeting, Diagnostic session, MDCT Technology and Image Quality, Seattle, WA, May 2008.

7. American Association of Physicists in Medicine Annual Meeting, The Physics and Technology of Breast Imaging Course, Digital Mammography Update: Design and Characteristics of Current Systems, Houston, TX, July 2008.

8. American Association of Physicists in Medicine Annual Meeting, The Physics and Technology of Breast Imaging Course, Digital Mammography Update: Design and Characteristics of Current Systems, Houston, TX, July 2009.

9. Medical Technology Management Institute, A Review of CT Imaging for Physicists Seminar, Las Vegas, NV, September 2009.

10. Medical Technology Management Institute, A Review of CT Imaging for Physicists Seminar, Baltimore, MD, October 2010.

11. American Society of Neuroradiology (ASNR) Annual Meeting, Basics of CT Dosimetry (CME), Seattle, WA, June 2011.

12. Medical Technology Management Institute, A Review of CT Imaging for Physicists Seminar, Baltimore, MD, August 2011.

13. American Roentgen Ray Society Annual Meeting, Use of CT Dose Length Product Information Mined from a RIS Database to Monitor and Iteratively Reduce Patient Dose in a Consensus Quality Assurance Program, Radiation Dose Course, Vancouver, BC, April 2012.

14. American Association of Physicists in Medicine Summer School, Determination of Organ & Effective Dose in Radiography and Mammography, San Diego, CA, June 2012.

15. American Association of Physicists in Medicine Summer School, Mammography: Fundamental Principles / Equipment Design & Siting, San Diego, CA, June 2012.

16. The 36th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Radiation Dose Reduction in CT, Tucson, AZ, October 2013.

17. The 36th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Radiation Issues in Pediatric CT: Risks, Doses & Dose Reduction Techniques, Tucson, AZ, October 2013.

18. The American College of Radiology Imaging Informatics Summit & Data Registries Forum, CT Dose Index Registry, Washington, DC, October 2013.

19. The 37th Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Round Table on Radiation Dose Monitoring and Radiation Dose Index Registry, New Orleans, LA, September 2014.

20. The American College of Radiology CT Dose Index Registry, CME Session, Course 223A, Radiological Society of North America Annual Meeting, Chicago, IL/Washington, DC, December 2014.

21. The 38h Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, Round Table on Radiation Dose Monitoring in CT, New Orleans, LA, October 2015.

22. The 38h Annual Course of the Society of Computed Body Tomography and Magnetic Resonance, CME Workshop - Recent Advances in CT Radiation Dose Reduction Techniques Registry, New Orleans, LA, October 2015.

23. The American College of Radiology CT Dose Index Registry, CME Session, Refresher Course 55C, ACR Usage of RadLex® Playbook for CT Dose Registry. Radiological Society of North America Annual Meeting, Chicago, IL/Washington, DC, December 2015.

Local Invited Lectures:

1. Catalyst event at University of Washington, Topic: Educational Technologies for Your Courses: Designing a Useful Course Web Site, January 21, 2005.

2. Western Washington Mammography Fall Seminar, Digital Mammography Technologist Quality Control, Seattle, WA, October 22, 2005.

3. UW Annual Positron Emission Tomography Course, CT Physics Update, What You Need to Know, Seattle, WA, June 2006.

4. UW Medicine, School of Medicine, Imaging of Coronary Arteries and Ischemic Heart Disease and Cardiac CT Review Course, Radiation Issues in Cardiac CT, Seattle, WA, February 2007.

5. CT Physics Update and Dosimetry Considerations: What you need to know, University of Washington, Department of Radiology – 7th Annual Positron Emission Tomography Course, Seattle, WA, June 2007.

6. UW Medicine, School of Medicine, Imaging of Coronary Arteries and Ischemic Heart Disease and Cardiac CT Review Course, Radiation Issues in Cardiac CT, Seattle, WA, February 2008.

7. Emergency Radiology Course (CME), University of Washington, Department of Radiology, Radiation Dose in the ER, Seattle, WA, August 2009.

8. Variation in Pediatric Head CT Protocols in Washington State, WAMI Annual Trauma Conference, Seattle, WA, June 2010.

9. Low Dose CT: Impact on your Practice (CME), University of Washington, Department of Radiology, How the unexamined CT can be high dose, Seattle, WA, October 2010.

10. Radiation Dose and Cancer Risk (CME), Society of Nuclear Medicine Local Chapter Meeting, Portland, OR, March 2011.

11. Low Dose CT: Impact on your Practice (CME), University of Washington, Department of Radiology, How the unexamined CT can be high dose, Seattle, WA, March 2011.

12. Radiation Safety in Fluoroscopy, American Radiological Nurses Association (Northwest Chapter) Conference, Seattle, WA, May 2013.

13. Pediatric CT, American Association of Physicists in Medicine (Northwest Chapter) Conference, Seattle, WA, October 2013.

14. Dose Monitoring in Diagnostic Radiology, American Association of Physicists in Medicine (Northwest Chapter) Conference, Portland, OR, May 2014.

15. Pediatric CT, Washington State Safe Imaging – 100K Children Campaign, Online WebEx Presentation, June 2015.

Miscellaneous:

1. **Kanal KM** and Shuman WP. Radiology Innovations Drop CT Dose Up to 60%. University of Washington, Department of Radiology Alumni Newsletter, Fall-Winter 2009.

2. **Kanal KM** and Shuman WP. Advances in Radiology: The Benefits of Low-dose CT Technology. www.patientpower.info, Webcast. Patient Power LLC, Seattle, WA, October 15, 2009.

3. **Kanal KM**, ***Only contributor from USA to draft and review document*** - Quality Assurance Programme for Screen Film Mammography, International Atomic Energy Agency (IAEA) Human Health Series No.2, Vienna 2009.

4. **Kanal KM**. Does Variability in CT Dose from Multi-Detector CT Scanners Matter? Blog on www.lowradiationdosect.com, July 15, 2010.

5. **Kanal KM**. CT Perfusion Dose – What is all the Hue and Cry About? Blog on www.lowradiationdosect.com, August 26, 2010.

6. Kinahan PE, MacDonald L, **Kanal KM**, Pierce L, ***X-ray based attenuation correction for a breast PET scanner***. Submitted record of innovation to University of Washington Center for Commercialization, Seattle, WA, December 21, 2011.

7. **Kanal KM**, Director and Faculty, CT Dose Workshop. University of Washington, Department of Radiology, May 11, 2013.

8. **Kanal KM** and Zamora D, Co-Directors and Faculty, CT Dose Workshop. University of Washington, Department of Radiology, December 13, 2014.

9. **Kanal KM**, blog contributor, http://blogs.uw.edu/radwblog/, ***Radiation Dose Management in CT: Is it easy to accomplish?*** September 4, 2015; ***Lower radiation dose without affecting diagnostic confidence***, October 6, 2014; ***Impact of education and awareness on reducing radiation dose***, October 3, 2014