

CURRICULUM VITAE

Brent K. Stewart, PhD, DABMP

Contact

Information: Department of Radiology, Box 357987
University of Washington School of Medicine
Seattle, WA 98195-7987
(206) 616-1314 (office), (206) 543-8356 (fax)
bstewart@u.washington.edu

1. Personal Data:

Place of Birth: Seattle, WA; Citizenship: USA

2. Education:

Physics, BS, 1980
Magna Cum Laude with Honors
University of Washington; Seattle, WA

Biomedical Physics, PhD, 1988
Emphasis in Medical Imaging
University of California at Los Angeles

3. Postgraduate Training:

None

4. Faculty Positions Held

Assistant Professor (tenure-track) of Radiology (1988-89)
Medical Physics Division, University of Cincinnati

Assistant Professor of Radiological Sciences (1990-93)
Medical Imaging Division, UCLA School of Medicine

Associate Professor of Radiology (1993-1999)
University of Washington School of Medicine
Adjunct Associate Professor of Bioengineering (1994-1999)
Adjunct Associate Professor of Medical Education (1997-1999)

Professor of Radiology (1999-present)
University of Washington School of Medicine
Adjunct Professor of Medical Education (1999-2006)
Adjunct Professor of Bioengineering (1999-2002)

5. Hospital Positions Held:

Director of Diagnostic Physics (1993-present)
Department of Radiology, University of Washington School of Medicine
Director of Imaging Informatics (1996-2002)
University of Washington Academic Medical Centers

6. Honors:

Who's Who in Education, 2002
Who's Who in the World, 2000
Who's Who in Science and Engineering, 1994-97
National Science Foundation Fellow, 1984-1987
Phi Beta Kappa, Washington Alpha, 1980

7. Board

Certification:

Medical Physics with Special Competence in Diagnostic Imaging Physics
American Board of Medical Physics Certification (1996)
Diplomat of the American Board of Medical Physics (DABMP)
American Board of Medical Physics Recertification (2006-2010)

Letter of Equivalence in Radiologic Physics, Diagnostic Imaging
American Board of Radiology (2001)

8. Current

License(s)

None

To Practice:

9. Professional

Organizations:

Full Member, American Association of Physicists in Medicine (AAPM)
Diplomate, American Board of Medical Physics (ABMP)

10. Teaching Responsibilities:

University of Washington Department of Radiology (1993-present): Radiology resident instruction in the physics of diagnostic radiology and resident physics board exam review instruction (<http://courses.washington.edu/radxphys/PhysicsCourse.html>).

Quarterly Medical Student Lectures (Intro to Medical Imaging and Radiation Biology) RADGY 693 Introduction to Diagnostic Radiology (assisting Dr. Kanal as required; 2006-present).

HMC Physics Noon Conferences (2003-present): bi-monthly physics lectures to residents. (<http://depts.washington.edu/diagphys/>).

HMC Department of Radiology Fluoroscopy Credentialing Program (1997-present): to assure adequate training of physicians who use fluoroscopy. Consists of self-study materials, an exam and hands-on practical session. (<http://depts.washington.edu/diagphys/FluoroCred/FluoroCredentialing.html>).

University of Washington Department of Bioengineering (1994-2001): Full responsibility for the Bioengineering Graduate Student course BIOEN/RADGY 508A (Physical Aspects of Medical Imaging).

University of Washington Department of Electrical Engineering (1998-2000): EE400B (Systems Engineering and Medical Imaging Informatics). This course is sponsored by a grant from the Hewlett Packard Company.

10. Teaching Responsibilities (cont.):

University of Washington (1994-2005) have taught components of EE500B (Seminar on Imaging Computing), MEDED530 (Medical Informatics), MEDED535 (Clinical Topics & Informatics) and HSERV590K/MEDED510 (Selected Topics in Health Informatics).

Faculty - American Association of Physicists in Medicine 1999 Summer School on Practical Digital Imaging and PACS: “Network, Pipes and Connectivity” and “Teleradiology” (Sonoma State University, CA). Faculty - American Association of Physicists in Medicine 1993 Summer School on Digital Imaging: “Mini-PACS” (Charlottesville, VA).

RSNA Refresher Course Faculty (1991-1996): “Categorical Course on Computers in Radiology Categorical Course,” “Information Systems for Radiology Clinical Practice and Research,” “Clinical Practice and Research Information Systems for Radiology’s Next Century,” “Clinical Information Systems for Radiology: Informatics Infrastructure for Healthcare Providers,” and “Diagnostic Physics Categorical Course.” See also: Invited Lectures, items 6, 9, 12, 15, 17, 18 and 21.

UCLA Biomedical Physics Graduate Program (1990-1993): Digital Techniques in Radiological Sciences (RS209), Advanced Instrumentation (RS206), Medical Physics Laboratory (RS208) and Medical Imaging Seminar (RS269), Biomedical Physics Graduate Program. Radiology resident training in radiological physics, computer technology, image processing and digital radiography.

University of Cincinnati Medical Physics Graduate Program (1988-1989): Radiology resident and Medical Physics graduate student teaching in computer technology, image processing, digital radiography, CT and MRI.

11. Editorial

Responsibilities: Associate Editor - Academic Radiology (1997-present)
Associate Editor – Medical Physics (2005-present)
Editor - Academic Radiology (1995-1997)

12. Special

National Responsibilities American Association of Physicists in Medicine Task Group #10: Computed Radiographic Imaging (1995-2005).

Presiding Officer, Radiological Society of North America (2000-2002): “Physics -PACS Architecture and Algorithms” (2000), “Physics – PACS Workflow and Quality Assurance” (2001) and “Physics – PACS Various Topics” (2002).

Faculty - American Association of Physicists in Medicine 1999 Summer School on Practical Digital Imaging and PACS: “Network, Pipes and Connectivity” and “Teleradiology.”

Scientific Program Committee, American Roentgen Ray Society (1996-98).

12. Special National Responsibilities (cont.):

RSNA Refresher Course Faculty (1991-1996): “Categorical Course on Computers in Radiology,” “Information Systems for Radiology Clinical Practice and Research,” “Clinical Practice and Research Information Systems for Radiology’s Next Century”, “Diagnostic Physics Categorical Course” and “Clinical Information Systems for Radiology”

Moderator, “Clinical Information Systems for Radiology” Refresher Course at the 82nd Scientific Assembly and Annual Meeting of the Radiological Society of North America (4 December 1996).

RadioGraphics RSNA Physics Scientific Exhibit Review Panel (1995-98)

Moderator, “Clinical Practice and Research Information Systems for Radiology’s Next Century” Refresher Course at the 81st Scientific Assembly and Annual Meeting of the Radiological Society of North America (30 November 1995).

Moderator, “Information Systems for Radiology Clinical Practice and Research” Refresher Course at the 80th Scientific Assembly and Annual Meeting of the Radiological Society of North America (2 December 1994).

Moderator, “Information Systems for Radiology Clinical Practice and Research” Refresher Course at the 79th Scientific Assembly and Annual Meeting of the Radiological Society of North America (2 December 1993).

Faculty - American Association of Physicists in Medicine 1993 Summer School on Digital Imaging: “Mini-PACS.”

13. Special
Local
Responsibilities

UW Provost’s UW Data Management Committee (2006-present)

UW Graduate Student Representative (1993-present)

UW Provost’s Future of Information Systems Task Force (2006)

UW President’s Strategic Risk Initiative Committee (2005-2006)

UW Research Advisory Board (2004-present)

Chair, Faculty Council on Research (2004-2006)

Vice-Chair, Faculty Council on Research (2002-2004)

Faculty Council on Research (2000-2006)

Faculty Senate Executive Committee (2004-2006)

University of Washington Faculty Senate (2004-2006)

Chair, UW Radiation Safety Committee (2004-2006)

Scientific Executor, UW Radiation Safety Committee (2004-2006)

Intellectual Property Advisory Management Committee (2004-2006)

Export Control Policy and Training Polices Committee (2005-2006)

Medical Centers Information Systems Steering Committee (1996-2002)

University of Washington Academic Medical Centers

13. Special Local Responsibilities (cont.):

University of Washington Academic Medical Centers (1996-2001)

IAIMS (Integrated Advanced Information Management System) Core Group,
University of Washington School of Medicine (1996-2000)

Clinical Informatics Workgroup
Medical Centers Information Systems (1996-2000)

Chair, Telemedicine Technology Oversight Committee
University of Washington School of Medicine (1997-1998)

Chair, Electronic Radiology Imaging Committee
University of Washington Dept. of Radiology (1995-1997)

Chair, Technical Advisory Committee
Technical Director, Leadership Team and Clinical Advisory Committee
WAMI Rural Telemedicine Network (1994-97)

Managed Care Committee, UW Dept. of Radiology (1994)

Dean's Task Force on Distance Learning and Telemedicine
University of Washington School of Medicine (1994)

14. Research Funding:

(1) Status: Inactive
Role: Principal Investigator
Support Source: Radiology Health Services Research Seed Grant Program
Title: Enhancement and Validation of a Simulation Model for the Introduction of Digital Radiography into a Radiology Department with Existing Computed Radiography
Duration: 4/04-3/05
Budget: \$7,090
Brief Description: The accurate prediction of workflow throughput is a critical issue in planning for and acquisition of any new imaging modality, be it conversion of computed radiography (CR) systems to digital radiography (DR) or successful installation of a picture archiving and communication system (PACS). Workflow bottlenecks or process design flaws can render a large-scale implementation or conversion process useless. This research presents a methodology for predicting workflow throughput and cost effectiveness in converting from CR to DR in an already existing radiology department with PACS.

14. Research Funding (cont.):

(2) Status: Inactive
Role: Principal Investigator (10% effort)
Support Source: General Electric Medical Systems
Title: Imaging Informatics Workflow Modeling and Simulation
Duration: 1/02 – 6/03
Budget: \$75,000
Brief Description: The objective of this research is to create generic and specific workflow models of the University of Washington Department of Radiology using MedModel. Both pre and post PACS installation models will be generated. These models will then be used to run simulations that will provide key cost and time parameters for use in a cost-benefit modeling (CBM) tool.

(3) Status: Inactive
Role: Principal Investigator (50% effort)
Support Source: National Library of Medicine, Biomedical Applications of the Next Generation Internet (NGI) - Phase II
Title: Patient-centric Tools for Regional Collaborative Cancer Care Using the NGI
Duration: 10/99 - 12/02
Budget: \$1,351,962
Brief Description: Phase II involves the creation of collaborative Internet tools necessary for the effective practice of oncology in the highly distributed and differentiated medical enterprise represented by the Seattle Cancer Care Alliance (SCCA) and its regional affiliates. These tools and their underlying infrastructure will be applied to three key collaborative steps in the diagnosis, management and treatment of oncology patients. Contextual inquiry and design are being used to determine user requirements for collaborative tools and in the design and evaluation of the collaborative tools developed. The Pacific Northwest Gigapop which connects all SCCA partners through 2.5 Gbps fiber-optic links and the MINDscape web-based electronic medical record developed at the University of Washington are key infrastructure components in this effort. 15 awards made.

(4) Status: Inactive
Role: Principal Investigator (20% effort)
Support Source: National Library of Medicine, Biomedical Applications of the Next Generation Internet (NGI) - Phase I
Title: Adopting the Next Generation Internet as a Tool for Healthcare Delivery and Information Access: Assessment, Selection and Planning
Duration: 10/98 - 6/99
Budget: \$85,470
Brief Description: In Phase I, an Assessment, Selection and Planning (ASP) team was formed to analyze the myriad of biomedical and healthcare information processes and select those which best demonstrate the application of Next Generation Internet technologies and toolsets, while simultaneously providing demonstrable benefit to healthcare practitioners and end users. Twenty-four awards made.

14. Research Funding (cont.):

(5) Status: Inactive
Role: Investigator (10% effort), Director of Imaging Informatics
Support Source: National Library of Medicine, Health Applications for the National Information Infrastructure
Title: From Bench to Bedside and Beyond: "Building and Testing an Integrated Regional Medical Information Network for the Pacific Northwest."
Duration: 10/96 - 9/99
Budget: \$2,028,000
Brief Description: The UWAMC will be creating a comprehensive, integrated, information access and management telemedicine regional network that will enhance the clinical, research, educational, and administrative effectiveness of the medical center and its affiliated clinics, institutions and programs over a five state region. The goal of the network is to provide clinicians, educators, students, researchers, administrators and staff with convenient and timely access to the information they need to function optimally, regardless of physical location of the user, the technical resources of the system, or the format of the information package.

(6) Status: Inactive
Role: Principal Investigator (35% effort), Telemedicine Component
Support Source: Technology Re-investment Program (TRP) - Defense Advanced Research Programs Agency (DARPA)
Title: Portable Ultrasound Imaging Device for Battleground Trauma
Duration: 5/96 - 4/99
Budget: \$2,250,049
Brief Description: Use advances in Application Specific Integrated Circuit (ASIC) design to construct a hand-held, ultrasound imaging device with telemedicine capability that would have comparable quality to that of conventional clinical systems. Specific protocols for the special application of combat casualty care will be determined. The UW is joined in this project by a number of industrial partners: Advanced Technology Laboratories (ATL), Harris Semiconductor, and VLSI Technology.

(7) Status: Inactive
Role: Investigator
Support Source: Intel
Title: Network and Resource Monitoring and Analysis with Model Simulation for Medical Informatics Infrastructures
Duration: 9/97-9/98
In-kind Contrib: Dual and single processor PC servers, est. value = \$22,000.
Brief Description: As more and more medical information is transferred electronically, networks and computing resources have become mission-critical cornerstones of the medical enterprise, adequate capacity planning, analysis of alternative architectures and configuration optimization are vital. This is especially critical for the deployment of new information processing systems where response-times are critical and network traffic patterns (tracking with changes in workflow patterns) cannot be predicted a priori or from experience.

14. Research Funding (cont.):

(8) Status: Inactive
Role: Co-Principal Investigator (20% effort)
Support Source: Biomedical Technology - Defense Advanced Research Programs Agency (DARPA)
Title: Telemedicine-Remote Portable Ultrasound

Duration: 4/95 - 3/98
Budget: \$445,214
Brief Description: Specify, develop, integrate and demonstrate a telemedical ultrasound system using leading edge technologies to develop a portable high resolution ultrasound imaging system, codecs tailored for real-time ultrasound image transmission, portable satellite communication links and virtual reality viewing devices.

(9) Status: Inactive
Role: Investigator (10% effort), Technical Director
Support Source: Office of Rural Health Policy, Department of Health and Human Services
Title: WAMI Rural Telemedicine Grant Program
Duration: 10/94 - 9/97
Ann. Direct Budget: \$227,672
Brief Description: Implementation and evaluation of a multi-state telemedicine network using the University of Washington School of Medicine WAMI (Washington-Alaska-Montana-Idaho) medical education consortium to deliver improved rural health services access using low-bandwidth, desktop compressed televideo systems.

(10) Status: Inactive
Role: Investigator
Support Source: NASA
Title: Telemedicine Using the NASA/JPL ACTS Mobile Terminal
Duration: 6/95-6/96
Budget: In-kind from NASA, some support from General Electric (\$40,000).
Brief Description: This experiment involved the transmission of static digital medical images, as well as real-time video and ultrasound imagery, between the ACTS/AMT and the Department of Radiology at the University of Washington.

14. Research Funding (cont.):

(11) Status: Inactive
Support Source: National Cancer Institute
ID Number: RO1-CA51198-04
Core PI: H.K. Huang, D.Sc.
Core Title: PACS in Radiology
Core Annual Costs: \$468,891
Duration: 5/90 - 4/95 (five years)
Brief Description: Research on three PACS modules in Neuroradiology, Thoracic Radiology and Intensive Care as well as Image Compression.
Project 1: PACS for ICU; Hooshang Kangarloo, M.D., PI
Project 2: PACS for Neuroradiology, Robert Lufkin, M.D., PI
Project 3: PACS for Thoracic Imaging, Denise R. Aberle, M.D., PI
Co-PI: Brent K. Stewart, Ph.D. (25% effort)
Proj. 3 Annual Costs: \$95,343
Description: Project 3 deals with the definition of the minimum requirements of digital projection radiography that maintain diagnostic accuracy, the design and integration of hardware necessary for Thoracic PACS, and the demonstration of PACS in the clinical environment.

(12) Status: Inactive
Support Source: University of California Tobacco-Related Disease Research Program
ID Number: 2RT0081
Title: Advances in Lung Cancer Detection with Digital Techniques
PI: Denise R. Aberle, M.D.
Co-PI: Brent K. Stewart, Ph.D. (15% effort)
Duration: 1/92 - 12/94
Ann. Direct Costs: \$88,962
Brief Description: Comparison of Digital Thoracic Imaging Modalities (laser film digitizers, dual-energy computed radiography, computer aided detection and advanced multiple-beam equalization radiography) with conventional radiography in the detection accuracy for early lung cancer.

15. Bibliography (Refereed Journals):

1. Stewart BK. Implementation of a magnetic resonance imaging computer simulator and preliminary results. Proc SPIE 1986; 626: 200-206.
2. Stewart BK, Lo SC, Huang HK. Gray level dynamic range in magnetic resonance imaging. Proc SPIE 1986; 626: 189-195.
3. Stewart BK. PACS at UCLA IV - picture communication. Proceedings of the Third International Symposium on PACS and PHD, 1986; 4: 84-86.
4. Mankovich NJ, Cho PS, Taira RK, Wong A, Stewart BK, Huang HK. A general purpose optical disk system with a radiological imaging application. Proc SPIE 1986; 626: 676-684.

15. Bibliography (Refereed Journals, cont.):

5. Huang HK, Mankovich NJ, Cho P, Taira R, Stewart BK, Ho BK. PACS at UCLA I - a status report. Proceedings of the Third International Symposium on PACS and PHD 1986; 4: 69-79.
6. Ho BK, Mankovich NJ, Stewart BK, Takeuchi H, Huang HK. PACS at UCLA III - image acquisition. Proceedings of the Third International Symposium on PACS and PHD 1986; 4: 82-83.
7. Stewart BK, Huang HK. Dual energy radiography using a single exposure technique. Proc SPIE 1987; 767: 154-161.
8. Stewart BK, Taira RK, Cho PS, Mankovich NJ. PACS module image communication at UCLA. Proc SPIE 1987; 767: 558-563.
9. Ho BK, Morioka C, Mankovich NJ, Stewart BK, Huang HK. Image acquisition for the pediatric radiology PACS module. Proc SPIE 1987; 767: 554-557.
10. Huang HK, Mankovich NJ, Taira R, Cho P, Stewart BK, Ho BK, Kangarloo H, Boechat MI, Dietrich RB. Picture archiving and communication systems for radiology. Proceedings of the International Symposium on Computer Assisted Radiology 1987; 3: 487-492.
11. Stewart BK. Single exposure dual-energy digital radiography. Proceedings of the International Symposium on Computer Applications in Medical Care 1987; 11: 535-542.
12. Huang HK, Mankovich NJ, Cho PS, Taira R, Stewart BK, Ho BK. Picture archiving and communication systems in Japan. AJR 1987; 148: 427-429.
13. Stewart BK. Single exposure dual-energy digital radiography. Computer Methods and Programs in Biomedicine 1989; 30:127-135.
14. Stewart BK, Huang HK. Single-exposure dual-energy computed radiography. Medical Physics 1990; 17: 866-875.
15. Wong A, Lou SL, Stewart BK, Chan KK, Valentino DJ, Huang HK. Performance comparisons of image communication networks. Proc SPIE 1990; 1234: 461-470.
16. Huang HK, Lou SL, Cho PS, Valentino DJ, Wong AWK, Chan KK, Stewart BK. Radiologic image communication methods. AJR 1990; 155: 183-186.
17. Stewart BK, Lou SL, Wong WK, Huang HK. An ultrafast network for communication of radiologic images. AJR 1991; 156: 835-839.
18. Stewart BK, Honeyman JC, Dwyer SJ. Picture archiving and communication system (PACS) networking: Three implementation strategies. Computerized Medical Imaging and Graphics 1991; 15: 161-169.

15. Bibliography (Refereed Journals, cont.):

19. Taira RK, Stewart BK, Sinha U. PACS database architecture and design. *Computerized Medical Imaging and Graphics* 1991; 15: 171-176.
20. Stewart BK, Pratt RG, Thomas SR, Dieckman SL, Ridgway TH. Software and hardware integration of a microprogrammable state machine for NMR imaging. *Magnetic Resonance Imaging* 1991; 9: 627-634.
21. Stewart BK, Lou SL, Wong A, Chan KK, Huang HK. Performance characteristics of an ultrafast network for PACS. *Proc SPIE* 1991; 1446: 141-153.
22. Taira RK, Chan KK, Stewart BK, Weinberg WS. Reliability issues in PACS. *Proc SPIE* 1991; 1446: 451-458.
23. Wong WK, Stewart BK, Lou SL, Chan KK, Huang HK. Multiple communication networks for a radiological PACS. *Proc SPIE* 1991; 1446: 73-80.
24. Stewart BK. Local area network topologies, media and routing. *Radiographics* 1992; 12: 549-566.
25. Dwyer SJ, Stewart BK, Sayre JW, Honeyman JC. Wide area network strategies for teleradiology systems. *Radiographics*, 1992; 12: 567-576.
26. Dwyer SJ, Stewart BK, Sayre JW, Aberle DR, Boechat MI, Honeyman JC, Boehme JM, Roehrig H, Ji TL, Blaine GJ. Performance characteristics and image fidelity of gray-scale monitors. *Radiographics* 1992; 12: 765-772.
27. Stewart BK, Dwyer SJ, Kangaroo H. Design of a high-speed, high-resolution teleradiology network. *Journal of Digital Imaging* 1992; 5: 144-155.
28. Dwyer SJ, Templeton AW, Anderson WH, Hensley KS, McFadden MA, Stewart BK, Honeyman JC, Cook LT, Baxter KG, Wingard RY, Hall CL. Teleradiology using switched dialup networks. *IEEE Journal on Selected Areas in Communications* 1992; 10: 1161-1172.
29. Stewart BK, Dwyer SJ. Teleradiology system analysis using a discrete event driven block oriented network simulator. *Proc SPIE* 1992; 1654: 2-13.
30. Stewart BK, Taira RK, Dwyer SJ, Huang HK. Acquisition and analysis of throughput rates for an operational, department-wide PACS. *Proc SPIE* 1992; 1654: 24-38.
31. Stewart BK, Dwyer SJ, Huang HK, Kangaroo H. Design of a high-speed, high-resolution teleradiology system. *Proc SPIE* 1992; 1654: 66-80.
32. Stewart BK, Taira RK, Dwyer SJ, Huang HK. Development and implementation of a PACS network and resource manager. *Proc SPIE* 1992; 1654: 530-535.

15. Bibliography (Refereed Journals, cont.):

33. Dwyer SJ, Templeton AW, Stewart BK, Honeyman JC. Dial-up switched 56,000 bits-per-second teleradiology system. *Proc SPIE* 1992; 1654: 97-102.
34. Taira RK, Wong AWK, Stewart BK, Huang HK. Design of a PACS cluster controller. *Proc SPIE* 1992; 1654: 203-207.
35. Huang HK, Wong WK, Lou SL, Stewart BK. Architecture of a comprehensive radiologic imaging network. *IEEE Journal on Selected Areas in Communications* 1992; 10: 1188-1196.
36. Stewart BK, Dwyer SJ. Prediction of teleradiology system throughput by discrete event-driven, block-oriented network simulation. *Investigative Radiology* 1993; 28: 162-168.
37. Huang HK, Taira RK, Lou SL, Wong AW, Breant C, Ho BK, Chuang KS, Stewart BK, Andriole K, Tecotzky R, Bazzill T, Eldredge SL, Tagawa J, Barbaric Z, Boechat MI, Hall T, Bentson J, Kangaroo H. Implementation of a large-scale picture archiving and communication system. *Computerized Medical Imaging and Graphics* 1993; 17: 1-11.
38. Stewart BK, Aberle DR, Boechat MI, Barbaric Z, Taira RK, Sayre JW, Dwyer SJ. Clinical utilization of grayscale workstations. *IEEE Engineering in Medicine and Biology* 1993; 11: 86-102.
39. Dwyer SJ, Vannier MW, Wilson CR, Stewart BK, Spraggins TA. Computer applications and digital imaging. 78th scientific assembly and annual meeting: Radiological Society of North America--meeting notes Part 2. Chicago, November 29-December 4, 1992. *Radiology* 1993; 186: 939-940.
40. Aberle DR, Gleeson F, Sayre JW, Brown K, Batra P, Young DA, Stewart BK, Ho BKT, Huang HK. The effect of irreversible image compression on diagnostic accuracy in thoracic imaging. *Investigative Radiology* 1993; 28: 398-403.
41. Stewart BK. Operational departmentwide picture archiving communication system analysis using discrete event-driven block-oriented network simulation. *Journal of Digital Imaging* 1993; 6: 126-139.
42. Gold RH, Kangaroo H, Grant EG, Yaghmai I, Stewart BK, Mankovich NJ, Sayre JW, Dwyer SJ. Teleconferencing for cost-effective sharing of radiology educational resources: Potential and technical development. *AJR* 1993; 160: 1309-1311.
43. Dwyer SJ, Stewart BK, Aberle DR, Boechat MI, Yao L, Marciano D. Electronic archiving for radiology image management systems. *Proceedings of the Twelfth IEEE Symposium on Mass Storage Systems*, April 26-29, 1993; Monterey, CA: 9-18.
44. Stewart BK, Mankovich NJ, Sayre JW, Dwyer SJ, Gold RH, Grant EG, Kangaroo H, Yaghmai I. Technical development of shared radiology educational resources via teleconferencing. *Proc SPIE* 1993; 1899: 284-295.

15. Bibliography (Refereed Journals, cont.):

45. Dwyer SJ, Stewart BK, Spraggins TA, Aberle DR, Boechat MI, Sayre JW, Yao L, Marciano DM, Johnson SL. Modeling of radiographic retrievals: a Markov chain analysis. Proc SPIE 1993; 1899: 117-123.
46. Sayre JW, Lee JS, Stewart BK, Liu M, Dwyer SJ, McNitt-Gray MF, Huang HK, Cox GG, Cook LT. Techniques for multiple-signal multiple-reader evaluations. Proc SPIE 1993; 1899: 638-651.
47. Stewart BK, Dwyer SJ. Electronic archiving system analysis using mean value analysis, Jackson queuing models and block oriented network simulation. Proc SPIE 1993; 1899: 511-517.
48. Duerinckx A, Stewart BK. Overview of PACS and their impact on network evolution. Proc SPIE 1993; 1977: 4-11.
49. Dwyer SJ, Stewart BK, Spraggins TA. Modeling of analog film-file radiographic retrievals: a Markov chain. Investigative Radiology 1993; 28: 1144-1147.
50. Stewart BK, Kimme-Smith C, Johnson SL, Johnson T, Aberle DR. Simultaneous acquisition of storage phosphor and asymmetric screen-film chest images using a hybrid cassette. Proc SPIE 1994; 2163: 81-88.
51. Collins CA, Lane D, Frank M, Hardy ME, Smith DV, Haynor DR, Stewart BK, Parker JES, Bender GN, Kim Y. Design of a receiver operating characteristic (ROC) study of 10:1 lossy image compression. Proc SPIE 1994; 2166: 149-158.
52. Gillespy T, Stewart, BK. Interactive display of computed radiographic images on personal computers. Proceedings of the Symposium for Computer Assisted Radiology (SCAR) 1994; 126.
53. Vannier MW, Combs MJ, Dwyer SJ, Stewart BK, Wilson CR. Computer applications and digital imaging. 79th scientific assembly and annual meeting: Radiological Society of North America--meeting notes Part 2. Radiology 1994; 190(3): 951-952.
54. Stewart BK, Gillespy T, Spraggins TA, Dwyer SJ. Functionality of Grayscale Display Workstation Hardware and Software in Clinical Radiology. Radiographics 1994; 14: 657-669.
55. Stewart BK. Adding Intelligence to PACS. Diagnostic Imaging 1994; 16(6): 81-84.
56. Stewart BK, Carter SJ, Rowberg AH. Application of the Advanced Communications Technology Satellite for Teleradiology and Telemedicine. Proc SPIE 1995; 2435: 210-219.
57. Dwyer SJ, Vannier MW, Cox GG, William MB, Huynh PT, Stewart BK, Boehme JM, Karellas A.. Computer applications and digital imaging. 80th scientific assembly and annual meeting: Radiological Society of North America--meeting notes Part 2. Radiology 1995; 194(2):616-618.

15. Bibliography (Refereed Journals, cont.):

58. Stewart BK. PACS: A Phased Implementation Strategy. *Administrative Radiology*, 1995; 14(11): 10-16.
59. Frank MS, Stewart BK, Rowberg AH. Use of Data in a Radiology Information System for Labeling Computed Radiographs: An Interface to Connect the Two Systems. *AJR* 1995; 164:745-747.
60. Stewart BK, Carter SJ, Rowberg AH, Cook J, Abbe B, Pinck D. Real-time Compressed Video Ultrasound Using the Advanced Communications Technology Satellite. *Proc. SPIE* 1996; 2711: 194-204.
61. Dwyer SJ, Stewart BK, Williams M. Computer applications and digital imaging. 81st scientific assembly and annual meeting: Radiological Society of North America--meeting notes Part 2. *Radiology* 1996; 198: 949-50.
62. Pratt RG, Zheng J, Stewart BK, et al. Application of a 3D volume 19F MR imaging protocol for mapping oxygen tension (pO₂) in perfluorocarbons at low field. *Magn Reson Med*, 1997; 37(2): 307-313.
63. Stewart BK. Balancing telemedical clinical requirements, cost-effectiveness and network options: The search for common ground. *Administrative Radiology*, 1998; 17(1):12-16.
64. Andrew RK, Stewart BK, Langer SG, Stegbauer KC. Wavelet Compression of Ultrasound Video Streams for Teleradiology. *IEEE International Conference on Information Technology Applications in Biomedicine* 1998, pp. 15-19.
65. Stewart BK, Carter SJ, Langer SG, Andrew RK. Compressed Ultrasound Video Image Quality Evaluation Using a Likert Scale and Kappa Statistical Analysis. *Proc. SPIE* 1998; 3335: 365-377.
66. Stewart BK, Langer SG, Taira RK. DICOM Image Integration into an Electronic Medical Record Using Thin Viewing Clients. *Proc. SPIE* 1998; 3339: 322-328.
67. Langer SG, Stewart BK. Implementation of an HL7/DICOM Broker for Automated Patient Demographic Data Entry in Computed Radiography Systems. *Proc. SPIE* 1998; 3339: 556-560.
68. Stewart, BK, Langer SG. Medical Image Databases and Informatics. *International Conference on Image Processing* 1998; 2: 29-33.
69. Stewart-B-K. Langer-S-G. Integration of DICOM images into an electronic medical record using thin viewing clients. *Proc AMIA Symp*, 1998; 902-6.
70. Langer SG, Stewart BK, Carter SJ. World Wide Web based Tool for Subjective Human Observer Ranking of Compressed Ultrasound Images. *RSNA-EJ* 1998; 3: <http://ej.rsna.org>.

15. Bibliography (Refereed Journals, cont.):

71. Langer SG, Stewart BK. World Wide Web based Quality Assurance, Problem Reporting and Information Management in Radiology Departments. RSNA-EJ 1998; 3: <http://ej.rsna.org>.
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60. Kanal KM, Kohlmyer S, Stewart BK, Shuman WP. Validation of the Accuracy of a Noise Addition Tool on a 64-channel MDCT Scanner. *Submitted to The Radiological Society of North America, Annual Meeting, Chicago, 2007.*

16. Other (Invited Lectures, in addition to 108 other lectures at various scientific meetings):

1. The Third International Symposium on PACS and PHD (Tokyo, Japan), "Keynote Lecture - System Description and Implementation of PACS at UCLA: Image Communication" (July 9, 1986). Invited by the President of the Japan Society of PACS - M. Onoe, M.D.

2. NATO Advanced Study Institute - Picture Archiving and Communication System (PACS) in Medicine (Evian, France), "Database Architecture and Design for PACS" (October 23, 1990). Invited by the NATO Advanced Study Institute on Picture Archiving and Communication Systems (PACS) in Medicine Program Committee - H.K. Huang, D.Sc.; Osman Ratib, M.D., Ph.D.; Albert Bakker, Ph.D.; Gerd Witte, Ph.D.

3. NATO Advanced Study Institute - Picture Archiving and Communication System (PACS) in Medicine (Evian, France), "Three Tiered Network Architecture for PACS Clusters" (October 24, 1990). Invited by the NATO Advanced Study Institute on Picture Archiving and Communication Systems (PACS) in Medicine Program Committee - H.K. Huang, D.Sc.; Osman Ratib, M.D., Ph.D.; Albert Bakker, Ph.D.; Gerd Witte, Ph.D.

4. American Association of Physicists in Medicine - Workshop on Computer Networks for the Medical Physicist (Los Angeles), "High-speed Communication Networks for Diagnostic Imaging" (1 February 1991). Invited by the Southern California Chapter of the American Association of Physicists in Medicine Education Committee - Bruce Liming, Chairman.

16. Other (Invited Lectures, in addition to 108 other lectures at various scientific meetings):

5. American Hospital Association MediTrends Education Series - Radiology Networks: Advantages in Diagnostic Imaging (Los Angeles), "Imaging Network Reliability: What Does It Mean?" (25 April 1991). Invited by the American Hospital Association.

6. Radiological Society of North America - Refresher Course 725 (Chicago, IL), "Mini Course PACS: Communications" (5 December 1991). Invited by the RSNA Refresher Course Committee - Donald R. Kirks, M.D., Chairman.

7. International Conference on Computers in Clinical Dentistry (Los Angeles, CA), "Networking for the Dental Office, an Examination of Interconnectivity Solutions Appropriate for the Clinical Environment" (17 September 1992). Invited by the International Conference on Computers in Clinical Dentistry Conference Committee.

8. International Conference on Computers in Clinical Dentistry (Los Angeles, CA), "IMACS, PACS, DICOM - Communication Standards - What are they and why does Dentistry Need Them?" (17 September 1992). Invited by the International Conference on Computers in Clinical Dentistry Conference Committee.

9. Radiological Society of North America - Special Course on Computers in Radiology (Chicago, IL), "PACS Communications: Network Topologies, Media and Routing" (2 December 1992). Invited by the RSNA Refresher Course Committee - Donald R. Kirks, M.D., Chairman.

10. Radiological Society of North America - *infoRAD* (Chicago, IL), "Electronic Archiving" (3 December 1992). Invited by the RSNA Electronic Communications Committee - Laurens V. Ackerman, M.D., Ph.D., Chairman.

11. 1993 AAPM Summer School on Digital Radiology (Charlottesville, VA), "Mini-PACS" (1 August 1993). Invited by the AAPM Summer School Program Directors - William R. Hendee, Ph.D. and Jon Trueblood, Ph.D.

12. Radiological Society of North America - Refresher Course (Chicago, IL), "Information Systems for Radiology Clinical Practice and Research: Adding Intelligence to PACS" (28 November 1993). Invited by the RSNA Refresher Course Committee - Donald R. Kirks, M.D., Chairman.

13. Radiological Society of North America - *infoRAD* (Chicago, IL), "Digital Communications in Radiology: The University of Washington Experience" (29 November and 1 December 1993). Invited by the RSNA Electronic Communications Committee - Laurens V. Ackerman, M.D., Ph.D., Chairman.

14. American Association of Physicists in Medicine, 36th Annual Meeting (Anaheim, CA), "PACS versus Teleradiology Requirements" (25 July 1994). Invited by the AAPM Educational Program Committee Chair - Perry Sprawls, Ph.D.

15. Radiological Society of North America - Refresher Course (Chicago, IL), "Information Systems for Radiology Clinical Practice and Research: Adding Intelligence to PACS" (December 1994). Invited by the RSNA Refresher Course Committee - Donald R. Kirks, M.D., Chairman.

16. Other (Invited Lectures, in addition to 108 other lectures at various scientific meetings):

16. Radiological Society of North America - *infoRAD* (Chicago, IL), “PACS and Teleradiology System Performance Modeling and Simulation” (1 and 2 December 1994). Invited by the RSNA Electronic Communications Committee - Laurens V. Ackerman, M.D., Ph.D., Chairman.

17. Joint Engineering in Medicine & Biology and Communications Society Conference (Bellevue, WA), “Electronic Imaging in Medicine - A Decade of Change and the Future” (23 February 1995). Invited by the IEEE Engineering in Medicine & Biology Society - Ming Li, Ph.D., Chairman.

18. State of Washington Governor’s Telecommunications Policy Coordination Task Force, “Telecommunications Infrastructure Deployment to Facilitate Health Care Services” (22 June 1995). Invited by the Governor’s Telecommunications Policy Coordination Task Force, Len McComb, Chairman.

19. Radiological Society of North America - Refresher Course (Chicago, IL), “Diagnostic Physics Categorical Course - Digital Image Processing: Exchange Media and Networks for Digital Fluoroscopy and Cineangiography Applications” (29 November 1995). Invited by the RSNA Refresher Course Committee - Donald R. Kirks, M.D., Chairman.

20. Radiological Society of North America - Refresher Course (Chicago, IL), “Clinical Practice and Research Information Systems for Radiology’s Next Century: Intelligent Display Systems” (30 November 1995). Invited by the RSNA Refresher Course Committee - Donald R. Kirks, M.D., Chairman.

21. Joint Engineering in Medicine & Biology and Communications Society Conference (Bellevue, WA), “Real-time Compressed Video Ultrasound Using the Advanced Communications Technology Satellite” (14 May 1996). Invited by the IEEE Engineering in Medicine & Biology Society - Tat-Jin Teo, Ph.D., Chairman.

22. Radiological Society of North America - Refresher Course (Chicago, IL), “Clinical Information Systems for Radiology: Informatics Infrastructure for Healthcare Providers” (4 December 1996). Invited by the RSNA Refresher Course Committee - Carol B. Stelling, M.D., Chairman.

23. Radiological Society of North America - *infoRAD* (Chicago, IL), “Is there a Place for Digitized Video in Radiological PACS?” (1 December 1996). Invited by the RSNA Electronic Communications Committee - C. Carl Jaffe, M.D., Chairman.

24. Telemedicine West Conference, “The Search for Common Ground: Balancing Telemedical Clinical Requirements, Cost-effectiveness and Platform and Network Options” (11 December 1996). Invited by the Telemedicine West Advisory Board - Jay Sanders, M.D., Chairman.

25. Washington State Board of Health Telemedicine Discussion, “Telemedicine: An Interim Report” (8 January 1997). Invited by the Washington State Board of Health - Warren Featherstone Reid, Chairman.

26. Tribal Healthcare Building Blocks: Telecommunications and Information Technology, “Clinical Requirements” (16 July 1997). Invited by the Conference Manager - Paulette Hansen.

16. Other (Invited Lectures, in addition to 108 other lectures at various scientific meetings):

27. Radiological Society of North America - *infoRAD* (Chicago, IL), “Is there a Place for Digitized Video in Radiological PACS?” (3 December 1997). Invited by the RSNA Electronic Communications Committee - C. Carl Jaffe, M.D., Chairman.

28. IEEE Signal Processing Society International Conference on Image Processing, Special Session on Medical Imaging (Chicago, IL), “Medical Imaging Databases and Informatics” (7 October 1998). Invited by Zhi-Pei Liang, Ph.D., Organizing Committee.

29. 1999 AAPM Summer School on Practical Digital Imaging and PACS (Sonoma State University, CA), “Network, Pipes and Connectivity” (29 June 1999) and “Teleradiology” (30 June 1999). Invited by the AAPM Summer School Program Director – J. Anthony Seibert, Ph.D.

30. Toward an Electronic Patient Record Conference 2002 (Seattle, WA), “Linking Laboratories and Radiology to EMRs” (12 May 2002). Invited by the Program Director of the American Academy of Family Physicians Spring Technology Conference – Tom E. Norris, MD.