

JAMES H. HARRISON, Jr., M.D., Ph.D.
CURRICULUM VITAE

BIOGRAPHICAL

Name:	James H. Harrison, Jr., M.D., Ph.D.	Birth Date:	January 18, 1954
Business Address:	Department of Public Health Sciences University of Virginia Medical Center West Complex Rm 3181 P.O. Box 800717 Charlottesville, VA 22908-0717	Birth Place:	New York, NY
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EDUCATION and TRAINING

UNDERGRADUATE

1972-1976	Furman University, Greenville, SC	B.S., 1976	Chemistry
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GRADUATE

1976-1983	Medical University of South Carolina, Charleston SC	M.D., 1983	Medicine
1976-1983	Medical University of South Carolina, Charleston SC Advisor: David Jollow, Ph.D.	Ph.D., 1983	Pharmacology

POSTGRADUATE

1983-1985	Yale-New Haven Hospital, New Haven, CT	Kenneth Barwick, M.D., Anatomic Pathology
1985-1987	Yale University, New Haven CT	John Lazo, Ph.D., Environmental Toxicology, Dept. of Pharmacology,
1987-1988	Yale-New Haven Hospital, New Haven CT	Peter Jatlow, M.D., Ph.D., Laboratory Medicine
1988-1989	Yale-New Haven Hospital, New Haven, CT	Peter Jatlow, M.D., Ph.D., Chief Resident & Instructor, Laboratory Medicine

APPOINTMENTS and POSITIONS

ACADEMIC

1989-1990	Tulane Medical Center, New Orleans LA	Assistant Professor of Pathology and Medical Director of Clinical Chemistry,
1990-1993	Tulane Medical Center, New Orleans LA Tulane Medical Center, New Orleans LA	Adjunct Assistant Professor of Pharmacology Assistant Professor of Pathology and Medical Director of Special Chemistry and Endocrinology
1993-1996	Tulane Medical Center, New Orleans LA Tulane Medical Center, New Orleans LA	Adjunct Assistant Professor of Pharmacology Assistant Professor of Pathology and Medical Director of Pathology Informatics
1995-1998	Tulane Medical Center, New Orleans LA	Adjunct Assistant Professor of Pharmacology
1996-1998	Tulane Medical Center, New Orleans LA	Director, Office of Medical Informatics Associate Professor of Clinical Pathology and Medical Director of Pathology Informatics
1997-1998	Tulane Medical Center, New Orleans LA Vanderbilt University Center for Biomedical Informatics	Adjunct Associate Professor of Pharmacology IAIMS Apprentice, (NLM-supported part-time fellowship; Ann Olsen, MBA.).
1998-1999	Department of Pathology, University of Pittsburgh Medical Center, Pittsburgh PA	Associate Director of Pathology Informatics
1999-2005	Department of Pathology, University of Pittsburgh Medical Center, Pittsburgh PA	Visiting Associate Professor of Pathology Associate Director of Pathology Informatics
1999-2005	Center for Biomedical Informatics, University of Pittsburgh Medical Center, Pittsburgh, PA	Associate Professor of Pathology Faculty Member in Residence

2001-2005	Intelligent Systems Program, University of Pittsburgh, Pittsburgh, PA	Associate Professor
2003-2005	University of Pittsburgh Cancer Institute	Cancer Institute Faculty member
2005-Now	Department of Public Health Sciences University of Virginia, Charlottesville, VA	Associate Professor and Director, Division of Clinical Informatics
2005-Now	Department of Pathology University of Virginia, Charlottesville, VA	Associate Professor and Associate Medical Director, Clinical Chemistry and Pathology Systems Engineering
2006-Now	Couric Cancer Center University of Virginia, Charlottesville VA	Director of Cancer Informatics

CERTIFICATION and LICENSURE

SPECIALTY CERTIFICATION

American Board of Pathology, Anatomic and Clinical 1989

MEDICAL or OTHER PROFESSIONAL LICENSURE

Medicine and Surgery	Connecticut	1984-1989
Medicine and Surgery	Louisiana	1989-1999
Medical Physician and Surgeon	Pennsylvania	1998-2006
Medicine and Surgery	Virginia	2005-2010

MEMBERSHIPS in PROFESSIONAL and SCIENTIFIC SOCIETIES

Fellow of the College of American Pathologists	1996 - Now
Academy of Clinical Laboratory Physicians and Scientists	1990 - Now
American Association for Clinical Chemistry	1990 - Now
American Medical Informatics Association	1994 - Now
Association for Pathology Informatics (Program Chair, '03-'04)	2001 - Now

HONORS

Phi Beta Kappa	1976
B.S. in Chemistry, Magna cum Laude	1976

PUBLICATIONS

REFEREED ARTICLES (Total 21)

1. Post, AR, and JH Harrison. Concept similarity in publications precedes cross-disciplinary collaboration. Proc AMIA Symp 2008:606-610.
2. Post, AR, AN Sovarel and JH Harrison. Abstraction-based temporal data retrieval for a clinical data repository. Proc AMIA Symp 2007:603-607.
3. Post, AR, and JH Harrison. PROTEMPA: A method for specifying and identifying temporal sequences in retrospective data for patient selection. J Am Med Inform Assoc 14:674-683, 2007.
4. Saadawi, G, and JH Harrison. Definition of an XML markup language for clinical laboratory procedures (CLP-ML) and comparison with generic XML markup. Clin Chem 52:1943-1951, 2006.
5. Post, AR, and JH Harrison. Data acquisition behaviors during inpatient results review: implications for problem-oriented data displays. Proc AMIA Annu Symp 2006:644-648.
6. Harrison, J.H., Jr. Pathology Informatics questions and answers from the University of Pittsburgh Pathology Residency Informatics Rotation. Arch Pathol Lab Med 128:71-83, 2004.

7. Mitchell KJ, Becich MJ, Berman JJ, Chapman WW, Gilbertson J, Gupta D, Harrison J, Legowski E, Crowley RS. Implementation and evaluation of a negation tagger in a pipeline-based system for information extract from pathology reports. *Medinfo* 11:663-667, 2004.
8. Harrison, J.H. Jr., and J. Stewart. Training in pathology informatics: implementation at the University of Pittsburgh. *Arch Pathol Lab Med* 127:1019-1025, 2003.
9. Henricks, W.H., P.J. Boyer, J.H. Harrison, J.M. Tuthill, and J.C. Healy. Informatics training in pathology residency programs: proposed learning objectives and skill sets for the new millennium. *Arch Pathol Lab Med* 127:1009-1018, 2003.
10. Corti, Miriam, Arnold Brody, and J.H. Harrison, Jr. Isolation and primary culture of murine alveolar type II cells. *Am J Respir Cell Mol Biol* 14:309, 1996.
11. Harrison, J.H., Jr., and Petrie Rainey. Identification of patients for pharmacologic review by computer analysis of clinical laboratory drug concentration data. *Am J Clin Pathol*, 103:710, 1995.
12. Harrison, J.H., Jr., C.P. Porretta, and Kimberly Leming. Purification of murine pulmonary type II cells for flow cytometric cell cycle analysis. *Exp Lung Res*, 21:407, 1995.
13. Harrison, J.H., D.G. Hoyt, and J.S. Lazo. Acute pulmonary toxicity of bleomycin: DNA scission and matrix protein mRNA levels in bleomycin-sensitive and -resistant strains of mice. *Mol Pharmacol* 36:231, 1989.
14. Haas, M., and J. H. Harrison, Jr. Stimulation of K-Cl cotransport in rat red cells by a hemolytic anemia-producing metabolite of dapsone. *Am J Physiol* 256:C265, 1989.
15. Harrison, J.H., and J.S. Lazo. Plasma and pulmonary pharmacokinetics of bleomycin in murine strains that sensitive and resistant to bleomycin-induced pulmonary fibrosis. *J Pharmacol Exper Ther* 247:1052, 1988.
16. Harrison, J.H., and J.S. Lazo. High dose continuous infusion of bleomycin in mice: a new model for drug-induced pulmonary fibrosis. *J Pharmacol Exper Ther* 243:1185, 1987.
17. Harrison, J.H., and D.J. Jollow. Contribution of aniline metabolites to aniline-induced methemoglobinemia. *Mol Pharmacol* 32:423, 1987.
18. Harrison, J.H., and D.J. Jollow. Role of aniline metabolites in aniline-induced hemolytic anemia. *J Pharmacol Exper Ther* 238:1045, 1986.
19. Harrison, J.H., and D.J. Jollow. A rapid and sensitive method for the microassay of nitrosobenzene and phenylhydroxylamine in blood. *J Chromatogr* 277:173, 1983.
20. Snyder, J.A., and J.H. Harrison. Frog lysozyme V. Isolation and some physical and immunochemical properties of lysozyme isozymes of the leopard frog, *Rana pipiens*. *J Exper Zool* 202:89, 1977.
21. Harrison, J.H., J.A. Snyder, and W.C. Harris. An inexpensive medium-scale preparative electrophoresis unit. *J Chem Ed* 54:487, 1977.

REVIEWS, BOOK CHAPTERS AND BOOKS (Total 11)

1. Harrison, J.H., Jr. Introduction to the mining of clinical data. *Clin Lab Med* 28(1):1-7, 2008.
2. Lyman, J.A., K. Scully and J.H. Harrison, Jr. The development of healthcare data warehouses to support data mining. *Clin Lab Med* 28(1):55-71, 2008.
3. Siadaty, M.S., and J.H. Harrison, Jr. Multi-database mining. *Clin Lab Med* 28(1):73-82, 2008.
4. Post, A.R., and J.H. Harrison, Jr. Temporal data mining. *Clin Lab Med* 28(1):83-100, 2008.
5. Harrison, J.H., Jr. and R.D. Aller. Regional and national healthcare data repositories. *Clin Lab Med* 28(1):101-117, 2008
6. Harrison, J.H., Jr., Guest Editor. *Clinical Data Mining and Warehousing*. *Clin Lab Med*, Vol. 28(1), March 2008.

7. Jackson, B., and J.H. Harrison, Jr. Clinical Laboratory Informatics. in: *Tietz Fundamentals of Clinical Chemistry, 6th Ed.* Burtis, C.A., Ashwood E.R., and Bruns, D.E., Eds. St. Louis: Elsevier Saunders, 2008.
8. Harrison, J.H., Jr. Information delivery methods. in: Lewis, D., Eysenbach, G., Kukafka, R., Stavri, Z., Jimison, H., Eds. *Consumer Health Informatics: Informing customers and improving health care.* New York:Springer Science+Business Media, Inc., 2005.
9. Schubert, E., Gross, W., Gilbertson, J., Harrison, J., and M. Becich. Anatomic Pathology Laboratory Information systems. In: *Modern Surgical Pathology*, Weidner, N., Cote, R.J., Suster, S., and Weiss, L.M., Eds. Philadelphia: Saunders, 2003.
10. Harrison, J.H., Jr. Outcomes Research. In: *Information Technology in Transfusion Medicine.* S.H. Butch and M. Simpson, Eds. AABB Press: Bethesda, MD, 2002.
11. Jollow, D.J., S.J. Grossman, and J.H. Harrison. Hydroxylamines and hemolytic anemia. In: *Biological Reactive Intermediates III. Mechanisms of Action in Animal Models and Human Disease.* J.J. Kocsis, D.J., Jollow, C.M. Witmer, J.O. Nelson, and R. Snyder, Eds. Plenum Press: New York, 1986.

PUBLISHED ABSTRACTS (Total 32)

1. Bassignani, M., Choudhri, A.F., Duong, P.T., Post, A., Harrison, J.H. Comparison between estimated glomerular filtration rate and serum creatinine as a screening tool prior to administration of iodinated contrast material for computed tomography. Proceedings of the 93rd Scientific Assembly and Annual Meeting of the Radiological Society of North America, p 627. 2007.
2. Sedarat, F., F.E. Craig and J.H. Harrison. A software tool to enhance flow cytometry quality assurance and interpretation. Presented at the ACLPS 2005 meeting, Pittsburgh PA, June 10, 2005.
3. Carter, A.B., J.H. Harrison and J.A. Kant. Database design for a molecular pathology laboratory. Presented at the ACLPS 2005 meeting, Pittsburgh PA, June 10, 2005. *Am J Clin Pathol* 124:457, 2005.
4. Lewis, D., S. Gunawardena, J.H. Harrison, Jr., J. Cooper, and Gilan El Saadawi. Caring Connection: developing an Internet resource for family caregivers of children with cancer. *AMIA Annu Symp Proc* 2005:1026. Presented at the American Medical Informatics Association fall symposium, Nov. 2005.
5. Post, A.R. and J.H. Harrison. A Two-Stage Temporal Abstraction Method for Pattern Detection in Clinical Laboratory Data. Presented at the APIII Conference, Pittsburgh PA, Oct, 2004. (Winner, Outstanding Brief Report)
6. Sedarat, F., F.E. Craig and J.H. Harrison. A software tool to enhance flow cytometry quality assurance and interpretation. Presented at the APIII Conference, Pittsburgh PA, Oct, 2004.
7. Post, A.R. and J.H. Harrison. Web-based implementation of a modular, general purpose temporal abstraction framework for pattern identification in clinical laboratory data. Presented at the APIII Conference, Pittsburgh PA, Oct, 2003. *Arch Pathol Lab Med* 128:1102, 2004.
8. Saadawi, G. and J.H. Harrison. A lightweight XML editor for clinical laboratory procedure manuals. Presented at the APIII Conference, Pittsburgh PA, Oct, 2003. *Arch Pathol Lab Med* 129:1104, 2004.
9. Saadawi, G., and J.H. Harrison. An XML Syntax for Clinical Laboratory Procedure Manuals. Presented at the American Medical Informatics Association fall symposium, Nov. 2003. *Journal of the American Medical Informatics Association, Symposium Supp.* 2003:993.
10. Post, A.R., and J.H. Harrison. An Enhanced Framework for Pattern Detection in Clinical Laboratory Data. Presented at the American Medical Informatics Association fall symposium, Nov. 2002. *Journal of the American Medical Informatics Association, Symposium Supp.* 2002:1134.
11. Post, A.R., and J.H. Harrison. An Enhanced Framework for Pattern Detection in Clinical Laboratory Data. Presented at the APIII conference, Pittsburgh PA, Oct 2, 2002. (Winner, Outstanding Brief Report). *Arch Pathol Lab Med* 127:808, 2003.

12. Post, A.R. and J.H. Harrison, Jr. Pattern detection in clinical laboratory data for patient identification and quality assurance. Presented at the American Medical Informatics Association fall symposium, Nov. 6, 2001. *Journal of the American Medical Informatics Association*, Symposium Supp. 2001:1000.
13. Davie, J., J.H. Harrison and J.A. Kant. Molecular diagnostics LIMS functions in an anatomic pathology LIMS environment: experience and challenges (a case study). Presented at the American Medical Informatics Association fall symposium, Nov. 6, 2001. *Journal of the American Medical Informatics Association*, Symposium Supp. 2001:817.
14. Davie, J., Kant, J.A., and J.H. Harrison. Molecular diagnostics LIMS functions in an anatomic pathology LIMS environment: experience and challenges (a case study). Presented at the APIII conference, Pittsburgh PA, Oct. 4-6, 2001. *Arch Pathol Lab Med* 126:790, 2002.
15. J. Stewart and J.H. Harrison. Pathology informatics training: meeting the challenges of the new millennium. Presented at the APIII conference, Pittsburgh PA, Oct. 4-6, 2001. *Arch Pathol Lab Med* 126:798, 2002.
16. Bowdish, B., J. H. Harrison and S. Chauvin. How does instructional technology influence student achievement and their learning environment? Presented to the Association of American Medical Colleges, Washington DC, Nov. 1-4, 1997.
17. Hessler, W., J. Harrison, L. Guillette, and J. McLachlan. Environmental Concepts Made Easy: Public information and Scientific Discussion on the Internet. Presented to the 17th Annual Meeting of Environmental Toxicology and Chemistry (SETAC), Nov. 17-21, 1996.
18. Harrison, J.H., Jr. Medical teaching via the World Wide Web: Adaptation and extension of the Virgil pathology lessons. Presentation to the Southern Group on Educational Affairs of the Association of American Medical Colleges, April 29-May 1, 1995, Nashville, TN.
19. Corti, M., A.R. Brody and J.H. Harrison, Jr. Proliferation in cultures of highly purified mouse alveolar type II cells. *Am. J. Resp. Crit. Care Med.* 151:A171, 1995.
20. Corti, M., and J.H. Harrison. Whole thorax gamma irradiation 24 hours prior to acute lung injury in mice results in dose-dependent decreases in the recovery of proliferating type II pneumocytes. Presented to the American Thoracic Society, May 1994, Boston, MA.
21. Harrison, J.H., Jr. Identification and follow-up of clinical pharmacokinetics problems using a microcomputer-based expert system to scan laboratory drug level data. *Proc. Symp. Comp. Appl. Med. Care* 17:879, 1993.
22. Harrison, J.H., Jr., K. Leming, and C.P. Porretta. Bleomycin blocks butylated hydroxytoluene-induced lung repair proliferation in murine type II pneumocytes. *Am. Rev. Respir. Dis.* 145:A139, 1992.
23. Harrison, J.H., Jr., Valerie Yantsos, and Petrie Rainey. Identification of patients for clinical pharmacology follow-up by computer scanning of drug level data. Presented to the American Society for Clinical Pharmacology and Therapeutics, Orlando, FL, March 1992.
24. Harrison, J.H., K. Leming, and C.P. Porretta. Differential early proliferative response of type II pneumocytes after fibrogenic vs. non-fibrogenic lung injury in mice. Presented to the Federation of Associated Societies for Experimental Biology, Atlanta, GA, April 1991.
25. Harrison, J.H., K. Leming, and C.P. Porretta. Preparation of an enriched population of murine type II pneumocytes by fluorescence-activated cell sorting. *Am. Rev. Respir. Dis.* 143:A304, 1991.
26. Haas, Mark, and J.H. Harrison. Stimulation of red cell (K + Cl) cotransport by a hemolytic anemia producing metabolite of dapsone. Presented to the Federation of American Societies for Experimental Biology, April, 1988.
27. Harrison, J.H., and J.S. Lazo. Rapid induction of lung DNA damage in vivo by bleomycin. Presented to the American Society for Pharmacology and Experimental Therapeutics, August, 1987.
28. Harrison, J.H., and J.S. Lazo. High dose continuous infusion of bleomycin in mice: a new model for drug-induced pulmonary fibrosis. Presented to the Federation of American Societies for Experimental Biology, April, 1987.

29. Harrison, J.H., and A.E. Filderman, and J.S. Lazo. Early phase pharmacokinetics and pulmonary disposition of parenteral bleomycin A2 (BLM A2) in BLM sensitive and resistant strains of mice. Fed. Proc. 45:574, 1986. Presented to the Federation of American Societies for Experimental Biology, April, 1986.
30. Harrison, J.H., and D.J. Jollow. Hemolytic anemia in the rat after aniline metabolites. Fed. Proc. 40:723, 1981. Presented to the Federation of American Societies for Experimental Biology, April, 1981.
31. Harrison, J.H., and D.J. Jollow. Aniline-induced methemoglobinemia in the rat: relative contributions of several aniline metabolites. The Pharmacologist 22:246, 1980. Presented to the American Society for Pharmacology and Experimental Therapeutics, August, 1980.
32. Jollow, D., J. Harrison, and G. Hurwitz. Possible potentiation of acetaminophen hepatotoxicity in man by salicylamide. Veterinary and Human Toxicology 22(suppl. 2):71, 1980. Presented to the American Academy of Clinical Toxicology, August, 1980.

OTHER PUBLICATIONS AND WHITE PAPERS (Total 8)

1. Harrison, J.H., Jr., C. Reniere and L. Burrus. Evaluation of caBIG™ online documentation for software selection. CaBIG Documentation and Training Workspace White Paper, February 2008.
2. Harrison, J. Web site comparison: The Apache Foundation and the Cancer Biomedical Informatics Grid. CaBIG Documentation and Training Workspace White Paper, December 2006.
3. Derr, L, J Hadfield, J Harrison, J Keller, V Monaco, P Purohit, T Scheetz and J Tucker. The Cancer Biomedical Informatics Grid (caBIG) Primer. CaBIG White Paper, 2006.
4. Harrison, J, K Smith and L Grouse. Initial software user documentation needs in the Cancer Bioinformatics Grid (caBIG). CaBIG White Paper, 2005.
5. Harrison, J.H., Jr. Pathology and the electronic medical record: challenges and opportunities for the future. Advance for Administrators of the Laboratory. 8(9):30-37, 1999.
6. Miller, R.A., E.K. Shultz and J.H. Harrison, Jr. Is there a role for expert systems in diagnostic anatomic pathology? (Editorial) Human Pathology 28:999-1001, 1997.
7. Harrison, J.H., Jr. Medical practice meets the World Wide Web. Minnesota Physician, July 1995.
8. Harrison, J.H. Weaving the information Web: An ongoing experiment in distributed hypermedia on the Internet. Newsletter of the Education Working Group of the American Medical Informatics Association, June 1994.

COMPUTER PROGRAMS

1. CiteInPages, a suite of scripts and templates for automatically creating formatted in-text citations and bibliography lists in Apple's Pages (v. 3) word processor using the open source reference manager BibDesk. Available from <http://jhh.med.virginia.edu/main/CiteInPages> under a BSD open source license.
2. LabScanner, a clinical data mining expert system programmed in REALbasic for Mac and Windows. LabScanner was featured in the March 2000 issue of **CAP Today**, a national publication of the College of American Pathologists. That article is available in electronic form at <http://www.cap.org/html/publications/archive/feat3300.html>. LabScanner executables and documentation are available for download at <http://jhh.med.virginia.edu/labscanner/>.
3. Flow Cytometry Verifier, a program developed in REALbasic to extract and process data from statistical files produced by BD CellQuest data analysis software. The program creates, stores and processes rules that specify numerous intra-run comparisons between epitope results used in laboratory quality assurance and case sign-out. It prints a form displaying the results of the rules that is used for quality assurance and sign-out. The program is currently in use in the UPMC/Presbyterian Flow Cytometry Laboratory.

4. TAT-omatic, a program developed in Python that is used to read lengthy clinical laboratory turnaround time reports, analyze the results and display a summary in a semi-graphical format. Currently used at UPMC/Shadyside Hospital for reporting lab turnaround times.

PROFESSIONAL ACTIVITIES

SEMINARS AND INVITED LECTURESHIPS

1. Harrison, J.H., Jr. Mining the Implicit: Pattern Matching in Clinical Data. Keynote presentation, Universitas 21 Annual Health Sciences Meeting. Charlottesville, VA, Sept. 18, 2008.
2. Harrison, J.H., Jr., and Paul Catrou. Dueling Hackers: Programming for Pathology Informatics. Breakout session, Advancing Practice, Instruction and Innovation Through Informatics (APIII) national meeting. Pittsburgh, PA, Sept. 10, 2007.
3. Harrison, J.H., Jr. The Future of Clinical Laboratory Medicine: The Impact of Informatics on the Clinician-Laboratorian Relationship. Invited for presentation at the Clinical Laboratory Improvement Advisory Committee (CLIA) meeting, Sept. 21, 2006, CDC, Atlanta, GA.
4. Harrison, J.H., Jr. A Framework for Integrating Time into Clinical Laboratory Quality Assurance and Clinical Process Control. Presented at the Academy of Clinical Laboratory Physicians and Scientists (ACLPS) 2005 meeting, June 11, 2005, Pittsburgh PA. Part of a session titled "Expert Systems in Clinical Laboratory Data Analysis and Quality Assurance," which was organized and moderated by Dr. Harrison.
5. Harrison, J.H., Jr. A Framework for Integrating Time into Clinical Laboratory Quality Assurance and Clinical Process Control Studies. Presented at LabAutomation05, San Jose, CA, Feb 2005. Also organized and chaired the Advances in Clinical Laboratory Informatics Session (a total of four presentations) in the Informatics Track of the meeting.
6. Harrison, J.H., Jr., and M.J. Becich, Course Directors and Meeting Coordinators. Advancing Practice, Instruction and Innovation Through Informatics (APIII) national meeting. Pittsburgh, PA, Oct. 6-8, 2004.
7. Harrison, J.H., Jr. Organizer, Pathology Informatics Track. Advancing Practice, Instruction and Innovation Through Informatics (APIII) national meeting. Pittsburgh, PA, Oct. 6-8, 2004.
8. Harrison, J.H., Jr., and Paul Catrou. Dueling Hackers. Breakout session, Advancing Practice, Instruction and Innovation Through Informatics (APIII) national meeting. Pittsburgh, PA, Oct. 6-8, 2004.
9. Harrison, J.H. Temporal Sequence Analysis of Clinical Laboratory Results for Patient Follow-up and Effective Data Display. Presented to the Dept. of Electrical Engineering, University of Pittsburgh. Feb. 25, 2004.
10. Harrison, J.H. Temporal Sequence Analysis of Clinical Laboratory Results for Patient Follow-up and Effective Data Display. Presented to the Dept. of Health Evaluation Sciences, University of Virginia Medical Center. Dec. 17, 2003.
11. Harrison, J.H. (Workshop Director) Pathology Informatics Boot Camp. Two presentations: 1) Introduction to Software and Operating Systems, and 2) Data Representation: File Formats and Standard Encoding. In conjunction with the Advancing Pathology Imaging, Informatics and the Internet (APIII), Oct. 2003.
12. Berman, J. and J.H. Harrison. PERL and PYTHON Programming Workshop. Breakout session presented at the Advancing Pathology Imaging, Informatics and the Internet (APIII), Oct. 2003.
13. Harrison, J.H. (Workshop Director) Pathology Informatics Boot Camp. Two presentations: 1) Introduction to Software and Operating Systems, and 2) Data Representation: File Formats and Standard Encoding. In conjunction with the Advancing Pathology Imaging, Informatics and the Internet (APIII), Oct. 2002.
14. Harrison, J.H. and J. Berman. Programming for Pathology Informatics: Why Should I Learn to Program? Breakout session presented at the Advancing Pathology Imaging, Informatics and the Internet (APIII), Oct. 2002.

15. Harrison, J.H. Intranets and Portals: Collaboration and Content Management. Presented as part of workshop C910, Are You Well-Connected? The E-Laboratory of Today and Tomorrow, at the ASCP/CAP Fall Meeting, Sept 2002.
16. Harrison, J.H. Moving to the Web: A Glimpse of the Future. Internet Communications for Cancer Registries. Presented at the NAACCR Annual Meeting, Toronto, Canada, June 9, 2002.
17. Harrison, J.H. Web-Based Clinical Information Systems. Presented at the NAACCR Annual Meeting, Toronto, Canada, June 9, 2002.
18. Harrison, J.H. The Future of Laboratory Information Systems. Presented at the International Society for Laboratory Hematology, Banff, Canada, April 10, 2002.
19. Harrison, J.H. (Workshop Director) Pathology Informatics Boot Camp. Two presentations: 1) Introduction to Software and Operating Systems, and 2) Data Representation: File Formats and Standard Encoding. In conjunction with the Advancing Pathology Imaging, Informatics and the Internet (APIII), Oct. 4, 2001.
20. Harrison, J.H. Laboratory Data Mining and Presentation to Support Clinical Decision-Making. Presented at the American Association for Clinical Chemistry (AACC) Annual Meeting, Chicago, IL, July 31, 2001.
21. Harrison, J.H. 21st Century Alchemy: Transforming Lab Data into Information Using Data Mining Software. Presented at the Automated Information Management in the Clinical Laboratory (AIMCL) Conference, Ann Arbor, MI, June 1, 2001.
22. Harrison, J.H. 21st Century Alchemy: Tools and Techniques for Transforming Data into Information. Presented at the Advancing Pathology Imaging, Informatics and the Internet (APIII) conference, Oct. 26, 2000.
23. Harrison, J.H. (Workshop Director) Pathology Informatics Boot Camp. Two presentations: 1) Introduction to Software and Operating Systems, and 2) Data Representation: File Formats and Standard Encoding. In conjunction with the Advancing Pathology Imaging, Informatics and the Internet (APIII), Oct. 25, 2000.
24. Harrison, J.H. (Workshop Director) Data Mining and Data Warehousing. Half-day workshop, CAP/ASCP Fall Meeting, Oct. 17, 2000. First Presentation—Introduction to Data Mining and Data Warehousing: Simple Pattern Recognition.
25. Harrison, J.H. The Data-opsy: Mining New Knowledge from Clinical Databases. Presented as part of the Computer Utilization Roundtables, College of American Pathologists Spring Meeting, Boston, MA, April 2000.
26. Harrison, J.H. Pathologists as Information Managers. Presented at the Advancing Pathology Informatics, Imaging and the Internet (APIII) Conference, Pittsburgh, PA, October 15, 1999.
27. Harrison, J.H. Tools for Outcomes Analysis in Pathology. Presented at the Advancing Pathology Informatics, Imaging and the Internet (APIII) Conference, Pittsburgh, PA, October 14, 1999.
28. Harrison, J.H. The Data-opsy: Mining New Knowledge from Clinical Databases. Presented as part of the Computer Utilization Roundtables, College of American Pathologists Fall Meeting, New Orleans, LA, September 1999.
29. Harrison, J.H. Telelearning: Distance Learning Opportunities for Physicians. Texas Medical Association, TEXMED 1999, May 8, 1999.
30. Harrison, J.H. The Internet: Structure, Access, Navigation. Informatics in Pathology Practice Symposium, Virginia Pathology Society, May 1, 1999.
31. Harrison, J.H. The "Data Biopsy" and Enhanced Clinical Consulting. Informatics in Pathology Practice Symposium, Virginia Pathology Society, May 1, 1999.
32. Harrison, J.H. From Biopsy to Data-opsy: Real-time Clinical Data Mining. Presented as a Sunrise Seminar, College of American Pathologists Spring Meeting, Orlando, FL, April 13, 1999.

33. Harrison, J.H. The Data-opsy: Mining New Knowledge from Clinical Databases. Presented as part of the Computer Utilization Roundtables, College of American Pathologists Spring Meeting, Orlando, FL, April 12, 1999.
34. Harrison, J.H. New Internet Resources for Physicians. Presented to the clinical staff of Lakeside Hospital, New Orleans, April 25, 1996.
35. Harrison, J.H. Pearls from the Net: Internet and Intranet Resources in Pathology Education. Presented as part of "The Internet, the Intranet, and the Practice of Pathology," a conference simulcast from the University of Michigan and Tulane University to Pathology training programs in the U.S. and Canada on March 12, 1996.
36. Harrison, J.H. Clinical Laboratory Information Distribution Using the Internet and Structured Text: The World Wide Web and Related Systems. Invited presentation for the Annual Laboratory Information Systems Symposium, University of Michigan, June 8, 1995.
37. Harrison, J.H. Invited panelist, Communications Technology in the Curriculum. Southern Group on Educational Affairs of the Association of American Medical Colleges, April 29-May 1, 1995, Nashville, TN.
38. Harrison, J.H. Identification of Patients for Clinical Pharmacology Follow-Up by Automated Analysis of Clinical Laboratory Drug Level Data. Presented to the New Orleans Society for Medical Technology, January, 1995.
39. Harrison, J.H. Identification of Patients for Clinical Pharmacology Follow-Up by Automated Analysis of Clinical Laboratory Drug Level Data. Presented to the Department of Pathology, Dartmouth University, July 1994.
40. Harrison, J.H. A Simple Microcomputer-Based Expert System for Identification and Follow-Up of Clinical Pharmacokinetics Problems. Presented as part of the Workshop on Computer Applications in Drug Therapy, 3rd International Congress on Therapeutic Drug Monitoring, Philadelphia, PA, May, 1993.

PEER REVIEW

Reviewer, American Journal of Clinical Pathology (Informatics)
Reviewer, Archives of Pathology and Laboratory Medicine
Reviewer, Clinical Chemistry

NIH STUDY SECTIONS

National Library of Medicine Special Emphasis Panel for K22, F37 and G08 awards, 3/22/06
National Library of Medicine K22 Special Emphasis Panel, 7/20/06

TEACHING

University of Virginia (beginning 2005)

Co-Director of the UVa NLM Training Program in Medical Informatics and Systems Engineering, a collaborative PhD training program between the Schools of Medicine and Engineering, funded from 2007 – 2012 by a National Library of Medicine T-15 training grant.

Course Director: **Introduction to Health Care Informatics** (PHS 707, 3 credits). An introduction to medical informatics taught as part of the Master's Program in Clinical Research and the PhD Training Program in Biomedical Informatics at the University of Virginia. (12-18 contact hours with additional guest presenters). Fall 2006–2008.

Guest Lecture in **Database Design and Implementation** (PHS 745), "XML and Databases" (1.5 contact hours). Dec. 3, 2007.

Guest Lecture in **Statistical Bioinformatics in Medicine** (PHS 795), "Introduction to Healthcare Informatics" (1.5 contact hours). Sept. 20, 2007.

Course Director: **Applied Informatics in Medicine and Health** (PHS 743, 3 credits). A project-oriented course in practical medical informatics, tailored for each student (4-10 contact hours per student). Spring 2007.

Clinical Chemistry Didactic Sessions:

- Laboratory Evaluation of Renal Function** (1 contact hour per session, spring and fall of 2006, Jan & Nov of 2008)
- Calcium and Bone Metabolism** (1 contact hour, fall 2006, 2007, 2008)
- Data: Representation, Standards and Modeling** (1 contact hour, May 2008)
- Data: Meaning, Modeling and Management** (1 contact hour, May 2008)
- Enterprise Information Systems** (1 contact hour, May 2008)
- Networking, Communications and Security** (1 contact hour, May 2008)
- System Construction: Software Selection and Development** (1 contact hour, May 2008)

Guest Lecture in **Health Care Informatics** (HES 707), "Error in Patient Care and Clinical Practice" (1.5 contact hours). Fall 2005.

University of Pittsburgh (1998-2005)

Course Director: **Problem-Oriented Programming in Medical Informatics** (ISSP 2062 / BIOINF 2012; 3 credits). A course in introductory computer programming taught in the fall semester, 2001-2004. (Approximately 45 contact hours)

Co-director: **The Internet and Health Informatics** (BIOINF 2109, 3 credits). A course covering Internet communications, communication system design and information resources as applied to healthcare. Taught in the spring semester, 2003 and 2004. (16.5 contact hours)

Course Director: **Structured Text and XML in Medicine** (BIOINF 2991, Directed Study: 1 or 3 credits). A course in markup languages (HTML, XML) and standard coding schemes as applied to medicine, taught in the spring semester, 2002-2005. (13 contact hours)

Course director: **Pathology Informatics Rotation**. Required introductory informatics lecture/lab course for second-year pathology residents, presented each July, 1999-2002, 2004. Overview of Pathology and medical informatics. 20-30 contact hours.

Course director: **Junior Lab Director** clinical pathology residency rotation at Presbyterian-Shadyside Hospital. A one-month required upper level clinical pathology residency rotation focusing on laboratory management and clinical correlation. Offered continuously 2002-2005. 12 Contact hours.

Course Director: **Pathology Informatics Boot Camp**, a 6 hour intensive introduction to pathology informatics presented in conjunction with the Advancing Pathology Informatics, Imaging and the Internet (APIII) national conference, October 2000-2003 (2 contact hours).

Developer and program coordinator for the **Area of Concentration in Medical Informatics** for medical students, approved by the School of Medicine Curriculum Committee subcommittee June 2000 for initiation in the 2000-2001 academic year. <http://www.omed.pitt.edu/informatics/BMI_AoC.html>

Course director: Directed Study (ISSP 2902, CRN 16524; 1 Credit) **XML Applications in Medical Informatics**, 14 contact hours, offered spring semester 2000.

Co-director: (ISSP 2040 / INFSCI 2902 / HSADM 2224, 3 Credits) **Introduction to Clinical Multimedia and the Internet**, 30 contact hours, spring 2000 and spring 2001.

Clinical Chemistry Didactic Sessions: **Acid-base, Electrolytes and Blood Gases**, January 2001-2003.

Member of the Medical Informatics Task Force, a subcommittee of the School of Medicine Curriculum Committee charged with reviewing the medical curriculum and identifying opportunities for improving the teaching of medical informatics (summer and fall, 2000).

Clinical Chemistry Rounds. Hands-on training for the resident currently rotating in Clinical Chemistry. Two hours per week, 1999-2002.

Medical Informatics teaching program for medical residents at Shadyside Hospital (shared with Charles Friedman, Ph.D.). Six contact hours between November, 1999, and May, 2000.

Center of Biomedical Informatics Core Faculty member.

Faculty advisor for the CBMI XML Special Interest Group 2001-2002 (evolved into the Structured Text and XML course noted above).

LOCAL CONFERENCES

(Virginia, beginning 2005)

Mining Interval-based Patterns from Clinical Time-series Data. Public Health Sciences research conference, University of Virginia, March 21, 2007.

Specifying and Identifying Temporal Sequences in Retrospective Data for Patient Selection. Pathology research conference, University of Virginia, February 20, 2007.

Detection of Patterns in Clinical Data to Support Physician Decision-making and Medical Research. Presented to the Charlottesville Java Users Group, January 17, 2006.

Detection of Context in Clinical Data to Support Physician Decision-making and Medical Research. Clinical Library Research Presentation, University of Virginia, August 11, 2006.

Clinical Decision-making Using a Data-driven Display. Poster presentation at the University of Virginia School of Medicine faculty research retreat, March 3-5, 2006, Greenbrier Resort, WV.

(Pittsburgh 1998-2005)

Temporal Sequence Analysis of Clinical Laboratory Results for Patient Follow-up, Laboratory Utilization and QA. Clinical Chemistry conference, March 17, 2004.

Improving Patient Care and Clinical Practice: Pathology Data Presentation and Analysis. Diagnostic Pathology Conference, March 1, 2001.

Clinical Laboratory Data Patterns: Recognition, Analysis and Communication. Current Topics in Laboratory Medicine Conference, January 23, 2001.

Pattern Recognition and Temporal Abstraction in Clinical Laboratory Data. Pathology Informatics Colloquium. November 15, 2000.

Clinical Data Patterns: Communication for Correct Clinical Decision-making. Clinical Chemistry CME Series, March 23, 2000.

The Data-opsy. Center for Biomedical Informatics Colloquium, December 9, 1999.

The Computer as Microscope: Data Mining and Pattern Recognition in 21st Century Clinical Pathology Practice. UPMC Department of Pathology Diagnostic Pathology Conference, March 11, 1999.

Neural Networks in Clinical Chemistry Test Interpretation. UPMC Clinical Chemistry Conference, January 28, 1999.

RESEARCH

CURRENTLY FUNDED

T15 LM009462 National Library of Medicine Training Grant in Biomedical Informatics, A systems engineering focus on medical informatics. S. Guerlain, PI. Co-investigator and Co-director, 5% effort. 7/1/2007 – 6/30/2012, total direct costs approximately \$4,500,000.

This newly-funded training program is one of 18 NLM biomedical informatics training grants nationally with funding from 2007-2012. It is designed as a collaboration between the School of Engineering, led by S. Guerlain, PhD, and the School of Medicine, led by J. Harrison, MD, PhD, and will confer MS and PhD degrees in the School of Engineering. The application has been approved with the Notice of Grant Award

to be filed in spring 2007 and funding to start in summer 2007.
(<http://www.nlm.nih.gov/ep/GrantTrainInstitute.html>)

2U01 CA091654-06 Tissue Procurement and Processing for Molecular Analysis. C. Moskaluk, PI. Co-investigator with a focus on biorepository informatics, 5% effort. 4/1/08-3/31/13, total direct costs \$354,379.

The goals of this project are to provide samples of human tissue to the Cooperative Human Tissue Network and to provide a tissue microarray production facility to support extramural research efforts of the NCI.

1R21LM009102-01A1 Evidence Based Anomaly Detection in Clinical Databases. M. Hauskrecht, PI. Co-investigator, 2.5% effort. 4/1/07 – 3/31/09.

This project uses a data mining approach to characterize events in a large clinical database that are associated with patients of particular types, and alert to events that are unusual for patients based on their type. Dr. Harrison's focus is on clinical events that are characterized by time sequences rather than individual data elements.

1R01CA126101-01 PICquant-An integrated platform for biomarker discovery. D. Templeton, PI. Co-investigator, 4% effort, 9/1/06 – 8/31/10.

The goals of this project are to develop automated biomarker quantification algorithms based on LC/MS/MS of derivatized tissue peptides, and to validate the approach using a set of urine specimens from cancer patients.

NCI Cancer Biomedical Informatics Grid (Booz-Allen-Hamilton contract), University of Virginia Cancer Center. PI, 5% effort. 3/27/06 – 3/6/09. Total costs \$122,857.

The Cancer Biomedical Informatics Grid (caBIG™, <http://cabig.nci.nih.gov/>) is a multi-institutional effort supported by the NCI to develop a set of software standards and applications that share information and computing resources between NCI-supported Cancer Centers. CaBIG includes seven "workspaces" focusing on key areas of need in the development of software and standards. Dr. Harrison is a member of the Training Strategic Workspace. Within Training, Dr. Harrison focuses on methods and procedures for the development, management and distribution of software documentation.

3P30CA044579-17S1 NCI Cancer Biomedical Informatics Grid, University of Virginia Cancer Center. Contract provided as CCSG supplemental funding 2007-2010. Application coordinator/author, total direct costs \$93,263 per year, renewable for a total of three years.

This supplemental funding to the UVa Cancer Center CCSG provides 50% support for an FTE to evaluate caBIG™ and caBIG-compatible software for installation at UVa, develop a plan for software installation and manage the installation process, under Dr. Harrison's supervision.

COMPLETED

1 R01LM008192 Clinical Decision-making Using a Data Driven Display, PI, 12.5% effort. 9/30/2003 – 3/31/2007, total direct costs \$300,000.

NCI RFA CA-01-006 Shared Pathology Informatics Network. Co-investigator, 12.5% effort. Michael Becich, M.D., Ph.D., PI. April 1, 2001 – June 30, 2005 (not transferred to UVa).

R21NR009053 Internet Resource for Caregivers of Children with Cancer. Co-Investigator, 5% effort. Deborah Lewis, EdD, RN, PI. 7/1/04 – 6/30/05, total direct costs \$300,000. (not transferred to UVa).

NHLBI BAA-HB-03-06 The Somatic Cell Processing Facility at the University of Pittsburgh. Co-investigator, 10% effort, 2003-2005 (laboratory information system design and implementation). Theresa Whiteside, Ph.D., PI. 10/1/03 – 9/30/05 (not transferred to UVa).

Department of Commerce #42-60-99029, The Special Vision Project: Telemedicine Connections for Special Needs Children. Co-Investigator, 5% effort. Bruce Rosenthal, PI, 1/1/00 - 12/31/02

NIH 05-101795 Expanded Deployment, Enhancement and Evaluation of Image Engine Multimedia Patient Record System. Co-investigator, 5% effort. Henry Lowe, M.D., PI, 10/1/99-9/30/01.

1 G08 LM06625 IAIMS Implementation: Advancing the Academic Mission, Co-investigator, 5% effort. Charles Friedman, PI, 5/01/98 - 4/28/03 (Pittsburgh).

“Enhancement of Computer Technology to Support Applications in Teaching and Learning and Medical Informatics;” Co-PI (equipment funds only), 8/1/98 - 7/31/99; Louisiana Board of Regents Educational Support Fund.

DNA Grant 2, Order 89, 116, 88-150; “Importance of radiation injury and radioprotection in combined-modality lung injuries;” PI, 25% effort; 9/1/91-3/31/95; Center for Bioenvironmental Research/Department of Defense.

NIEHS 5 P42 ES05946-02; “Petrochemical Wastes: Risks and Remediation;” Project leader, Project 5, “Cell biology of combined mutagenic and cytotoxic lung injury,” 15% effort; 4/1/92-3/31/95; NIEHS Superfund Basic Research Program

2RO1CA38192-04A2; “Suicide inhibitors of cytochrome P450 as anticarcinogens;” Co-investigator, 2% effort; 2/1/93-1/31/96; NIH

STUDENTS MENTORED (Univ. of Pittsburgh Biomedical Informatics Training Program)

Andrew Post, MD	PhD	2006	“Decision-Oriented Display of Clinical Laboratory Data”
Gilan Saadawi, MD, PhD	MS	2004	“XML Syntax for Clinical Laboratory Procedures”
Jimmie Stewart, MD	Cert.	2002	“Training in pathology informatics: implementation at the University of Pittsburgh”

LIST of CURRENT RESEARCH INTERESTS

- Advanced clinical data query tools that identify patients based on implicit information represented by patterns in data, particularly temporal patterns.
- Mining data patterns in large clinical data sets to support biomedical research, clinical decision-making and healthcare quality assurance.
- Clinical data displays that communicate effectively and support clinical decision-making.
- Informatics support of translational research, research collaboration and collaboration discovery
- Clinical and educational applications of Extensible Markup Language (XML).
- Human interface development for clinical and medical education workstations.
- Informatics training in pre- and postgraduate medical, pathology and engineering curricula.

SERVICE

DEPARTMENT (Public Health Sciences and Pathology)

1. Director, Division of Clinical Informatics, Public Health Sciences
2. Associate Medical Director, Clinical Chemistry, Pathology
3. Associate Medical Director, Systems Engineering, Pathology

LOCAL (University and School of Medicine)

1. Biomedical Informatics Steering Committee, School of Medicine (2007 – now)
2. Clinical Information Technology Oversight Committee (CITOC), UVa Health System (2007 – now)
3. Allocation and Policy Board of the UVA Computational Science Initiative (2008 – now)
4. Co-Director, UVa Medical Informatics Training Program (2007 – now)
5. Computational Science Advisory Council (CSAC), University of Virginia (2006 – now)
6. Clinical and Translational Science Award Executive Committee (2006 – now)

7. Director, Cancer Informatics, Couric Cancer Center (2006 – now)
8. Co-director, Biomedical Informatics, Clinical and Translational Science Award (CTSA) project development team (2006 – now)
9. Clinical Data Repository Steering Committee (*ex officio* member, 2007-now)
10. Chair, Cancer Clinical Trials Management System steering committee (2006 – now)
11. Member, Information Management and Critical Thinking Team (2006 – now)
12. Participant, Leadership in Academic Medicine program (2006)

NATIONAL

1. Internet Editorial Board, College of American Pathologists (1996-2004, 2006-current; vice chair 2004, 2006-7; chair 2008-now)
2. Information Science and Technology Committee, College of American Pathologists (2000-current)
3. Cooperative Human Tissue Network (CHTN) Informatics Committee (2008-now)
4. Informatics Committee, College of American Pathologists (1996-1999)
5. Education Committee, Association for Pathology Informatics (2002-2005)
6. Standards Committee, Association for Pathology Informatics (2002-2005)
7. Program Chair, Association for Pathology Informatics (2004)
8. Co-Director, APIII Conference 2004
9. Internet Committee, Academy of Clinical Laboratory Physicians and Scientists (1996-1998)

EXTERNAL CONTINUING MEDICAL EDUCATION (CME) ACTIVITIES

1. American Medical Informatics Association annual meeting, November 2008
2. American Medical Informatics Association annual meeting, November 2007
3. Advancing Practice and Instruction through Informatics and Innovation (APIII), September, 2007
4. American Medical Informatics Association annual meeting, November 2006
5. American Medical Informatics Association annual meeting, October 2005
6. Advancing Practice and Instruction through Informatics and Innovation (APIII), October, 2004
7. Medinfo/AMIA annual meeting, September, 2004.
8. American Medical Informatics Association annual meeting, November, 2003.
9. Advancing Pathology Informatics, Imaging and the Internet (APIII), October, 2003.
10. American Medical Informatics Association annual meeting, November, 2002.
11. Advancing Pathology Informatics, Imaging and the Internet, October, 2002.
12. American Medical Informatics Association annual meeting, November, 2001.
13. Advancing Pathology Informatics, Imaging and the Internet, October, 2001.
14. American Medical Informatics Association annual meeting, November, 2000.
15. Advancing Pathology Informatics, Imaging and the Internet, October, 2000.
16. College of American Pathologists Fall Meeting, September 2000.
17. College of American Pathologists Spring Meeting, April 2000.
18. Advancing Pathology Informatics, Imaging and the Internet, October, 1999.
19. College of American Pathologists Fall Meeting, September 1999.
20. Joint AAMC Professional Development Conference and IAIMS Symposium, "Putting Information to Work." June 27-29, 1999.
21. Informatics in Pathology Practice Symposium, Virginia Pathology Society, May 1, 1999 (Director)
22. College of American Pathologists, Spring Meeting, April 10-13, 1999.
23. Advancing Pathology Informatics, Imaging and the Internet, November 5-7, 1998
24. Symposium for Computer Applications in Medical Care/AMIA Fall Meeting, 1989, 1993, 1994, 1995, 1997, 1999.
25. Tulane Pathology Grand Rounds, 1989-1998.
26. American Association of Medical Colleges Annual Symposium on Academic Medical Center Information Management (Lansdowne, VA), 1996, 1997.
27. Vanderbilt University IAIMS Symposium, 1996.
28. Stanford Short Course in Medical Informatics, 1996.
29. University of Michigan Symposium on Automated Information Management, 1995.
30. American Association for Clinical Chemistry National Meeting, 1994.
31. University of Michigan Laboratory Information Systems Symposium, 1994.
32. USC/Albany Medical College Symposium on Bayesian Individualization of Drug Dosage Regimens, New Nonparametric EM Population Pharmacokinetic Modeling, Modeling Drug Diffusion into Endocardial Vegetations, and Bacterial Killing Curves, 1993.
33. ASCPT Clinical Pharmacology Board Review Course, 1992.
34. American Lung Association/American Thoracic Society National Meeting, 1992.

35. Osler Institute Pathology Review Course, 1989.