Efficacy of a Diagnostic Algorithm to Reduce CT Utilization for Suspected Pulmonary Embolism in Non-Pregnant Adult Patients in an Academic Emergency Department

by Robert D. Heninger, MD, Radiology Resident, 2008-2012; Alan H. Stolpen, MD, PhD, Associate Professor

INTRODUCTION

In 2009, the UIHC Chief-of-Staff convened a Task Force to address three issues facing medical imaging: (1) patient concerns about medical radiation; (2) the explosive growth of CT utilization; and (3) the clinical appropriateness of CT studies at UIHC. The Task Force included representatives from the Departments of Radiology (two radiologists and a radiation physicist), Emergency Medicine (two physicians) and Internal Medicine (a cardiologist and a hospitalist).

Early on the Task Force agreed that the goal of assessing the clinical appropriateness of every CT performed at UIHC was unfeasible. The goal needed to be something more manageable and in a well-defined patient population. The Task Force decided to study the utilization of CT pulmonary angiography (CTPA) to assess for suspected pulmonary embolism (PE) in patients evaluated by the UIHC ETC (Emergency Treatment Center). Moreover, the goal of the study was to decrease utilization of CTPA in this patient population. To that end, the task force agreed to implement a diagnostic algorithm to guide the decision making process in ETC patients with suspected PE.

MATERIALS AND METHODS

The Task Force adopted a clinically based diagnostic algorithm known as the dichotomous Wells Score (see Fig. 1). The ETC implemented this algorithm on 17 June 2009. To use the algorithm, patients with a Wells score of four or higher were evaluated with CTPA only (no D-dimer assay). Patients with a score of less than four were evaluated with a high sensitivity D-dimer assay; if positive, the patients underwent CTPA, and if negative, the CTPA was not performed. IRB approval was obtained to study the effectiveness of the diagnostic algorithm. The electronic medical record (EMR) was searched to identify all ETC patients who had undergone CTPA for suspected PE during two time periods: the six months immediately prior to implementation of the algorithm (December 2008-June 2009) and the six months immediately after the implementation of the algorithm (June 2009-December 2009). The main study endpoints were the number of CTPA performed and the positive rate for PE during each time period.

During the second six month period, laminated cards with the diagnostic algorithm
Déjà Vu All Over Again (from Yogi Berra)

Those of you who have for years been following the activities of the Department of Radiology at The University of Iowa Carver College of Medicine and UIHC will be familiar with me from my service as Chair of the Department of Radiology 1979-1994, and as Interim Chair 2001-2002. Well, it happened again. As of January 1, 2012, I again became Acting Chair of the Department of Radiology at this institution. Considering my advanced age and various infirmities, I hope that the third time will be my shortest tenure in this position.

Dr. Laurie Fajardo stepped down from the Chair’s position in December, 2011. She remains at Iowa as Professor of Radiology, and is enjoying a sabbatical year here pursuing research in breast imaging.

To give some idea of the accomplishments made under her direction I offer some statistical information. Department total service volume grew 8%, from 280,000 in 1991 examinations per year to 322,000 in 2011. For advanced imaging, the growth was very impressive, with CT, MRI and Ultrasound essentially doubling during this time.

Under Dr. Fajardo’s leadership extramural research grew from $4 million to $12 million in 2011, a 275% increase. Radiology Practice Plan charges grew substantially over this time period, along with a 385% increase in hospital charges for radiology.

The sophistication of our equipment changed dramatically during these years. Dr. Fajardo was instrumental in negotiating a strategic purchasing alliance with Siemens Medical, which provided for the purchase of equipment at a significant savings as well as a strategic research alliance that provides for the exchange of technology and scientific findings between the Radiology Department and Siemens. The period also saw major improvement in the department’s imaging equipment with the upgrading of all MR, CT, and PET scanners, and a new cyclotron as well as conversion to all digital image and image distribution throughout the institution. All radiologists’ reports are now transcribed by a voice activation system. Major facility renovations include MRI, ETC, PET, and the new conference room. In total the institution invested over $59 million in the Radiology Department during this time.

Of the department’s total current full- and part-time faculty of 58, 27 or nearly half were hired by Dr. Fajardo. Tom Barloon is the only radiologist in abdominal imaging who arrived prior to Dr. Fajardo’s tenure. The breast imaging section is made entirely of hires during her time, and all sections have added several new faculty. One of Dr. Fajardo’s appointments was to make D. Lee Bennett, M.D., Vice Chair of Radiology with responsibilities for the clinical service. Dr. Bennett has been invaluable in this role, particularly in providing continuity in clinical service involving Dr. Fajardo and me. Lee has taken interest in all phases of the clinical service, and now works in a fashion akin to a chief operating officer, managing the day-to-day affairs of the clinical operation. He has also taken on several individual projects, making my life much easier.

Dr. Bennett also plays a significant role in the leadership of the American College of Radiology. He is a past president of the Iowa Radiological Society, and this year was appointed to the Council of the American College of Radiology, a position that recognizes him as one of the leaders of our specialty.

All in all, the department is in much better shape as a result of Dr. Fajardo’s efforts. We all wish her the best and look forward to seeing many academic achievements from her during her sabbatical and in the years thereafter.
Notes from the Chair, continued from previous page

To change gears, I have a personal appeal to our friends and alumni. Our residents have, for many years, become involved in research activities during their training. And they are required to do so by the Radiology Residency Review Committee. Each resident works under a designated faculty member on his/her project, and the resultant investigations are uniformly of high quality. The majority of these investigations are published in the medical literature and/or presented at national meetings.

As departmental resources have become tighter, it has become more and more difficult to identify seed money for resident research. Even the simplest project usually requires $1000-$2000 for essential information gathering. In the past our friends and alumni have offered support for this program, creating a fund in the UI Foundation (it’s called the Franken Radiology Resident Research Fund) to help pay for this. The success of their research projects has been greatly enhanced by these funds, so much so that the available dollars are now low. I am asking each of you to consider giving a donation to the fund, allowing us to continue fiscal support for that program. Your contribution would be greatly appreciated.

Efficacy of Diagnostic Algorithm, continued from page 1

were taped to all order entry computers in the ETC. Inclusion criteria for the study were CTPA studies ordered by an ETC provider to “rule out PE” in patients age 18 years or older. Exclusion criteria included pregnancy, hypotension or shock.

CTPA studies were performed on a variety of CT scanners, including the Toshiba 4 slice machine and the Siemens 6, 16, 64, dual 64, and 128 slice machines. Our standard protocol includes 150 mL of IV Isovue-370 administered at 4 mL/sec with triggering off the main pulmonary artery. Images were reconstructed in the axial, coronal and sagittal planes and interpreted by either a chest or abdominal radiologist.

DISCUSSION AND CONCLUSION

The diagnostic algorithm failed to reduce CTPA utilization for suspected PE in non-pregnant adults evaluated in the ETC. However, the algorithm marginally increased the positive rate of CTPA for PE.

Our study had several limitations: (1) the ETC providers did not document the Wells score or adherence to the diagnostic algorithm; and (2) the official radiology report was used to determine if the CTPA was positive or negative for PE – the studies were not over-read by an expert chest radiologist. The algorithm was apparently violated 27 times as evidenced by patients with a negative D-dimer test who underwent CTPA. Interestingly, the pre- and post-algorithm groups each had one false negative D-dimer test (i.e., CTPA positive for PE).

Possible explanations for the failure of the algorithm to reduce CTPA utilization in the ETC include: (1) ETC providers
may have ignored the algorithm or “fudged” the Wells score to ensure that CTPA would be performed; (2) patient volume in the ETC increased during the post-algorithm period; and (3) some hospital services that admitted these patients from the ETC subverted the algorithm (this was noted anecdotally by the ETC in one case).

In conclusion, seemingly straightforward efforts to improve patient care and reduce health care costs can be unexpectedly challenging.

ACKNOWLEDGEMENTS

The authors would like to thank the following for their assistance: Mark Madsen, PhD, and Brad Thompson, MD, Department of Radiology, UIHC; Edwin Van Beek, MD, PhD, University of Edinburgh; Azeemuddin Ahmed, MD, and Michael Takacs, MD, Department of Emergency Medicine, UIHC; and Scott Wilson, MD, and Paul Lindower, MD, Department of Internal Medicine, UIHC.

In addition, the author would like to thank Alan Stolpen, MD, PhD, for serving as mentor during this project. Without his assistance, this project would not have been possible, and he was instrumental in facilitating presentation of this data at the 2010 RSNA Annual Meeting in Chicago, IL.

REFERENCES


The Children’s Hospital is coming! Construction is now underway for a free-standing, 480,000 square foot facility, twelve stories above the ground and two stories below, that will house 200 beds. The building will be located beside the John Pappajohn Pavilion and across from the Kinnick Stadium. Construction is targeted for completion in 2016. The Pediatric Radiology facility will be located in the basement -2nd level - where we will share the floor space with the endoscopy procedure rooms. Plans for the pediatric imaging facility include general radiology, fluoroscopy, CT, MRI and ultrasound. The Pediatric Radiology Section is excited and actively participating in the Steering Committee on this project.

Since our last sectional update, pediatric radiologist, Geetika Khanna, MD, left for Washington University after an extremely successful academic career here at Iowa. She is still greatly missed by our clinical colleagues and by us. She is now an associate professor of radiology and continues to be academically very active at her new institution. She was back to Iowa as a visiting professor in September 26, 2011. Drs. Simon Kao, Michael D’Alessandro and myself cover general pediatric radiology with special interest and expertise in ultrasound and tumor imaging (Dr. Kao), computer science and computer-based education (Dr. D’Alessandro) and neuroimaging and head and neck imaging (Dr. Sato). Dr. Kao is active in the Child Oncology Group, Dr. D’Alessandro has been a frequent speaker at the Radiological Society of North America and Society for Pediatric Radiology, and I have been a presenter in refresher courses at the Society for Pediatric Radiology and the American Roentgen Ray Society. The Pediatric Radiology Fellowship program headed by Dr. Kao was successfully granted an unrestricted five-year accreditation by the AC-GME and has enjoyed a series of well qualified fellows: Drs. Achint Singh (2008 – 2009), Lokesh Khanna (2009 – 2010), Janet Dubois (2010 – 2011), Ryan Reynolds (2011 – 2012), and Kiran Sargar (2012-2013).

We continue to be well represented in multidisciplinary conferences and tumor boards for pediatric patients and maintain high regard among our clinical colleagues.

A Letter from the UI Foundation

Greetings from the University of Iowa Foundation! I hope 2013 is filled with health, happiness and prosperity for you all.

As you may know, my occupation with the Foundation is to promote the department of Radiology by informing our friends and alumni about the department’s priorities and to encourage financial support to those areas.

What made your time at The University of Iowa a wonderful time in your life? Was it a particular professor or faculty member that served as your mentor and support? Was it the opportunity you had to work on cutting edge research? Perhaps it was the scholarship you received to relieve some of the financial pressure. Whatever the case may be, your time at Iowa was impactful. Listed below are just a few of the funds you can support to help make future radiologists’ experience at The University of Iowa a great one.

Radiology Development Fund 30-538-000
Franken Radiology Resident Research Fund 30-538-011
Krabbenhoft Chair in Radiology Fund 30-538-025

Whichever fund and no matter the amount, you can make a difference in the future of the UI Department of Radiology.

To learn more about the University of Iowa Foundation, and how gifts from alumni and friends support students and faculty in the UI Department of Radiology, please visit www.uifoundation.org or contact me at heather-ropp@uiowa.edu, (319) 335-3305 or toll-free 800-648-6973.

Heather Ropp
University of Iowa Foundation
NEW FACULTY

**Joshua M. McDonald, MD,** joined the Body Imaging Section as Clinical Assistant Professor. Dr. McDonald received his medical training at The University of Iowa College of Medicine. He completed his residency in diagnostic radiology at University of Iowa Hospitals and Clinics and a fellowship in body and musculoskeletal imaging at Indiana University Hospital in Indianapolis. Prior to his appointment at UIHC, Dr. McDonald worked in general radiology at Radiology Waukesha, S.C., in Waukesha, WI.

**Kousei Ishigami, MD, PhD,** comes to the Department as Visiting Associate Professor. In addition to his appointment at UIHC, Dr. Ishigami is also current Assistant Professor of Clinical Radiology at Kyushu University in Fukuoka, Japan. He received both his MD and PhD at Kyushu University and has completed radiology residencies at Kyushu University, the International Medical Center of Japan, the Labor Welfare Chikuho Rosai Hospital and Medical Institute of Bioregulation. Dr. Ishigami joins the Body Imaging Section.

**Howard J. O’Rourke, MD,** joined the Department of Radiology as Clinical Assistant Professor. Dr. O’Rourke completed his medical training at the University of Rochester in Rochester, NY. He went on to complete both his residency in diagnostic radiology and fellowship in musculoskeletal radiology at the University of Pittsburgh Medical Center in Pittsburgh, PA. Dr. O’Rourke joins the Musculoskeletal Radiology Section.

**Honors & Awards...**

**Monzer M. Abu-Yousef, MD**
- American Board of Radiology Examiner, May 2012

**David W. Dick, PhD**
- Elected to serve as Secretary of the Society of Nuclear Medicine & Molecular Imaging’s Radiopharmaceutical Council from June 2012 - June 2014

**Laurie L. Fajardo, MD, MBA**
- Chair of the Radiological Society of North America’s Research & Education Corporate Giving Subcommittee
- Member, Board of Directors of the Association of University Radiologists GE Radiology Research Academic Fellowship

**Eric A. Hoffman, PhD**
- Appointed to the Editorial Review Board of Pulmonary Circulation

**Archana T. Laroia, MD**
- Young Physician Alternate Representative from Iowa at the American College of Radiology’s Annual Meeting and Chapter Leadership Conference, April 21-25, 2012
- Panel member on the ACR Appropriateness Criteria Expert Panel on Cardiac Imaging
- Member, ACR Contrast Media Committee

**Toshio Moritani, MD, PhD**
- Appointed to the American Society of Neuroradiology, Education Committee, 2011-2015
- Appointed to the American Society of Neuroradiology’s Outstanding Presentations Subcommittee, 2011-2015
- Appointed to the American Society of Neuroradiology’s Website & Online Subcommittee, 2011-2015

**Jun Ni, PhD**
- Recipient of the 2011 3rd Place Heilong Jiang High Education Science and Technology Award for Protein Visualization and Computer Modeling and Simulation, China

(continued on page 8)
New 2012-2013 Fellows

Bathla Girish, MBBS  
Neuroradiology

David De Bruin, MD  
Neuroradiology

Tamer Ghosheh, MD  
Musculoskeletal

Michael Munagian, MD  
Musculoskeletal

Oscar Pinzon, MD  
Neuroradiology

Kiran Sargar, MBBS  
Pediatric Radiology

Charles Smittkamp, MD  
Neuroradiology

Damon Shearer, DO  
Breast Imaging

Warren Spencer, MD  
Musculoskeletal

Michael Spieth, MD  
Body Imaging

James Stecher, MD  
Musculoskeletal

DIAGNOSTIC RADIOLOGY RESIDENTS

Back row left to right: Nathan Miller, MD, Virginia Commonwealth University School of Medicine; Joel Ziegelbein, MD, University of Iowa Carver College of Medicine; Nicholas Turman, MD, University of North Dakota; Derek Savells, MD, University of Kentucky; Mark VanTassell, MD, University of Iowa Carver College of Medicine; Eric Ericson, MD, University of North Dakota; Hussein Kekhia, MD, American University of Beirut, Beirut, Lebanon; Jason Mueller, MD, University of Iowa Carver College of Medicine; Mohammad Amarneh, MBBS, Jordan University, Amman, Jordan

NUCLEAR MEDICINE RESIDENTS

Front row left to right: Tracy Teo, DO, New York College of Osteopathic Medicine; Jiefu Zheng, MD, PhD, First Military Medical University School of Medicine, China

O U R  N E W  R E S I D E N T S
Honors, continued from page 6

- 2012 Honorable Professor and PhD Advisor, Nanjing University of Sciences and Technology, College of Computer Science and Information Technology, Nanjing, China, 2012-14
- Honorary Senior Advisor in Biomedical and Mechanical Engineering Computations, CSST Beijing Aerospace General Hospital, Beijing, China, 2011-14
- Editorial Board member for Advances in Computed Tomography (ACT), International Journal of Computer Science & Information Technology Applications

Bruno Policeni, MD
- Appointed to the Education Committee of the American Society of Head & Neck Radiology

Takashi Shawn Sato, MD
- Selected to attend the Introduction to Academic Radiology program at the 2012 American Roentgen Ray Society’s Scientific Meeting in Vancouver, BC, Canada

Michael K. Schultz, PhD
- Selected to be the Congress Vice President for the 2nd World Congress on Ga-68 (Generators and Novel Radio-pharmaceuticals), Molecular Imaging (PET/CT), Targeted Radionuclide Therapy & Dosimetry (SWC2013), February 28-March 2, 2013

Jessica C. Sieren, PhD
- Appointed Associate Member, Integrative Health Sciences Facility, Environmental Health Sciences Research Center, University of Iowa, IA, 2012
- Recipient of a 2012 American Lung Association Cancer Discovery Award for “Regional Computed Tomography Derived Biomarkers for Lung Cancer Risk Assessment”
- Recipient of an Institute of Clinical and Translational Science Pilot Award for “Medical imaging for phenotyping novel porcine cancer models”
- Recipient, ACRIN Young Investigator Award for “Imaging biomarkers for understanding the mechanistic relationship between COPD and lung cancer”
- Mentor for students, Nicholas Stoyles and Alexandra Judisch, who received the Iowa Center for Research by Undergraduates Fellow Scholarship awards

Wendy R.K. Smoker, MS, MD
- Lecturer in Neuroradiology. American Institute for Radiologic Pathology, Silver Springs, MD

William Stanford, MD
- Inducted as a Fellow of the North American Society of Cardiovascular Imaging at their 2012 annual meeting and was recognized as a recipient of their Gold Medal Award in recognition of contributions to cardiovascular imaging

Alan H. Stolpen, MD, PhD
- Appointed President of the Iowa Radiological Society, Iowa chapter of the ACR, 2012-2014

Brad H. Thompson, MD
- Inducted as a Fellow of the American College of Radiology, 2012

Limin Yang, MD, PhD
- Appointed to the editorial board of the Journal of Medical Diagnostic Methods

Kevin S. Berbaum, PhD, Receives Distinguished Investigator Award
Radiology researcher, Kevin S. Berbaum, PhD, received the Distinguished Investigator Award from the Academy of Radiology Research. Dr. Berbaum was recognized for his significant accomplishments in imaging research that have had a profound impact on healthcare. For 30 years Dr. Berbaum’s research has focused on medical image perception, and he is considered a leader and expert in ROC research design and statistical analysis in observer-performance experimentation. He is co-founder of the Medical Image Perception Laboratory.

Dr. Berbaum was honored for this award at a reception during the 2012 Radiological Society of North America’s Annual Meeting.

US News & World Report America’s Top Doctors
The Radiology faculty listed below were nominated by their peers for outstanding work and are considered to be in the top *1% or 10% of physicians in their field:

David L. Bushnell, MD ~ Georges El-Khoury, MD
Laurie L. Fajardo, MD ~ Michael M. Graham, MD, PhD
David M. Kuehn, MD ~ Yutaka Sato, MD, PhD
Alan Stolpen, MD, PhD ~ Brad H. Thompson, MD*
Years of Service Awards...

Five Years
Amanda Chidister, Angela Gulbranson, Anna Krug, Anne Moorhead, Bridgette Scharas, Courtney Hegouet, Gabe Decker, Hannah Cates, Jack Kademian, Joseph Ekdahl, Leah Koskinen, Melissa Kolker, Tasha Huff

Ten Years
Autumn Craig, Christina Hamarstrom, Crystal Lavin, David Kuehn, Jean Wiese, Jerri Stockman, Jonathan Dubois, Kenjirou Ohashi, Lani Noska, Laurie Fajardo, Lisa Manes, Luke Sanderson, Michelle Petersen, Rebecca Egbert, Steven Mccafferty, Allen McGruder

Fifteen Years
Amy Mente, Benjamin Bender, Debra Halsrud, Jay Honohan, Marci Tucker, Peggy Knight, Shari Cole, Stephanie Harris, Susan Walsh, Travis Witham, Zanetta Hoehle

Twenty Years
Christine Mundt, David Bushnell, Eric Hoffman, Greg Shaffer, Randy Ferguson, Timothy Lamp, Vincent Magnotta

Twenty-Five Years
Er-wei Bai, James Olson, Kathy Martensen, Marie Beelman, Sheri Walters, Simon Kao

Thirty Years
Debra Barnes, Joseph Ruva, Lisa Brunsting, Lisa Ireland, Nancy Harney

Thirty-Five Years
Kevin Berbaum, Mary McBride
Awards Received at National Meetings


Publications

Book Chapters


**ElectRONIC PUBLICATIONS**


**ARTICLES**


Scientific Presentations

• Bhatt SP, Sieren JC, Doerschug KC, Hoffman EA. COPDGene Investigators correlation of emphysema measured by multidetector computed tomography with spirometry: lobar contribution. Am J Respir Crit Care Med 185;2012:A4333


• Fuld MK, Halaweish AF, Newell JD, Hoffman EA. Gas composition and energy settings for optimization of dual-energy xenon-CT. Am J Respir Crit Care Med 185;2012:A2038

• Ghazle H, Abu-Yousef, MM. Stent-Induced Cholangitis Mimicking Biliary Dilatation on Sonography. AIUM Annual Meeting, Phoenix, AZ March 29-April 1, 2012


• Hasegawa M, Chan KS, Burnette NE, Hoffman EA. Quantitative computed tomography of normal non-smokers demonstrates greater low density areas at both frc and tlc scans as well as increased frc/tlc volume of the right middle lobe. Am J Respir Crit Care Med 185;2012:A2023


• Kravchuk OA, Fuld MK, Halaweish AF, Ghaghada K, Annapragada A, Newell JD, Hoffman EA. Liposomal iodine blood pool CT contrast agent-detected measures of CT perfused blood volume assessed at 80/140kV dual energy setting are equivalent to measures assessed at 100/140 kV dual energy setting. Am J Respir Crit Care Med 185;2012:A2036

• Kulkarni HS, Fajt ML, Uvalle CE, Hoffman EA, Cook-Granroth J, Wenzel SE. Airway wall thickness on computerized tomography correlates with increased mast cell markers in severe asthma. Am J Respir Crit Care Med 185;2012:A3925


Invited Speakers

- Abu-Yousef MM. 1) Doppler Ultrasound in the diagnosis of scrotal pain; 2) Doppler Ultrasound in the diagnosis of testicular & extratesticular masses; 3) Contribution of Doppler ultrasound in diagnosis of bowel disease; 4) Doppler Role in diagnosis of hepatic and extra hepatic diseases; 5) Doppler ultrasound in diagnosis liver transplant & portosystemic shunt malfunction; 6) Role of Doppler ultrasound in diagnosis and follow up of renal artery stenosis. 41st Annual Brazilian Congress of Radiology Meeting, Brasilia, Brazil, September 2012. [Invited Speaker]
- Moritani T. Learning from the American Board of Radiology. Showa University School of Medicine, Tokyo, Japan, January 2012. [Invited Lecture]
- Moritani T. Interesting pediatric cases. Showa University School of Medicine, Tokyo, Japan, January 2012. [Invited Lecture]
- Moritani T. Diffusion-weighted imaging – pathology and pathophysiology. Boston University, Boston, MA, August 2012. [Invited Lecture]
- Ni J. 3D Tomosynthesis and molecular imaging, Harbin Engineering University, College of Electrical Engineering, Aug. 2012
• Ni J. Establish 21st Century International College of International Programs, Shanghai Institute of Technology, May 5, 2012

• Ni J. Fluid dynamics and data visualization in micro-fluid flows in physiological systems, Harbin Engineering University, College of Shipbuilding Engineering, Aug. 2012

• Ni J. Towards 21st century system of systems engineering in integrated healthcare information systems, Henan University of Economics and Law, April 21, 2012

• Ni J. Towards 21st Century system of systems engineering in integrated healthcare information systems, Shanghai University, May 4, 2012

• Ruprecht A. 1) Warning: computers at work; 2) CBCT: the good, the bad, and the ugly; 3) CBCT in modern dental practice. 2012 Annual Post College Assembly of The Ohio State University College of Dentistry, Columbus, May 17, 2012. [Invited Speaker]

• Schultz MK. Gordon Research Conference – Metals in Medicine. Radiochemistry and PET Imaging Applications of Generator Based Gallium-68. Andover, NH, June 2012. [Invited Presenter]


• Schultz MK. Radionuclides for Molecular Imaging and Therapy of Cancer. [Invited Faculty]. Oregon State University, Host Alena Paulenova, Professor of Radiochemistry, April 2012.

• Schultz MK. The role of 68Ga for molecular imaging of cancer in the United States. Theranostics CME Symposium. Society of Nuclear Medicine Mid Winter Meeting. Orlando, FL, January 2012. [Invited Scientific Faculty]

• Smoker WRK. University of Texas Medical Branch, Galveston, TX, January 2012. [Visiting Professor]

• Smoker WRK. Roosevelt Hospital, New York, NY, May 2012. [Visiting Professor]

---

**Invited / Refresher Course Faculty**

- El-Khoury GY. Imaging of Spondyloarthropathies: When to Use Radiography, CT, or MRI. 23rd Annual Rheumatology Symposium, Coralville Marriott Hotel & Conference Center, Coralville, IA, June 2012.

- Schultz MK. Chelator additions to peptides for molecular imaging by ring strain promoted copper free click chemistry. Society of Nuclear Medicine Annual Meeting, Miami, FL, June 2012. [Invited Faculty Continuing Education Seminar]


- Smoker WRK. 1) Spinal Neoplasms; 2) Degenerative Spine Disease and Spinal Infections; 3) Vascular and Miscellaneous Spinal Pathology; 4) Suprahyoid Neck I (SS, PPS, CS); 5) Suprahyoid Neck II (MS and PS); 6) Suprahyoid Neck III (PMS and oral cavity) Armed Forces Institute of Pathology, Bethesda, MD, July 2012. [Course Faculty]
Exhibits / Posters


New & Renewed Grants

**Co-PIs:** Thomas Collins, MD, Alan Stolpen, MD, PhD; **Title:** ACRIN 6690: A Prospective, Multi-center Comparison of Multiphase Contrast-enhanced CT and Multiphase Contrast-enhanced MRI for Diagnosis of Hepatocellular Carcinoma and Liver Transplant Allocation; **Sponsor:** American College of Radiology Imaging Network; **Amount:** $127,500; **Duration:** 3/22/2012 - 3/22/2014

**PI:** Stephen L. Hillis, PhD; **Title:** Power and Sample-Size Methodology for Radiology Research; **Sponsor:** US Department of Health & Human Services, NIH; **Amount:** $1,019,250; **Duration:** 4/1/2012 - 3/31/2015

**PI:** Eric A. Hoffman, PhD; **Title:** Multi-center Structural & Functional Quantitative CT Pulmonary Phenotyping; **Sponsor:** NIH.; **Amount:** $5,795,339; **Duration:** 08/01/12 - 06/30/16

**PI:** Eric A. Hoffman, PhD; **Title:** Subclinical Interstitial Lung Disease in MESA; **Sponsor:** Columbia University; **Amount:** $277,565; **Duration:** 3/1/2012 - 2/28/2013

**PI:** Vincent A. Magnotta, PhD; **Title:** Mood and Anxiety Disorders Due to TBI Among OIF/OEF Veterans - Jorge; **Sponsor:** US Department of Veterans Affairs; **Amount:** $49,322; **Duration:** 6/1/2012 - 5/31/2013

**PI:** Punam K. Saha, PhD; **Title:** Tensor Scale-based Methods for Assessment of Trabecular Bone Quality; **Sponsor:** US Department of Health & Human Services, NIH; **Amount:** $1,422,893; **Duration:** 6/18/2012 - 5/31/2013

**Co-Faculty Under Development:** Michael K. Schultz, PhD, Tori Forbes, PhD; **Title:** Radiochemistry Faculty Development at The University of Iowa; **Sponsor:** US NRC NRC-HQ-12-G-38-0041; **Amount:** $599,000; **Duration:** 4/1/2012 - 3/31/2015

**Faculty Mentor to Kyle Kloepping:** Michael K. Schultz, PhD; **Title:** Advanced Fellowship for Cancer Research; **Sponsor:** India-US Science and Technology Forum; **Amount:** $32,000; **Duration:** 11/1/2012 - 3/1/2013

**PI:** Michael K. Schultz, PhD; **Title:** Multi-Receptor Targeting of Metastatic Melanoma for Imaging and Therapy; **Sponsor:** International Union for Cancer Control Period; **Amount:** $6,000

**PI:** Jessica C. Sieren, PhD; **Title:** Regional Computed Tomography Derived Biomarkers for Lung Cancer Risk Assessment; **Sponsor:** American Lung Association, Cancer Discovery; **Amount:** $99,703; **Duration:** 2012-2014

**PI:** Jessica C. Sieren, PhD; **Title:** Imaging Biomarkers for Understanding the Mechanistic Relationship Between COPD and Lung Cancer; **Sponsor:** American College of Radiology Imaging Network; **Amount:** $10,000; **Duration:** 1/1/2012 - 6/1/2012

**PI:** Jessica C. Sieren, PhD; **Title:** Medical Imaging for Phenotyping Novel Porcine Cancer Models; **Sponsor:** ICTS Pilot Grant; **Amount:** $46,000; **Duration:** 7/1/2012 – 6/30/2013

**PI:** Jessica C. Sieren, PhD; **Title:** Funding for Alex Ju-disch and Nicholas Stoyles; **Sponsor:** Iowa Center for Research by Undergraduates (ICRU); **Amount:** $5,000; **Duration:** 2012 - 2013