

# RSNA® *News*



Image courtesy of Stanford Radiology 3D Laboratory

## Stanford Lab Emerges as 3D Imaging Leader

### Also Inside:

- Study Reinforces Concerns about CIN
- Negative Perception of Pediatric Radiology May Explain Workforce Shortage
- Biomarker Identification Accelerates Alzheimer Research
- iPhone Application Tracks Radiation Exposure, Risk

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**RSNA News**

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## IHE® Issues Call for Committee Participants

**U**SERS AND vendors are invited to join the Integrating the Healthcare Enterprise (IHE®) domain committees and participate in the current cycle of profile development. Participants have the opportunity to influence the adoption of standards for sharing electronic medical information and improving care. All

domain committees are seeking members:

- Anatomic pathology
- Eye care
- IT infrastructure
- Laboratory
- Patient care coordination
- Patient care devices
- Quality, research and public health
- Radiation oncology
- Radiology

For more information on each committee, go to the domain listing at the top of the screen at [www.ihe.net](http://www.ihe.net) and access the Wiki page for each category.

Those interested in participating or learning more should contact secretaries listed for each committee.

IHE is an initiative of

RSNA and the Healthcare Information and Management Systems Society to accelerate the adoption of electronic health records by improving the exchange of information among healthcare systems.



## ACR Calls for Revocation of Breast Cancer Screening Recommendations

The American College of Radiology (ACR) is strongly opposing the newly revised U.S. Preventive Services Task Force (USPSTF) screening recommendations for breast cancer, calling the controversial guidelines “a step backward” and asking the U.S. Department of Health & Human Services to rescind the recommendations.

USPSTF recommendations issued in November advise against regular mammography screening for women 40–49 years of age, provide mammograms only every other year for women

between 50 and 74, and stop all breast cancer screening in women over 74.

The task force concluded that, “There are insufficient data to determine which particular screening strategy is best in terms of the balance of benefits and harms or cost-effectiveness.”

ACR and the Society of Breast Imaging (SBI) continue to urge following American Cancer Society guidelines recommending mammograms for all healthy women beginning at age 40.

ACR and SBI issued a joint response to the recommendations, read-

ing in part:

“These unfounded USPSTF recommendations ignore the valid scientific data and place a great many women at risk of dying unnecessarily from a disease that we have made significant headway against over the past 20 years,” said Carol H. Lee, M.D., chair of the ACR Breast Imaging Commission.

A full report on the recommendations will appear in the January issue of *RSNA News*.

### RSNA-Sponsored Biomarkers Roundtable Continues Work on Guidelines

More than 30 representatives from academic institutions, pharmaceutical and device manufacturers, government organizations and professional societies gathered in November for an RSNA-sponsored Imaging Biomarkers Roundtable held at RSNA Headquarters in Oak Brook, Ill. Representatives continued the work they began earlier this year, breaking into disease- and modality-centered groups to develop strategies for implementing imaging biomarkers guidelines.





## RadiologyInfo™ Receives Two Healthcare Information Awards

*RadiologyInfo.org*, the joint RSNA/American College of Radiology (ACR) patient information portal, recently received two honors: the Gold Award for best health/healthcare in the eHealthcare Leadership Awards competition and a merit certificate from the Health Information Resource Center's (HIRC) Web Health Awards competition.

The eHealthcare Leadership Awards recognize the best Web sites of healthcare organizations, online health companies, pharmaceutical/medical equipment firms, suppliers and business improvement initiatives.

An independent panel of 116 healthcare and the Internet experts rated

Web sites based on a standard of Internet excellence. Considerations included, "How extensive, balanced, up-to-date, well-organized and credible is the information presented?" and "Can material be tailored to individual needs?" Winners were honored in the November issue of *eHealthcare Strategy & Trends*.

HIRC recognizes the best Web-based health-related content for consumers and professionals and is an extension of HIRC's 16-year-old



National Health Information Awards. A panel of international health information and Internet experts judge entries based on accuracy, success

in reaching target audience and overall quality. *RadiologyInfo.org* was selected from nearly 1,000 entries.

Created in 2000 as a first-of-its-kind joint RSNA/ACR project, *RadiologyInfo.org* draws nearly 500,000 hits a month and increases its traffic by 25 percent each year.

## 2010 Medicare Physician Fee Schedule Ruling Raises Patient Access Concerns

**R**ADIOLOGISTS are warning that proposed increases to the imaging equipment utilization rate assumption under the 2010 Medicare Physician Fee Schedule (MFS) could restrict many patients' access to critical imaging procedures.

The Centers for Medicare and Medicaid Services (CMS) released the review copy of the 2010 MFS final rule in October. The American College of Radiology (ACR) has opened a public comment period to be submitted to CMS by end of this month.

Proposed changes would raise the rate assumption—the time imaging equipment is assumed to be in operation during office hours—from 50 to 90 percent. Such cuts could imperil rural and community-based imaging centers,

which according to the Radiology Business Management Association only use equipment 48 percent of office hours, said James H. Thrall, M.D., chair of ACR's Board of Chancellors and an 2007 RSNA Gold Medalist.

"Many hospitals are not equipped to handle the substantial influx of patients that could result from the inevitable closure of rural and suburban imaging facilities caused by these cuts," said Dr. Thrall, radiologist-in-chief at Massachusetts General Hospital and Juan M. Taveras Professor of Radiology at Harvard Medical School in Boston. "Wait times will surge. Access will plummet and lives may be lost due to these ill-advised cuts."

Although proposed reimbursement rates would cut funding to imaging

providers an average of 16 percent, specific changes would reduce reimbursement for exams such as lung CT and spine MR by 40 percent or more, ACR reported.

"Not only will these cuts affect patients in need of high-tech scans, but wait times for common exams like bone density scans and even mammography will skyrocket," continued Dr. Thrall. "Women could wait months or longer to receive mammograms if additional non-hospital providers who rely on offsetting payments for MR and CT to allow them to offer mammograms, are forced to stop providing the service."

The fee schedule ruling is available at [www.federalregister.gov/OFRUPload/OFRData/2009-26502\\_PI.pdf](http://www.federalregister.gov/OFRUPload/OFRData/2009-26502_PI.pdf).

### Print Journal Opt-Out Available on myRSNA®

RSNA members who prefer to receive electronic-only versions of RSNA journals including *Radiology*, *RadioGraphics* and *RSNA News*, can now "opt out" of receiving print copies in the mail. Along with furthering RSNA efforts to go "green," the paperless versions offer online subscribers additional features. To opt out, members can log onto myRSNA at *RSNA.org*, go to My Profile and click "Print Journal Opt-Out" to select the print journals they no longer wish to receive in the mail.



## Radiologist Reappointed to Chair AMA CPT Panel

**William T. Thorwarth Jr., M.D.**, a trustee of the RSNA Research & Education Foundation Board of Trustees, has been reappointed chair of the current procedural terminology (CPT®) panel of the American Medical Association. The two-year term ends in June 2011.



**William T. Thorwarth Jr., M.D.**

Dr. Thorwarth was first appointed to a full seat on the panel in 2003 and became the first radiologist to chair the panel in 2007. He practices with Catawba Radiological Associates in Hickory, N.C.

## ASER Awards Gold Medal to West

**O. Clark West, M.D.**, received the gold medal from the American Society of Emergency Radiology (ASER) during its 20th Annual Scientific Meeting and Postgraduate Course in Orlando, Florida, in October. Dr. West is an associate professor and chief of emergency radiology at The University of Texas Health Science Center at Houston Medical School. The gold medal recognizes distinguished and exemplary service to the society and/or the specialty it represents.



**O. Clark West, M.D.**

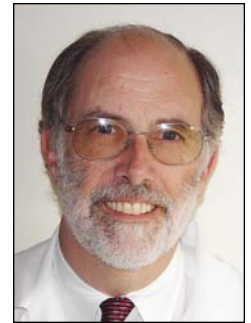
## Zerhouni Names Seven Most Powerful in Medicine for Forbes

Diagnostic radiologist **Elias A. Zerhouni, M.D.**, a professor of radiology and biomedical engineering at Johns Hopkins University in Baltimore and past director of the National Institutes of Health (NIH), was asked to name the seven most powerful people in medicine for *Forbes* magazine's annual, "The World's Most Powerful People" list. Physicians on Dr. Zerhouni's list are:

**Francis S. Collins, M.D., Ph.D.; Anthony S. Fauci, M.D.; Chen Zhu, M.D., Ph.D.; David L. Baltimore, Ph.D.; Harold E. Varmus, M.D.; Tadataka Yamada, M.D.; William Gates III; James Thomson, Ph.D.; and Shinya Yamanaka, M.D., Ph.D.**

## ASHNR Awards Gold Medal to Curtin

The American Society of Head and Neck Radiology (ASHNR) presented its 2009 gold medal to **Hugh D. Curtin, M.D.**, during the society's 43rd Annual Meeting in New Orleans. Formerly the chief of radiology at the Massachusetts Eye and Ear Infirmary in Boston, Dr. Curtin is now a professor of radiology at Harvard Medical School. Dr. Curtin is an internationally recognized lecturer who serves as a reviewer for numerous journals and has authored numerous peer-reviewed articles and chapters.



**Hugh D. Curtin, M.D.**

## Butts Pauly Named to ISTU Board

**Kim Butts Pauly, Ph.D.**, an associate professor of radiology and bioengineering at Stanford University, was recently elected to a three-year term on the board of the International Society for Therapeutic Ultrasound (ISTU). Dr. Butts Pauly is currently researching MR-guided high intensity-focused ultrasound (US) and MR-guided cryoablation.

ISTU is a non-profit organization created to increase knowledge of therapeutic US to the scientific and medical community and facilitate the translation of therapeutic US techniques into clinical practice.



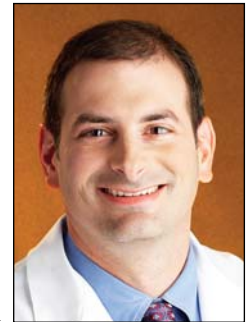
**Kim Butts Pauly, Ph.D.**

## Horwitz Named Chair of Radiation Oncology at Fox Chase Cancer Center

Radiation oncologist **Eric M. Horwitz, M.D.**, has been named chair of the Department of Radiation Oncology at Fox Chase Cancer Center in Philadelphia. Recognized nationally for his expertise in treating patients with prostate cancer, Dr. Horwitz also holds the Gerald E. Hanks Endowed Chair in Radiation Oncology.

Since joining the staff in 1997, Dr. Horwitz has developed advanced programs using intensity-modulated radiation therapy, image-guided radiation therapy and brachytherapy.

Dr. Horwitz is national president of the American Brachytherapy Society and is active in the American Society for Radiation Oncology and the American College of Radiology.



**Eric M. Horwitz, M.D.**

## Lerona recognized by Cambridge Who's Who

**Petronio T. Lerona, M.D.**, a radiologist with Medical Professional Associates of Arizona, P.C., in Phoenix, has been recognized by Cambridge Who's Who for demonstrating dedication, leadership and excellence in diagnostic radiology. A prolific researcher and author with 50 years experience, Dr. Lerona is a founding member of the Society of Cardiovascular Computed Tomography and a member of the Association of University Radiologists. Dr. Lerona was chair of the Department of Radiology at Maricopa Integrated Health Systems in Phoenix from 1981 to 2001.

## IN MEMORIAM

**Harold J. Lasky, M.D.**

**Harold J. Lasky, M.D.**, a leading innovator in mammography and namesake of the Chicago Radiological Society's (CRS) annual oration, died of lung cancer on Oct. 15. Dr. Lasky was 87.

Dr. Lasky, who received his medical degree from The University of Texas Medical

Branch in Galveston, played a pivotal role in developing the national quality assurance program that resulted in the Mammography Quality Standardization Act (MQSA) passed in 1994 to better regulate breast imaging. Dr. Lasky served as 1977–78 CRS president and as 1985–86 president of the

Illinois Radiological Society.

Dr. Lasky, who practiced in Chicago for 40 years, taught radiology at the Chicago Medical School and the University of Illinois at Chicago. In February, CRS created the Harold J. Lasky Annual Oration to honor his achievements.



**Harold J. Lasky, M.D.**



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## MY TURN

## Drinking from the Firehose

**A**S PHYSICIANS, we are drowning in information. As radiologists, we recognize that imaging is the largest medical information source and that datasets are rapidly expanding in all four dimensions (xyz and time). Moving from 2D to 3D imaging clearly increased the information generated per exam, while the growing prevalence of chronic diseases and expansion of image-guided procedures results in more images per year. Our ability to gather information is growing exponentially and medicine seems to have an insatiable thirst for information. Like it or not, radiologists are standing first in line at the firehose.

Acquiring, storing and analyzing all this information comes at tremendous cost. Most critics focus on the price of healthcare and some voice concerns over damage caused by ionizing radiation. Both groups question the value of collecting all this information—they

accuse radiologists of wasting precious resources and causing harm when they see us standing next to the firehose.

As physicians, radiologists and potential patients, we must convince the public of our commitment to improve the value they receive for every healthcare dollar spent. The biggest leverage point is improving radiology quality, defined as the degree to which our actions increase the likelihood of a positive health outcome.

In my view, we can best make our case by optimizing radiation use during fluoroscopic procedures. When we step on the fluoro pedal, we directly control information flow. We must collect evidence demonstrating we are continually improving our ability to regulate radiation flow so that we gather just enough informa-



**James R. Duncan, M.D., Ph.D.**

tion to solve the problem at hand. Achieving the same or better outcomes with less radiation is an opportunity to persuade the public that radiologists are capable of doing more with less.

While we might not control many of the key valves in the information pipeline, we need to “Step Lightly” during fluoroscopic exams and continually optimize the information flow. Otherwise, someone else will step in and regulate the flow for us.

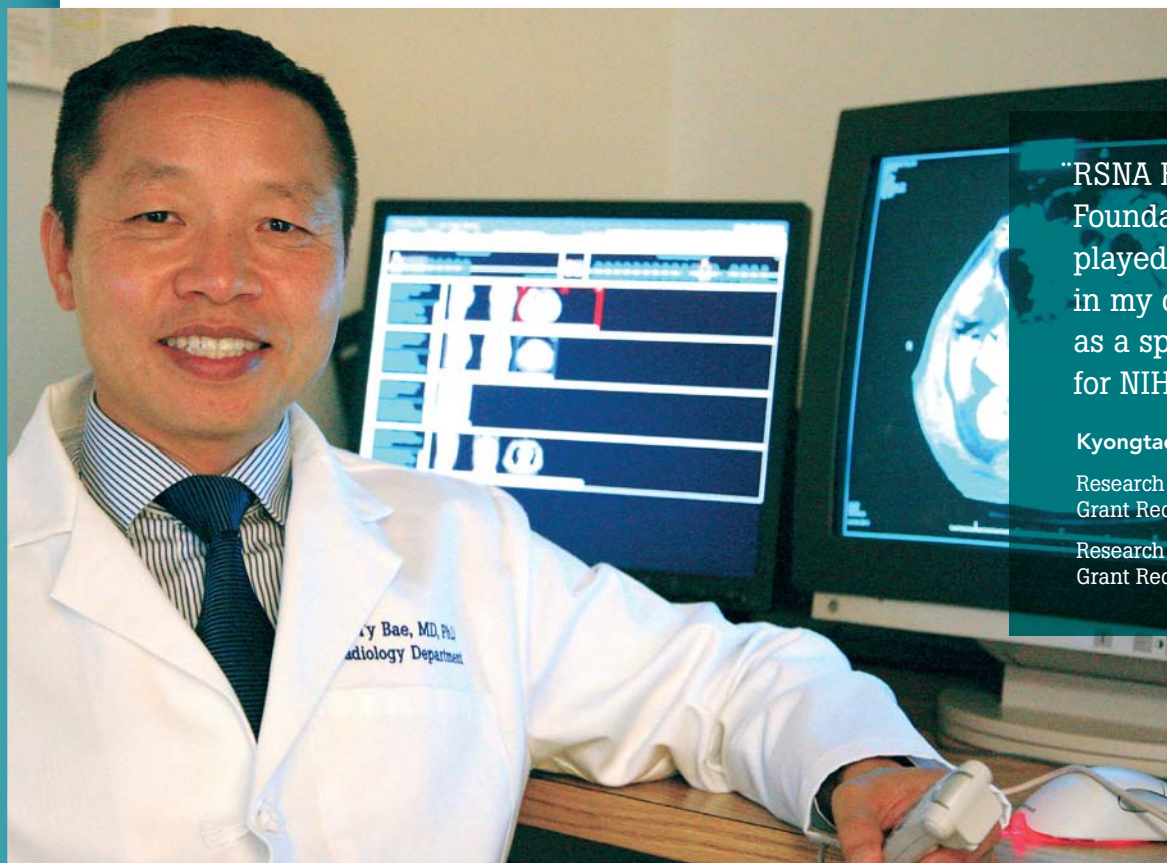
*James R. Duncan, M.D., Ph.D., is an associate professor of radiology in the Interventional Radiology Section of the Mallinckrodt Institute of Radiology at Washington University School of Medicine in St. Louis. Dr. Duncan serves as the department's chief quality and safety officer. He also serves on RSNA's Quality Improvement Committee and the structured reporting subcommittee of the RSNA Radiology Informatics Committee.*

**My Turn**  
**ONE**  
**RADIOLOGIST'S**  
**VIEW**



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# Stanford Lab Emerges as 3D Imaging Leader

**D**URING THE COURSE of producing extraordinary clinical images for patients and clinicians, the 3D Imaging Laboratory at Stanford University School of Medicine has established itself an international epicenter for developing and teaching the 3D image postprocessing techniques that are becoming increasingly critical to clinicians and researchers worldwide.

“On the research side, we’re always working to develop new and more efficient postprocessing techniques,” said Laura Pierce, M.P.A., R.T.(CT), manager of the laboratory. “On the educational side, we disseminate the information we have acquired here to the world so that other sites can use this technology and implement their own 3D laboratories.”

The lab recently unveiled its very latest in 3D images to the public at [Flickr.com/photos/StanfordMedicine](http://Flickr.com/photos/StanfordMedicine).

Pierce has been involved with the lab since its inception in 1996, along with Stanford radiology professors Sandy Napel, Ph.D., and Geoffrey D. Rubin, M.D. The lab was among the

first to develop advanced visualization for CT colonoscopy as well as vascular visualization techniques including removal of bone (segmentation); maximum intensity projections; curved planar reformats that follow the trajectory of vessels through the body for display on a single image; and quantification, such as measuring the maximum diameter of an aneurysm or the position of a stent graft and measuring change over time, according to Pierce.



**Laura Pierce, M.P.A., R.T.(CT)**  
Stanford University



**Sandy Napel, Ph.D.**  
Stanford University



**Geoffrey D. Rubin, M.D.**  
Stanford University

The lab has also developed several computer-aided detection (CAD) techniques for procedures such as CT colonoscopy and lung nodule detection. Data used to create 3D images comes from images produced by CT and MR imaging scanners. Examinations appropriate for 3D imaging

are routed to the lab via PACS. The majority of image processing is done by specially trained radiologic technologists.

“In our past lives we were technologists in CT, MR and cath-angio,” said Pierce. “There are seven of us process-

ing cases full time and our volume has increased to almost 1,000 exams a month.”

## Protocols Drive Postprocessing

Images are processed according to protocols based on the type of imaging study, Dr. Rubin said. “Some focus predominantly on measurements made in the dataset, others focus on visualization and the creation of images and many have elements of both,” he said.

The lab currently has about 90 protocols and more are continually being added, said Dr. Rubin. These protocols enable the quantitative measurement that is essential for quality assurance, he said.

“Although every exam is slotted into a specific protocol we have enough breadth in our protocols to accommodate the wide range of clinical scenarios we may encounter,” said Dr. Rubin. “The protocols form the basis for a highly formalized quality assurance/improvement program. We have learned lessons that go well beyond the 3D lab and could benefit many areas of diagnosis, both within radiology and beyond.”

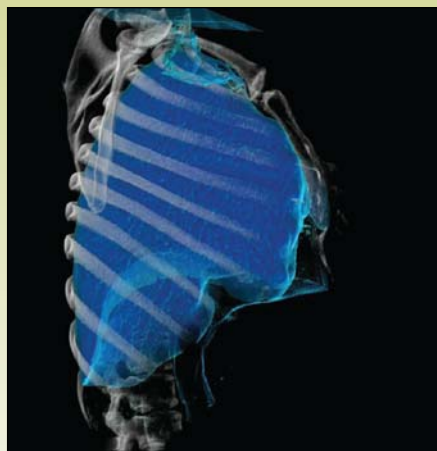
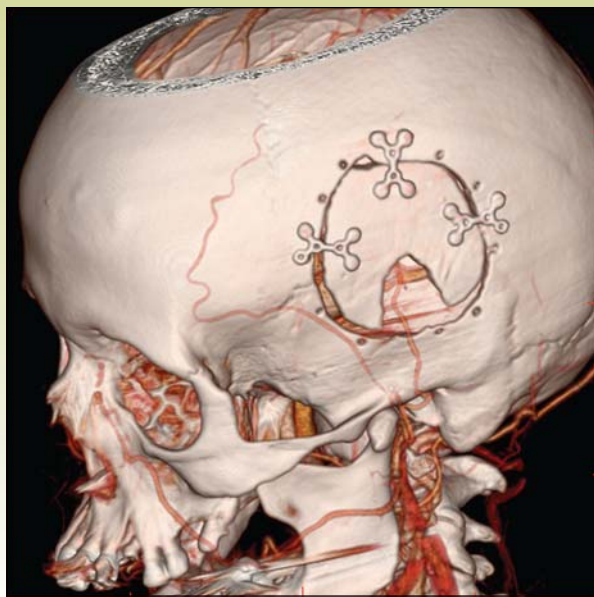
After creating protocol images, the technologist also produces images unique to each patient’s dataset, said Pierce.

“The technologist has to look into the patient’s history and understand what the radiologist needs to see,” she said. “For example, if the patient has a neoplasm in the pancreas, the technologist will decide which views will best demonstrate that neoplasm to allow the radiologist and the referring physician to fully characterize its location and extent.”

*When CT went from single to multidetector and it became possible to get very thin slices, the ability to create these images was improved.”*

**Sandy Napel, Ph.D.**





#### ON THE COVER

A CT image of legs reveals underlying bone, muscle and vasculature in this 360° composition from Stanford's 3D Radiology Laboratory.

Images courtesy of Stanford Radiology 3D Laboratory.

(Above) This lateral view of the upper torso, constructed from CT data in Stanford's 3D Radiology Laboratory, reveals the lungs in relation to surrounding bone and shows the "texture" of contoured surfaces.

(Left) A CT image illustrates cranial sutures holding a piece of bone removed during surgery.

### 3D Postprocessing Evolves with CT

The mathematical basis for 3D postprocessing has been around since the early days of the first CT scanners, with significant gains coming recently, Dr. Napel said.

"Over the past five years, the clarity and detail in these images have improved substantially and most of that is due to the improvement in resolution in the imaging devices," he said. "When CT went from single to multidetector, and it became possible to get very thin slices, the ability to create these images was improved."

Due to advancements in CT and available datasets, 3D imaging has become a necessary part of daily practice, according to Elliot K. Fishman, M.D. "It's no longer an option," said Dr. Fishman, a professor of radiology and oncology at The Johns Hopkins University School of Medicine and director of Diagnostic Imaging and Body CT at The Johns Hopkins Hospital. "We used to have 100 slices and now we have 1,000. We can't begin to look at all of those slices without 3D."

Equipment vendors have been working for the past several years to improve data rendering techniques, said Dr. Napel, resulting in fine enhancements such as imparting "light" to the images. "An image can be shaded in such a way

as if there were, for instance, a light sitting off to one side, so you can better see surface variations the way you would with room lighting," he said.

Postprocessing speed has continued to improve as well. "For perspective, the first virtual colonoscopy images that we made in 1994 were rendered on a \$250,000 computer and it took 48 hours to create 1,000 frames of a movie to fly through," Dr. Napel said. "Now you can do that in real time as you drive through the volume with a computer that costs no more than an average laptop. Progress has been facilitated through faster processors and clever software implementations."

Because some added time and cost are still involved, only about a tenth of the CT and MR examinations performed at Stanford are processed as 3D images, Pierce noted. "We only use 3D when it's going to add value to a patient's exam," she explained. "I think we have to be good stewards of this technology and not increase patient cost needlessly."

### Flickr Site Aids Patient Understanding

The 3D photos on Flickr include a sampling of images ranging from vascular to musculoskeletal. A few viewers have posted comments and questions—answered by Stanford staff—about topics like avoiding arterial calcification

and radiation exposure from CT scans.

"The site is mainly for the public to see and appreciate what we do," said Dr. Rubin. "The opportunity for public education is compelling."

The ability of 3D images to demonstrate anatomical features plainly to even the layperson is beneficial to practitioners and patients alike, added Dr. Napel. Referring physicians can use the images as visual aids to help patients understand the disease process. "It's a lot easier for patients to understand what's really going on inside their body when they see these images," he said.

### 3D in Every Institution is Goal

Although understanding the nuances of visualization requires highly specialized skills, few such training opportunities for technologists exist, according to Pierce.

"Right now the only training a technologist can get is from the vendors, and it's only for a few days once you purchase a workstation," she said. "The vendors don't really have any idea about clinical images that are necessary to display pathology." Few academic programs offer 3D training, she added.

Stanford's 3D lab offers clinical training on postprocessing skills via fellowship and assistance to institutions interested in starting a 3D lab,

*Continued on Page 9*

# Biomarker Identification Accelerates Alzheimer Research

**A** NEW STUDY, showing that PET scans and cognitive testing can help detect the risk of developing Alzheimer disease (AD), is among promising new research that could lead to diagnosis of AD at the preclinical stage.

The findings were among those presented by investigators from the landmark Alzheimer's Disease Neuroimaging Initiative (ADNI) at the Alzheimer's Association's 2009 International Conference on Alzheimer's Disease (ICAD) held in July in Vienna, Austria.

"Aggressive imaging research is under way to identify patients who are at risk for developing or are in the early stages of AD," said Matthew T. Walker, M.D., chair of the RSNA Education Committee's Neuroradiology Subcommittee. "One goal is early intervention to slow the progression of disease. The ultimate goal is to identify high-risk patients and prevent the disease from developing. To that end, great strides have been made with flurodeoxyglucose (FDG) PET and MR morphometry in combination with neurocognitive tests and other measurable biomarkers."

Launched in 2004, ADNI is an ongoing \$60 million public-private partnership organized by the National Institutes of Health (NIH) to test whether imaging technologies such as MR imaging, PET, biomarkers and clinical and neuropsychological assessment can be combined to measure progression toward AD. The private partners are managed through

the Foundation for NIH.

This multicenter initiative involves 57 centers in Canada and the U.S. and includes more than 800 people who have normal cognition, mild cognitive impairment (MCI) or the early stages of AD. The initiative is unique because any qualified researcher can access its database at [www.loni.ucla.edu/ADNI](http://www.loni.ucla.edu/ADNI).

## PET, Memory Scans Predict AD

In one ADNI study, investigators from the University of California (UC) Berkeley, discovered that subjects with MCI who had a low baseline FDG-PET and poor memory recall were 15 times more likely to develop AD over a two-year period compared to patients who had normal PET scans and memory recall.

Primary investigator William Jagust, M.D., and Susan Landau, Ph.D., used data from 85 ADNI participants with MCI that included MR imaging, PET, cerebrospinal fluid protein measurements, the genetic marker apolipoprotein E and memory recall tests at six-month intervals. The goal of the study was to use a variety of predictor variables obtained at baseline to identify MCI patients likely to experience further cognitive



Susan Landau, Ph.D.  
UC Berkeley



Michael Ewers, Ph.D.  
Trinity College, Dublin

decline or convert to AD.

Researchers found that low measurements of glucose metabolism in FDG PET scans and poor recall on an auditory-verbal memory recall test were the most consistent predictors for progressing from MCI to AD. Of the total group, 28 subjects converted to AD within the two-year follow-up period, said Dr. Landau, a post-doctoral fellow at UC Berkeley's Helen Wills Neuroscience Institute and the Lawrence Berkeley National Laboratory.

This is the first time a longitudinal study has examined all of these biomarkers in the same subjects, which aids researchers in comparing the predictive value of any one more biomarker over the other, said Dr. Landau. The research has been submitted for publication, she said.

"This research is important because it will help us select participants for future studies," said Dr. Landau. "We need to figure out who is more likely to experience clinical decline so we can target those patients for trials and treatments."

*This research is important because it will help us select participants for future studies. We need to figure out who is more likely to experience clinical decline so we can target those patients for trials and treatments.*

Susan Landau, Ph.D.

### Hippocampus Key to Early AD Diagnosis

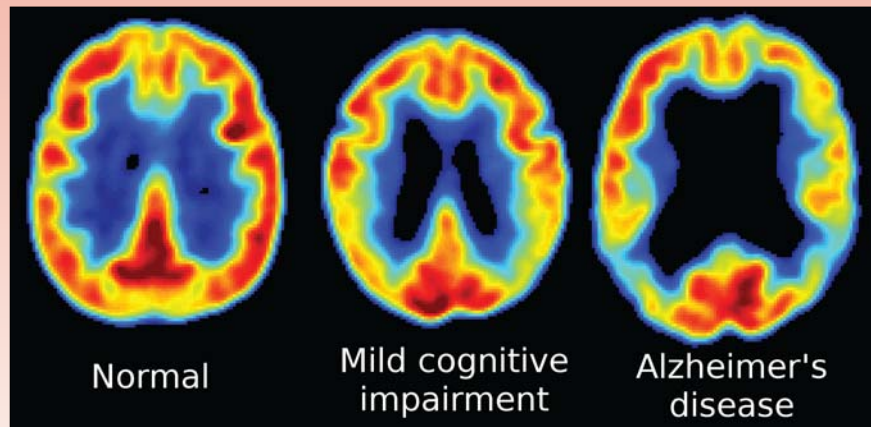
MR imaging-based measures of brain atrophy in the hippocampus proved to be the most sensitive to early indicators of AD when combined with another primary biomarker or neuropsychological measure as demonstrated by Michael Ewers, Ph.D., and principal investigator Harald Hampel, M.D., both of Trinity College of Dublin. Dr. Hampel presented ADNI findings at ICAD.

In a study of 345 subjects including 81 AD patients, 163 amnesic MCI subjects and 101 elderly healthy controls, researchers used a relatively simple prediction model combining hippocampal volume measured by MR imaging and episodic memory testing to diagnose AD at a very early stage with 94 percent accuracy, according to Dr. Ewers.

“Results show that the fully automated MR imaging-based volumetry of the hippocampus can achieve clinically relevant diagnostic accuracy when combined with psychometric tests of episodic memory ability or cerebrospinal fluid markers of tau and beta-amyloid,” said Dr. Ewers, senior research fellow at Trinity College.

The research, also conducted by Cathal Walsh, Ph.D., and other ADNI researchers, has been submitted for publication, according to Dr. Ewers, who is analyzing a follow-up study using ADNI data.

“We have demonstrated that a combination of primary biomarker candidates significantly improves early detection of AD when compared to unidimensional prediction of AD,” said Dr. Ewers. “Eventually we will have to



Researchers at the University of California (UC), Berkeley, discovered that subjects with mild cognitive impairment (MCI) who had a low baseline FDG-PET and poor memory recall were 15 times more likely to develop Alzheimer's disease (AD) over a two-year period compared to patients who had normal PET scans and memory recall. Above: FDG-PET images show reduced glucose metabolism in temporal and parietal regions in AD and MCI.

Image courtesy of Suzanne Baker, Ph.D., and Susan Landau, Ph.D.

weigh the benefits against the cost of the assessment.”

### ADNI Database Promotes Information Sharing

Qualified physicians seeking such landmark research can access the ADNI database which contains biomarker data along with thousands of MR imaging and PET brain images and clinical data, according to Neil S. Buckholtz, Ph.D., chief of the Dementias of Aging Branch of the Division of Neuroscience at the National Institute on Aging and a founder of the ADNI initiative. Medical researchers at universities and those who work for imaging and pharmaceutical companies are given equal access, he said.

The database has fast become a model for information sharing—critical considering that approximately 35 million people worldwide are living with AD or some form of dementia, with that number expected to nearly double every 20 years to 65.7 million by 2030,

according to the 2009 World Alzheimer Report.

ADNI received an NIH grant utilizing American Recovery and Reinvestment Act funds that will allow recruiting 200 new subjects with an earlier stage of MCI and tracking normal cognitive aging subjects as well as those with a later stage of MCI from the original ADNI study.

“No other study has been able to do this and get as many participants at 57 sites in the U.S. and Canada,” said Dr. Buckholtz.

Dr. Landau said she believes ADNI studies will lead to many breakthroughs in the fight against AD in years to come. “This is an amazing joining of forces of all these researchers,” she said.

#### Learn More

■ For information on the Alzheimer's Disease Neuroimaging Initiative, go to [www.adni-info.org](http://www.adni-info.org). Investigators can apply for access to ADNI data at [www.loni.ucla.edu/ADNI](http://www.loni.ucla.edu/ADNI).

### Stanford Lab Emerges as 3D Imaging Leader

*Continued from Page 7*

said Pierce. While Stanford may have emerged as a trendsetter, Pierce emphasized it's possible for any institution to create such a lab.

“What we do here is very reproducible,” she said. “It's not that we have the great technology here. You can duplicate it at any site, anywhere

around the world.

Dr. Fishman agreed. “Although Stanford is a role model of excellence in terms of 3D imaging, everyone should be doing it,” he said. “There are different models at different places, but when all is said and done, the important thing is that you use 3D imaging.”

“I would like there to be 3D labs in

every radiology department, even if it's very small,” said Pierce.

#### Learn More

■ For more information on the 3D Imaging Laboratory at Stanford University School of Medicine, go to [3dradiology.stanford.edu](http://3dradiology.stanford.edu). A photoset of Stanford's 3D images is available at [Flickr.com/photos/StanfordMedicine](http://Flickr.com/photos/StanfordMedicine).



# Negative Perception of Pediatric Radiology May Explain Workforce Shortage

**T**HE PERCEPTION that pediatric radiologists earn less money and are more limited in where they work were among the deterrents named by radiology residents surveyed in a recent study analyzing the persistent workforce shortage in the subspecialty.

The survey published in the September 2009 issue of the *Journal of the American College of Radiology (JACR)* used the online tool *SurveyMonkey.com* to randomly question selected radiology residents on issues such as fellowship and career plans as well as possible factors affecting fellowship choice. Of the 1,000 residents asked to complete the survey, 332 responses were tabulated.

“Residents want flexible job opportunities and fair compensation,” said Ryan Arnold, M.D., lead author of the study and a fellow at Children’s Hospital Boston. “There’s a perception that pediatric radiology is disadvantaged in these areas.”

Overall, the four most popular subspecialties named in the survey were body imaging at 16 percent, neuro-radiology at 15 percent, interventional radiology at 14 percent and musculoskeletal imaging at 13 percent. Seven percent of respondents chose pediatric radiology, although the study authors said a response bias may have inflated the percentage as the questionnaire purposely identified the survey as a project of the Society of Pediatric Radiology (SPR).



**Ryan Arnold, M.D.**  
Children’s Hospital Boston



**Richard Barth, M.D.**  
Lucile Packard Children’s Hospital and Stanford University



**George Taylor, M.D.**  
Children’s Hospital Boston and Harvard Medical School

*Residents want flexible job opportunities and fair compensation. There’s a perception that pediatric radiology is disadvantaged in these areas.*

**Ryan Arnold, M.D.**

Those who chose pediatric radiology ranked three factors higher than others: physician-to-physician interaction, physician-to-patient contact and altruism. By comparison, the three highest factors for the entire pool of residents were areas of strong personal interest (what I love doing), advanced/multimodality imaging and intellectual challenge.

### Examining Deterrents to Pediatric Radiology

Followed by breast imaging and interventional radiology,

pediatric radiology was named the third most difficult subspecialty to fill according to “Update on the Diagnostic Radiology Employment Market: Findings Through 2007-2008,” published in the July 2008 issue of *JACR*.

Approximately 57 pediatric radiologists are trained each year but not all

stay in the U.S., according to Dr. Arnold and colleagues. Approximately 100 positions are advertised, the study said.

“Finding out what deters residents from choosing pediatric radiology has been helpful,” said Dr. Arnold.

Respondents said they believe pediatric radiologists make \$325,000 a year versus \$385,000 for other subspecialties and are more limited in their place of work—mostly to academic centers, the survey showed.

Although there is no up-to-date comparison of salaries among all subspecialties, an examination of advertised positions showed opportunities for “partnership tracks in adult-centered practices, with an opportunity to read 50 to 100 percent pediatric cases,” according to the study.

“Subspecialists in these groups become partners after one to three years and enjoy equal earning potential in the partnerships,” the study said. Half of the advertised positions were in non-academic settings.

## Pediatrics Must Lure Residents Early

Overcoming the perceptions identified in the study begins in residency or earlier, said Dr. Arnold, who said he was drawn to pediatric radiology during his second year of medical school.

"I saw the pediatric radiologist at our hospital interacting with patients and clinicians and she seemed to be making a real difference in patient care," he said. "Radiology residents are the future of our subspecialty. They need to provide inspiring, enjoyable experiences during pediatric rotations. These rotations also have to take place early in their training before fellowship applications are due."

Clearly that is one of the biggest changes in the subspecialty in the past 10 to 15 years, said Richard Barth, M.D., radiologist-in-chief at Lucile Packard Children's Hospital, a professor and associate chair of radiology at Stanford University and a member of the RSNA pediatrics subcommittee.

"If residents are exposed to exciting modalities, of course they are going to want to continue that in their fellowship," Dr. Barth said. "Historically, pediatric radiologists suffered in not having some of those exciting modalities. They were relegated to doing more of the plain film work and didn't have access to high-end procedures. That has changed a lot."

Attending an SPR annual meeting with a respected mentor helped sway Dr. Barth in choosing the subspecialty, he said.

"This mentor really took me aside and talked to me about how much he loved pediatric radiology," he said. "He really made me feel a part of the pediatric radiology family as a junior resident. I never looked back."

At Children's Hospital Boston, residents and fellows work with staff members who believe in what they are doing, said George Taylor, M.D., who co-authored the study, "SOS: Can We Save Pediatric Radiology?" published in the June 2005 issue of *Radiology*.

"This is a fun place to be," said

Dr. Taylor, radiologist-in-chief at Children's Hospital Boston and the John A. Kirkpatrick Professor of Radiology at Harvard Medical School. "Residents get here and they love it."

Dr. Taylor contrasts that to experiences where residents see practitioners who are spread too thin and then wonder, "Why would I want to do that?"

## The Changing Face of Pediatric Radiology

Has anything changed since the 2005 *Radiology* article? Yes and no, Dr. Taylor said. Although the number of residents entering the subspecialty has not fluctuated much, the range of career paths is broadening, he said.

Dr. Taylor said he believes pediatric radiology will change over the next decade in part due to the increasing number of children from diverse backgrounds who will need care. He also believes smaller pediatric units will close and that higher-end care will shift toward larger medical centers. The growth of teleradiology will also have a centralizing impact.

The biggest surprise in the study was that imaging modalities ranked so high in residents' fellowship choices, said Dr. Arnold. Researchers were also surprised that subjective factors such as personal interest and intellectual challenge outweighed objective factors such as compensation, call responsibilities and work hours.

There was a bit of a conflict with the information on compensation importance. "Favorable financial compensation" came out as No. 13 on a list of 20 factors for choosing a subspecialty. However, compensation concerns were the second-most important deterrent.

## Promoting Pediatric Radiology a Must

The considerable change now under way in healthcare in general and overall makes it difficult to predict how pediatric radiology will change in the next decade, said Dr. Barth. "It's like predicting interest rates."

With the economy, resident educa-

## Subspecialty Preferences Among Residents:

Body Imaging	15.7%
Neuroradiology	15.1%
Interventional Radiology	14.2%
Musculoskeletal Imaging	13.4%
Women's Imaging	9.8%
Other or Unsure	8.9%
MRI Fellowship	8.0%
Pediatric Radiology	7.1%
Chest/Cardiac	3.3%
Nuclear Medicine	3.0%

Source: "Factors Influencing Subspecialty Choice Among Radiology Residents: A Case Study of Pediatric Radiology," *Journal of the American College of Radiology* 2009;6:635-642

tion and healthcare all in a state of flux, "there's no way to predict the future of the job market," Dr. Arnold said. "The shortage is a little better than it was five years ago."

Going forward, SPR is more aware of potential workforce shortfalls and has created a task force dedicated to keeping the specialty filled, said Dr. Arnold. He stresses the importance of emphasizing the many job opportunities, diverse practice setting and well-compensated private practice positions available to pediatric radiology graduates.

"Fortunately, as we promote the wide array of jobs—and incomes—available, residents can be reassured that they will have plenty of options," said Dr. Arnold. □

## Learn More

■ To view an abstract of the study, "Factors Influencing Subspecialty Choice Among Radiology Residents: A Case Study of Pediatric Radiology," published in the September 2009 issue of the *Journal of the American College of Radiology (JACR)*, go to [acr.org/article/S1546-1440\(09\)00232-4/abstract](http://acr.org/article/S1546-1440(09)00232-4/abstract).

■ To view an abstract of the study, "Update on the Diagnostic Radiology Employment Market: Findings through 2007-2008," published in the July 2008 issue of *JACR*, go to [jacr.org/article/S1546-1440\(08\)00089-6/abstract](http://jacr.org/article/S1546-1440(08)00089-6/abstract).

■ To view the study, "SOS: Can We Save Pediatric Radiology?" published in the June 2005 issue of *Radiology*, go to [radiology.rsna.org/content/235/3/719.full](http://radiology.rsna.org/content/235/3/719.full).

# Study Reinforces Concerns about CIN

**A** RECENT STUDY linking contrast-induced nephropathy (CIN) to long-term adverse events is causing some radiologists to question whether the research mischaracterizes the role of intravenous contrast—thereby discouraging its use.

Although research has long established a link between acute kidney injury and poor long-term outcomes, a causal relationship to CIN has not been conclusively confirmed.

In the study published in the June 2009 issue of the *Clinical Journal of the American Society of Nephrology (CJASN)* researchers again asserted that developing acute kidney injury after exposure to CIN is associated with worse one-year outcomes, particularly death, heart attack and stroke.

“Until this study, the assumption has always been that patients who develop kidney injury are in some way sicker to begin with,” said lead author Richard J. Solomon, M.D., a professor of medicine at the University of Vermont College of Medicine and director of the division of nephrology at Fletcher Allen Health Care in Burlington, Vermont. “Kidney injury was thought to be a flag that marks the patient as sick and not as likely to survive.”

## CIN Patients Exhibit Great Number of Adverse Events

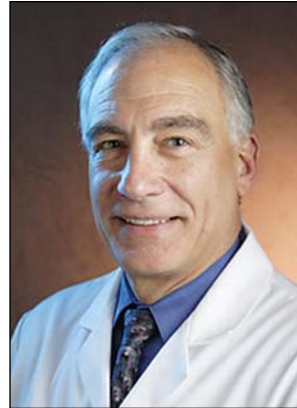
In the current study, researchers used data from the 2007 Cardiac Angiography in Renally Impaired Patients (CARE) trial—a randomized, prospective trial comparing two contrast agents—iopamidol and iodixanol—in preventing CIN. Dr. Solomon, also the lead author on the CARE study, and colleagues, conducted a follow-up

study on 294 of the original 414 CARE participants one year or more after contrast exposure. In the double-blind comparison of the two contrast agents, researchers examined the incidence of adverse events between patients who developed CIN and those who did not.

Researchers discovered that the incidence of adverse events overall was significantly lower in iopamidol recipients than in iodixanol recipients (27 percent vs. 36 percent), as was the incidence of major adverse events (11 percent vs. 15 percent) respectively.

Of the 294 patients, 31 percent experienced adverse events while 13 percent experienced major adverse events including death, stroke, myocardial infarction or end-stage renal disease that required dialysis. For all definitions of CIN, the incidence of adverse events was significantly greater in CIN patients (42 percent vs. 46 percent) than non-CIN patients (26 percent vs. 29 percent) respectively, according to the study.

Because the CARE trial was supported by a grant from Bracco Diagnostics, Inc., which manufactures iopamidol, Michael A. Bettmann, M.D., offers a word of caution concerning the study. Dr. Solomon is also a paid consultant for Bracco.



**Richard J. Solomon, M.D.**  
University of Vermont College of Medicine



**Michael A. Bettmann, M.D.**  
Wake Forrest University Baptist Medical Center

“It is important to keep in mind that if a researcher has financial backing from a company, then invariably the article is likely to show that the agent produced by that company is better than or at least as good as the comparator agent,” said Dr. Bettmann, a professor and vice-chair for Interventional Services, Department of Radiology at Wake Forrest University Baptist Medical Center in Winston-Salem, N.C.

In response, Dr. Solomon replied:

*Until this study, the assumption has always been that patients who develop kidney injury are in some way sicker to begin with.*

**Richard J. Solomon, M.D.**

“This paper isn’t about contrast agents—it’s about the relationship between kidney injury to long-term outcomes,” he said. “We used data from a trial that randomized subjects to two different contrast agents.

The randomization process controls for the baseline risk-factor burden. The difference in long-term outcomes in subjects with less CIN implies a causal relationship, not a lower risk factor burden.”



## Radiologists Question Cardiac Connection to CIN

A small but growing number of radiologists who question the assumption that intravenous CT contrast is linked to CIN are now asking whether the actual link lies with administering arterial contrast during coronary procedures.

“The *CJASN* analysis is a very logical and well done, and I think the conclusions are valid,” said Jeffrey H. Newhouse, M.D., of the Department of Radiology at Columbia-Presbyterian Medical Center in New York. “However, I think it’s important to caution everyone that this is a group of patients who had cardiac catheterization. You cannot make the automatic assumption that the same results will occur in patients who receive contrast intravenously.”

Mischaracterizing the study lead radiologists to exaggerate the risk that contrast actually carries, said Dr. Newhouse.

“To assume these results would be the same if contrast was administered intravenously is not valid,” said Dr. Newhouse, who presented the multi-session course, “Intravenous Contrast Media and Contrast-Induced Nephropathy: What is the Risk,” at RSNA 2009.

Dr. Solomon agrees that the risk of CIN could be overestimated for intravenous contrast and that there is very little data on long-term outcomes with intravenous contrast.

“Less data doesn’t mean it doesn’t happen, but the evidence is not nearly as strong for intravenous use with CT,” said Dr. Solomon. “However, CIN does occur with intravenous contrast and when examined in large databases, research has shown that patients who develop CIN following intravenous contrast have worse short- and long-term outcomes.

## Different CIN Definitions Questioned

The study’s methodology was also questioned by Dr. Bettmann who pointed out that different definitions of CIN are used in the original CARE

study vs. the current study and that 120 of the patients included in the initial study were not included in the one-year follow up.

“It’s an odd statistical analysis,” said Dr. Bettmann, who presented “Intra-arterial Contrast Media and Contrast-Induced Nephropathy: Significance and Prevention,” as part of the RSNA 2009 Genitourinary Series, “Contrast Material and the Kidneys—Issues and Controversies Concerning Contrast-induced Nephropathy and Nephrogenic System Fibrosis.”

“The study starts with data showing no difference between two contrast agents and ends up with new results through different definitions of CIN than were used originally to show there are differences between the contrast agents,” said Dr. Bettmann.

In the original CARE trial, CIN was defined as a serum creatinine (SCr) increase of 0.5 mg/dL or higher or an increase of 25 percent or more. The study did not prove a significant difference between the groups.

In the follow-up study, Dr. Solomon and colleagues defined CIN as a rise in SCr of 0.3 mg/dL and relative increases in cystatin C, which Dr. Solomon said has repeatedly shown to have greater sensitivity and specificity for acute kidney injury compared to creatinine.

Researchers used three definitions of CIN based on rises in cystatin C: 15 percent or greater, 20 percent or greater and 25 percent or greater. By all definitions, iopamidol recipients in the follow-up trial had a lower incidence of CIN compared with iodixanol recipients, the study showed.

“Furthermore, in 350 patients of the original CARE study, cystatin C changes showed that there was a difference in the incidence of acute kidney injury between the two arms of the study, confirming the non statistically significant trend that was evident in the original trial using creatinine levels,” said Dr. Solomon.

The cystatin C definitions were considered clinically valid because they

were significantly associated with a doubling of one-year adverse events, said Dr. Solomon. “The two-fold increase in adverse events in patients with acute kidney injury is consistent with other observations in literature of the impact of acute kidney injury on these same adverse events.”

In terms of the patient cohort, Dr. Solomon said the 120 patients lost to follow-up were not different clinically or demographically from the 294 in the current study. “The baseline characteristics of the original patients were similar to those in the follow-up cohort reducing the likelihood that there was a bias created by the loss of these patients.”

## Alternative Markers Part of Future CIN Research

The more sensitive definitions should be included as primary outcomes in future randomized trials for CIN prevention and long-term adverse events should be included as secondary trial outcomes, suggested Dr. Solomon.

Alternative markers will see more use because of the statistical power associated with them, predicts Dr. Solomon. “We know that defining kidney injury by creatinine change is very imprecise,” said Dr. Solomon.

“In light of my research and reading, I suggest that radiologists consider raising the creatinine threshold for CIN as it would be diagnosed if the patient’s creatinine changed,” said Dr. Newhouse. □

## Learn More

■ To view an abstract of the study, “Contrast-Induced Nephropathy and Long-Term Adverse Events: Cause and Effect?” in the June 2009 issue of the *Clinical Journal of the American Society of Nephrology*, go to [cjasn.asnjournals.org/cgi/content/abstract/4/7/1162](http://cjasn.asnjournals.org/cgi/content/abstract/4/7/1162).

# iPhone Application Tracks Radiation Exposure, Risk

**E**DUCATING the public, residents and referring physicians about radiation exposure and associated risk took a step forward with the creation of the new iPhone application, Radiation Passport.

The concept first came to Mark Baerlocher, M.D., as a resident in his final year in the Radiology Residency Training Program at the University of Toronto. Dr. Baerlocher co-authored a 2007 study that found that 92 percent of 127 patients surveyed were not informed of the radiation risks associated with tests they were scheduled to receive and had false perceptions about the use of radiation and associated risks.

The study, "Perception of Radiation Exposure and Risk Among Patients, Medical Students and Referring Physicians at a Tertiary Care Community Hospital," has yet to be published but was presented at the Society of Interventional Radiology's 2008 annual meeting.

That research cited a 2007 *New England Journal of Medicine* study that estimates 1.5 to 2 percent of all cancers in the U.S. may be attributable to CT in the future if current usage rates continue. Other studies have shown that potentially up to one-third of CT scans are not "medically indicated," said Dr. Baerlocher.

"A lot of patients who undergo procedures and exams aren't educated on the risks," he said. "I think that's unfortunate, and I think that has to change."

To that end, the National Institutes of Health (NIH) recently began requiring CT and PET/CT equipment

purchased by its Clinical Center to routinely record radiation dose exposure in a patient's hospital-based electronic health record (EHR).

## Patients, Physicians Estimate Dose, Risk

Teaming with his brother Adrian Baerlocher, a programmer at Tidal Pool Software in Victoria, British Columbia, Dr. Baerlocher created Radiation Passport, a program designed to track radiation exposure and calculate cancer risk related to radiology exams and procedures as well as common background radiation.

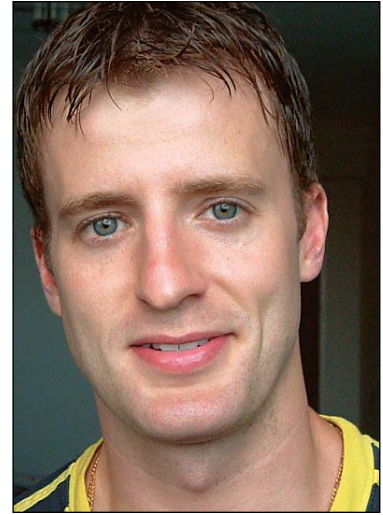
He began by examining other research including the Biological Effects of Ionizing Radiation (BEIR) VII Committee's 2005 lifetime risk model which predicts that approximately one in 100 persons would be

*In the future I wouldn't be surprised—and I kind of hope—that exposure doses will be attached to each individual imaging examining procedure so that it would be part of the patient's electronic health record.*

Mark Baerlocher, M.D.

expected to develop cancer (solid cancer or leukemia) from a dose of 100 mSv while approximately 42 of those 100 people would be expected to develop solid cancer or leukemia from other causes. Roughly half of these cancers would result in death, according to the report.

"We followed the same models that the BEIR VII Committee followed with the linear nonthreshold model," Dr. Baerlocher said. "From that report I came to the conclusion—which I'm sure many other people share—that more education and radiation risk awareness is necessary. The next logical step was to team up with my brother to program the iPhone application."



Mark Baerlocher, M.D.

Functions of the downloadable application, which costs \$3.99, are tailored to the user. If a specific exam is ordered, the patient can enter demographic information and exam type and the program will provide the estimated radiation dose and estimated cancer risk from that exam. Patients can also track their radiation exposure throughout their lifetime. As of early November, about 700 applications had been sold, Dr. Baerlocher said.

Healthcare workers can also use the program as an educational tool and resource in helping to evaluate the risk-benefit equation when deciding if an exam is necessary.

"A clinician can enter in the patient's gender and age, the modality of the exam and the body part targeted in the exam or procedure and the program assigns an average, published radiation effective dose," Dr. Baerlocher said. "The program then provides an estimated risk of developing fatal and nonfatal cancers from that dose due to that specific exam and the patient's age and gender."

Radiation Passport is designed to track radiation exposure and calculate cancer risk related to radiology exams and procedures as well as common background radiation.

From left: a screenshot from Radiation Passport lists imaging exams and related procedures for a given patient, with associated radiation exposures (effective dose); shows estimated risk of cancer with a specific exam (in this example, a bone scan), specific to a patient of given age and gender; and estimates risks of cancer (all exposure - Background + Medical and separately for Medical only—total and fatal) associated with radiation exposure for a patient of specific age and gender with a specific entered list of exposures.



### Critics Say Patients Need the Full Story

Some physicians say they want to make sure patients are getting all of the information when it comes to radiation dosage.

“My view is that no matter how exactly we believe we can measure something, those measurements should be considered estimates of the item of interest’s true value,” said James R. Duncan, M.D., Ph.D., an associate professor of radiology in the Interventional Radiology Section of the Mallinckrodt Institute of Radiology at Washington University School of Medicine in St. Louis and a member RSNA’s Quality Improvement Committee and the structured reporting subcommittee of the RSNA Radiology Informatics Committee. “While it is unnerving to think we are relying on estimates rather than true values when making decisions, the alternative is to completely discard the available data and rely on emotion to drive decisions.”

Dr. Baerlocher points out that there are inaccuracies with any model. “It is the best information we have available at this time, and in medicine that’s exactly what we do,” he said. “We act based on the best information we have at the time.”

Other physicians point out that the application only provides the risk side of the equation, making patients more likely to refuse a particular exam without having all the information. But Dr. Baerlocher said that healthcare workers have a responsibility to inform patients of the benefits of the exam as well as the risk.

“In the future I wouldn’t be

surprised—and I kind of hope—that exposure doses will be attached to each individual imaging examining procedure so that it would be part of the patient’s EHR,” he said.

### NIH Requires Dose Tracking

The NIH decision to require CT and PET/CT equipment purchased by its Clinical Center to routinely record radiation dose exposure in a patient’s hospital-based EHR is a significant step in that direction. About 25,000 CT and 1,250 PET/CT scans are performed at the center each year as part of NIH research protocols.

“Any new radiation producing equipment that we purchase at NIH will have this requirement,” said David Bluemke, M.D., Ph.D., director of radiology and imaging sciences at the Clinical Center. “In addition, the manufacturers are to provide a means for patients to upload radiation doses to their personal electronic medical records, such as Google Health or Microsoft HealthVault.

“This is necessary not only at NIH, but also at all hospitals across the country,” said Dr. Bluemke. “There is currently no routine means for any person in the U.S. to determine their annual lifetime exposure to medical radiation. Our policy is only one step in that direction.”

### Bridging the Gap Between Patient, Physician Knowledge

Patients aren’t alone in their lack of radiation knowledge, according to Dr. Baerlocher’s 2007 study. Dr. Baerlocher and colleagues surveyed medi-

cal students and referring physicians from various specialties to determine knowledge on radiation exposure and risk associated with commonly ordered medical imaging tests. Thirty-two referring physicians and 30 medical students completed the survey.

Researchers found that 25 percent of physicians and 43 percent of medical students were unaware that interventional procedures utilized ionizing radiation. Nine percent of physicians were unaware that CT scans were associated with ionizing radiation.

“In terms of the medical community as a whole, their education in radiology is poor and their education on the radiation side of radiology is probably non-existent,” said Andy Myers, M.D., C.M., a radiologist in the Department of Radiology at Lakeridge Health Corporation in Oshawa, Ontario, and co-author of the study. “We’re trying to bridge the gap between our knowledge and the public’s knowledge. It’s an ongoing challenge.”

### Learn More

- The study “Computed Tomography—An Increasing Source of Radiation Exposure,” published Nov. 29, 2007, in *The New England Journal of Medicine*, is available online at [content.nejm.org/cgi/content/full/357/22/2277](http://content.nejm.org/cgi/content/full/357/22/2277).
- For more information on Radiation Passport, go to [tidalpool.ca/radiationpassport/index.html](http://tidalpool.ca/radiationpassport/index.html).
- Copies of “Health Risks from Exposure to Low Levels of Ionizing Radiation (BEIR VII—Phase 2) are available at [www.nap.edu](http://www.nap.edu).





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 Jongdae Suh, M.D.  
 Susan G. & Richard J. Sukov, M.D.  
 Susan & Aijiro P. Suzuki, M.D.  
 Ghulam M. Syed, M.B.B.S., Ph.D.  
 Ruth H. & Richard A. Szucs, M.D.  
 Azita Tadjali, M.D.  
 Kristian Talle, M.D.  
 Karen M. & Robert D. Tarver, M.D.  
 Lynne S. Steinbach, M.D. &  
 Eric Tepper, M.D.  
*In memory of Sheila D. Davis, M.D.*  
 Kerry L. Thomas, M.D.  
 James H. Timmons, M.D., Ph.D.  
 Bradley M. Tipler, M.D.  
 Kitt Shaffer, M.D., Ph.D. &  
 Timothy Titcomb  
 Kathleen R. Tozer, M.D.  
 Stanford B. Trachtenberg, M.D.  
 Dianne & Phuoc T. Tran, M.D., Ph.D.  
 Bradley R. Trotter, M.D.  
 Astrid & Scott S. Tsai, M.D.  
 Kyo Tsuda, M.D.  
 Diane M. Twickler, M.D.  
 Bettyanne B. &  
 Homer L. Twigg Jr., M.D.  
 Ronni C. & Eric J. Udoff, M.D.  
 Chrie & Scott D. Valadez, M.D.  
 Gert J. Van Der Westhuizen,  
 M.B.Ch.B.  
 Philip G. Van Dyck, M.D.  
 Thomas Varghese, M.D.  
 Patricia & Richard I. Vigran, M.D.  
 Jyothipriya Jagannathan, M.B.B.S.  
 & Rajendran Vilvendhan, M.D.  
 Peter Vock, M.D.  
 David D. Vu, M.D.  
 Steven C. Wagner, M.D.  
 George H. Wakefield III, M.D.  
 Darlene & James C. Walker Jr., M.D.  
 Kyle R. Walker, D.O.  
 Scott A. Walker, M.D., Ph.D.  
 Eric W. Wallace, M.D.  
 Michael J. Wallace, M.D.  
 Edna A. Griffenhagen, M.D. &  
 Mark Waller  
 Scott Walter, M.S.  
*In memory of Peggy J. Fritzsche,*  
*M.D.*  
 Takeyuki Watadani, M.D.  
 Susan K. & James R. Weeks Jr., M.D.  
 Danielle M. Weems, M.D. &  
 Ronald Weems  
 Patti Novak, D.V.M. &  
 Ralph C. Weichselbaum, D.V.M.,  
 Ph.D.  
 Faith A. Weidner, M.D.  
 Judith & Steven Weisblatt, M.D.  
 Polly & Gregg A. Wells, M.D.  
 Naree & Richard I. Welshman,  
 M.B.B.S.  
 Siew K. Teoh, M.D. & Patrick Wen  
 Alexandra L. Wesley, M.D.  
 Gabriele &  
 Karl-Wilhelm Westerburg, M.D.  
 Paul R. White, M.D.  
 Elysa Widjaja, M.D.  
 Bret N. Wiechmann, M.D.  
 Aaron J. Wielenberg, M.D.  
 Susi Bottger, M.B.Ch.B. & Terry Willis  
 Dana & John R. Witherow, M.D.  
 Gerhard R. Wittich, M.D.  
 Holger H. Woerner, M.D.  
 Beverly P. Wood, M.D., M.S.Ed.,  
 Ph.D. & Lawrence W. Wood, M.D.  
 William F. Wosick, M.D.  
 Terri T. Samuel, M.D. &  
 Curtis Wright, M.D.  
 Daniel J. Wunder, M.D.  
 Clifford K. Yang, M.D.  
 Irene E. Chen, M.D. & Steven Yang  
 Nina & Ramana V. Vedavalli, M.S.,  
 M.D.  
 Angeline A. Young, M.D.  
 Richard S. Young, M.D.  
 Steven A. Young, M.D.  
 Henry R. Zayas, M.D.  
 Peter T. Zimmerman, M.D.  
 Olga & Christoph L. Zollikofer, M.D.  
 Beverly & Steven Zuckerman, D.O.  
 Suzanne & Mark Zwirn, M.D.  
 Dana & Charles V. Zwirewich, M.D.



# Journal Highlights

The following are highlights from the current issues of RSNA's two peer-reviewed journals.

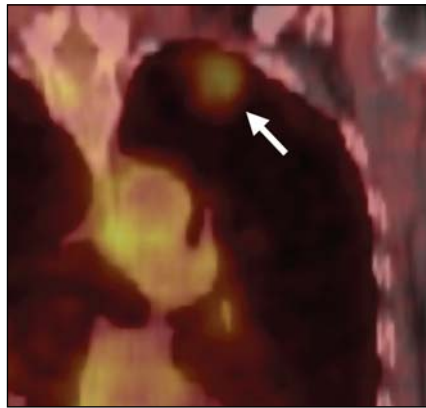
## Subsolid Pulmonary Nodules and the Spectrum of Peripheral Adenocarcinomas of the Lung: Recommended Interim Guidelines for Assessment and Management

**S**UBSOLID NODULES are now known to frequently represent the histologic spectrum of peripheral adenocarcinomas including premalignant atypical adenomatous hyperplasia, bronchioloalveolar carcinoma and mixed subtype adenocarcinoma. Based on current knowledge, new guidelines are necessary for follow up and management of subsolid nodules on CT scans.

**Radiology**

In a review article in the December issue of *Radiology* ([RSNA.org/radiology](http://RSNA.org/radiology)), Myrna C.B. Godoy, M.D., and David P. Naidich, M.D., of New York University-Langone Medical Center, examine clinical, radiologic and pathologic aspects of subsolid pulmonary nodules and propose new interim management guidelines. Specifically, authors discuss:

- Epidemiology and histopathologic classification of adenocarcinoma of the lung
- Peripheral adenocarcinoma: CT-pathologic correlations and prognosis
- Benign vs. malignant subsolid nod-



Correlated coronal PET image shows FDG uptake (*arrow*) by the lesion in the left upper lobe (maximum standardized uptake value, 3.4).

(*Radiology* 2009;29:7:2127-2141). © RSNA, 2009. All rights reserved. Printed with permission.

- ules: CT evaluation
- Current concepts in the diagnosis and management of subsolid nodules
- Growth rate of small peripheral adenocarcinomas in low-dose CT screening for lung cancer
- Methods for measuring interval change in the appearance of focal nodules
- Role of PET
- Role of transbronchial and transthoracic needle biopsy for diagnosis of BAC
- Surgical resection of small peripheral

adenocarcinomas

- Current status and ongoing controversies in the management of subsolid lung nodules

“It is anticipated that future developments based on multidisciplinary efforts will result in greater consensus regarding optimal CT classification of subsolid lesions and ultimately more definitive, evidence-based guidelines leading to more rigorous standardization and ultimately improved clinical treatment of patients with subsolid lung nodules,” the authors conclude.

## Thermal Ablation of Osteoid Osteoma: Overview and Step-by-Step Guide

**A**LTHOUGH osteoid osteoma—a small, benign but painful lesion with specific clinical and imaging characteristics—has traditionally been treated with surgery, the potentially serious complications have made percutaneous radiofrequency (RF) ablation an effective alternative.

**RadioGraphics**

In an article in the November-December issue of *RadioGraphics*

*Continued on next page*



Surgically inaccessible lesion. Axial and coronal CT images obtained in a 15-year-old girl demonstrate an osteoid osteoma in the left sacrum (*arrow*) with adjacent sclerosis and with narrowing of the left S2 neural foramen secondary to hyperostosis. Surgical access to a lesion in such close proximity to the nerve roots is a challenge.

(*RadioGraphics* 2009;253:3:606-622). © RSNA, 2009. All rights reserved. Printed with permission.

# Radiology in Public Focus

## Media Coverage of Radiology

IN October, media outlets carried 246 news stories generated by articles appearing in the print and online editions of *Radiology*. These stories reached an estimated 83 million people.

October coverage included *Diagnostic Imaging*, *Radiology Today*, *RT Image*, Yahoo! Health, The Medical News, Earth Times, Discovery Health, Science Daily, *modernmedicine.com*, *usnews.com*, *healthscout.com*, *ivillage.com*, *health24.com*, *dotmed.com*, *applesforhealth.com*, *healthfinder.com*, *drugs.com*, *abcnews.com*, *healthtechwire.com* and *orlandosentinel.com*.



## December Outreach Activities Focus on Pediatric Imaging

In December, RSNA's 60-Second Checkup radio program focuses on preparing children for a radiology procedure or exam, specific concerns related to imaging pediatric patients and the Image Gently Campaign launched in 2008 by the Alliance for Radiation Safety in Pediatric Imaging.

## Journal Highlights

Continued from previous page

### Thermal Ablation of Osteoid Osteoma: Overview and Step-by-Step Guide

([RSNA.org/radiographics](http://RSNA.org/radiographics)), Daria Motamedi, M.D., of Cedars-Sinai Medical Center in Los Angeles, and colleagues summarize the indications and contraindications for RF ablation and offer a step-by-step guide for performing successful ablation. In addition, the authors discuss:

- Histologic and radiologic imaging characteristics

- Differential diagnosis
- Treatment options
- Special cases
- Complications

“RF ablation, which involves the use of thermal coagulation to induce necrosis in the lesion, is a minimally invasive alternative to surgical treatment of osteoid osteoma,” the authors conclude. “With reported success rates

approaching 90 percent, RF ablation should be considered among the primary options available for treating this condition.

This article meets the criteria for 1.0 AMA PRA Category 1 Credit. CME is available online only.

### RSNA Launches Online System for Publication Permissions, Reprints

TO INCREASE the effectiveness of its permissions and reprints request process, RSNA has introduced RSNA Rights, an interactive, online permissions request form.

Requestors can select the service and/or licensed content, such as figures, tables and reprints, that they wish to purchase from RSNA publications

including *Radiology*, *RadioGraphics* and *RSNA News*. The form is online at [RSNA.org/publications/RSNARights](http://RSNA.org/publications/RSNARights).

RSNA's recently revised permissions policies include fees for non-authors, said Roberta E. Arnold, M.A., M.H.P.E., RSNA's assistant executive director of publications and public information.

“The change was made after a consultation indicated that RSNA was unique in not charging third parties for permission to use text, figures and tables taken directly from journal articles for which RSNA owns copyright,” said Arnold. “We found that many publishers even charged authors for subsequent use of their own material.

However, RSNA gives authors a license to use their images as they see fit, and this is a policy that the Society will not change.”

Answers to frequently asked questions about RSNA's permissions policies are available at [RSNA.org/publications/RSNARights/faq.cfm](http://RSNA.org/publications/RSNARights/faq.cfm).

# Program and Grant Announcements

## IHE® Connectathon 2010 Conference

January 12, 2010 • Hyatt Regency Chicago—Wacker Drive

The 2010 Integrating the Healthcare Enterprise (IHE®) Connectathon will include a one-day conference including presentations by leaders in the movement to adopt electronic health records, personal health record systems and national health information networks.

Attendees will also learn about IHE's support for these critical improvements

and receive an introduction to the IHE interoperability testing process. Attendees will have the opportunity to observe the IHE Connectathon, to be held January 11–15, as it takes place and learn about its significance in enabling the connected health system.

Companies at the Connectathon test the



interoperability of their health information systems by exchanging information with complementary systems of multiple vendors. Thousands of vendor-to-vendor connections have been tested since the first Connectathon was held in 1998.

Registration is limited; fee is \$150 per conference attendee. For more information, go to [www.ihe.net/connectathon/](http://www.ihe.net/connectathon/).

## RSNA Co-Sponsors SPIE Medical Imaging Conference

February 13-18 • Town and Country Resort and Convention Center, San Diego

RSNA will co-sponsor International Society for Optics and Photonics (SPIE) Medical Imaging 2010, a multidisciplinary conference featuring topics including medical physics, image processing, CAD, visualization and modeling, PACS, perception, ultrasonic imaging and biomedical research. For more information on SPIE, an international society advancing light-based research, go to [spie.org/medical-imaging.xml](http://spie.org/medical-imaging.xml).

## Prepare 2010 R&E Grant Applications Now

RSNA Membership Now Required

Applicants are being accepted for R&E research and education grants. Applicants for 2010 R&E grants are now required to be RSNA members (at any level) at the time of application.

Application deadlines are:

- January 10: Education Grants
- January 15: Research Grants
- February 1: Medical Student Grant

For more information on all Foundation grant and recognition programs, including current and past grant projects, go to [RSNA.org/Foundation](http://RSNA.org/Foundation) or contact Scott Walter, M.S., assistant director, grant administration at 1-630-571-7816 or [swalter@rsna.org](mailto:swalter@rsna.org).

## RSNA MEMBER BENEFITS

# Working For You

## RSNA Education Center Releases 2009–2010 Product Catalog

The RSNA Education Center has released its 2009–2010 product catalog which includes the new CD-ROM Collections of Refresher Courses from past RSNA meeting. Bundled into topical sets for easy reference, the Collections allow members to build a comprehensive education library at a reduced price.

Those who did not get a catalog in their RSNA 2009 bag this year can contact [ed-ctr@rsna.org](mailto:ed-ctr@rsna.org) for an e-mail copy. For additional information on courses or products, please contact the RSNA Education Center at 1-800-381-6660 x3753 or 1-800-272-2920.

## RSNA 2009 Physics Modules Available Online

The physics modules introduced at RSNA 2009 are now available online free of charge to RSNA and AAPM members. Designed to educate radiology residents about important concepts in physics, these self-guided modules include a self-testing feature that creates a comprehensive learning experience for the viewer.

Modules were developed by teams that included at least one physicist and one radiologist and are peer reviewed for content and qual-

ity before being officially launched online. The goal is to provide a basic understanding of physics in the following areas: general imaging, radiography, mammography, fluoroscopy, interventional radiology and CT and imaging processing. RSNA will release additional online physics modules in 2010.

View these modules at [RSNA.org/physics](http://RSNA.org/physics). For more information, call 1-630-368-3753 or e-mail [physics@rsna.org](mailto:physics@rsna.org).



# Working For You

## Testing Launches IHE® Image Sharing Demonstration

**T**HE RSNA 2009 Integrating the Healthcare Enterprise (IHE®) Image Sharing Demonstration was preceded by a successful testing event held in October at RSNA Headquarters in Oak Brook, Ill.

RSNA welcomed the American Academy of Ophthalmology, which oversaw testing by 15 vendors of profiles published on the IHE Eye Care domain.

The RSNA 2009 Image Sharing Demonstration showcased methods of sharing medical images and reports in an electronic information exchange and via personal health records. The event also demonstrated how patient radiation exposure can be measured and tracked through the new IHE Radiation Exposure Monitoring profile, which requires imaging modalities to export radiation exposure details

in a standard format. Eleven companies took part in the demonstration:

- Aware
- Forcare
- GE Healthcare
- Initiate Systems
- InterSystems
- Krucom
- Microsoft
- Philips
- Rogan-Delft
- Siemens
- StructuRad

Sponsored by RSNA, the Healthcare Information and Management Systems Society and several other health professional organizations, IHE is a global initiative by healthcare providers and industry to improve interoperability and information exchange. For more information, go to [ihe.net](http://ihe.net).



RSNA hosted a successful October testing event prior to the Integrating the Healthcare Enterprise (IHE®) Image Sharing Demonstration held at RSNA 2009.

## Workshop Targets Radiology Research Initiatives

RSNA hosted a 1½ day October workshop attended by 30 representatives of clinical and educational departments in support of Revitalizing the Radiology Research Enterprise, an ongoing program aimed at enhancing research in radiology and radiation oncology.

The workshop, held at RSNA Headquarters in Oak Brook, Ill., focused on strategies for developing and expanding research programs in radiology, radiation oncology and nuclear medicine. A combination of presentations, case studies and group discussions facilitated the program.



Thirty representatives of clinical and educational department attended an RSNA-hosted October workshop in support of Revitalizing the Radiology Research Enterprise.

# News about RSNA 2010

## Submit Abstracts for RSNA 2010

**T**HE online system to submit abstracts for RSNA 2010 will be activated in mid-January. **The submission deadline is 12:00 p.m. Central Time on April 15, 2010.** Abstracts are required for scientific presentations, education exhibits, applied science and quality storyboards.

To submit an abstract online, go to [RSNA.org/abstracts](http://RSNA.org/abstracts).

The easy-to-use online system helps the Scientific Program Committee and Education Exhibits Committee evaluate submissions more efficiently. For more information about the abstract submission process, contact the RSNA Program Services Department at 1-877-776-2227 within the U.S. or 1-630-590-7774 outside the U.S.



# RSNA 2010

**PERSONALIZED MEDICINE:**  
In Pursuit of Excellence

NOVEMBER 28 – DECEMBER 3 · McCORMICK PLACE, CHICAGO

## Important Dates for RSNA 2010

<b>April 28</b>	RSNA/AAPM member registration and housing open
<b>May 26</b>	General registration and housing open
<b>June 30</b>	Course enrollment opens
<b>October 22</b>	Deadline for international mailing
<b>November 5</b>	Deadline for final advance discounted registration, housing and course enrollment
<b>November 28 – December 3</b>	RSNA 96th Scientific Assembly & Annual Meeting

## RSNA Travels to France for SFR 100th Anniversary

RSNA honored the Société Française de Radiologie (SFR) on its 100th anniversary in October by hosting an exhibit at the society's annual conference in Paris. RSNA staff members met about 300 conference attendees over the five-day event, enrolling more than 30 new RSNA members. SFR presented RSNA with a gold medallion during the meeting.



# Product News

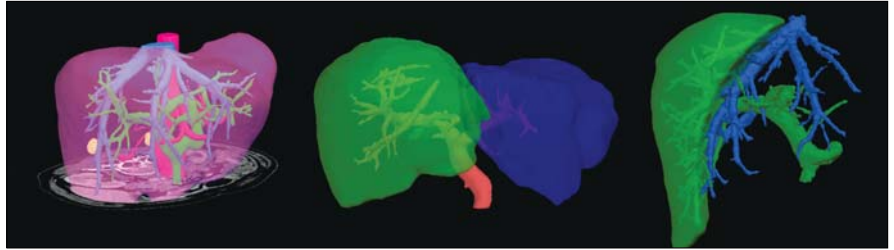
## NEW PRODUCT

### Pre-surgical Liver Assessment Toolset

EDDA Technology ([edda-tech.com](http://edda-tech.com)) introduces the IQQA®-Liver Enterprise, enabling efficient application of contrast multidetector CT for liver evaluation

and pre-surgical assessment. The toolset provides real time, interactive 3D/4D evaluation, volumetric quantification, automated segmentation and refinement of liver, liver lobes and segments, hepatic lesions and vascular structures. Quantitative measurements are instantly extracted from segmented and labeled volumes.

The efficient workflow of intuitive volumetric evaluation is powered by the integration of automatic computer analysis and the real time interactive 2D/3D editing capabilities for users. Through Web-based enterprise solution, IQQA®-Liver is instantly accessible anywhere, anytime within hospital's existing IT platform.

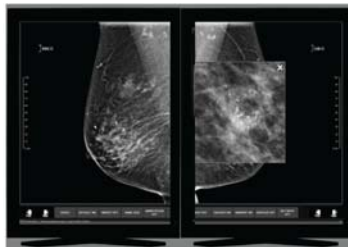


## PRODUCT UPGRADE

### Workstation with Reporting System Integration

WorkstationOne™ by Three Palm Software ([www.threepalmsoft.com](http://www.threepalmsoft.com)) includes bi-directional reporting integration with leading mammography reporting systems such as MRS and PenRad, allowing either system to be driven by the other with automatic propagation of radiologist assessment and findings.

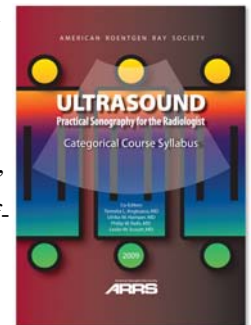
WorkstationOne now features high-speed and 10-bit grayscale display with new graphics cards from NVIDIA and Matrox and multireader/multimachine work list synchronization. An expanded suite of visualization packages includes ultrasound, MR imaging, CT and nuclear medicine viewing, computer-aided detection (CAD), MR analysis and interventional guidance, Web-based document viewing and dictation system integration. The software has the capability to display enhanced mammography CAD reports and support tomosynthesis images.



## NEW PRODUCT

### Practical Sonography Syllabus

The latest edition of the American Roentgen Ray Society's ([www.arrs.org](http://www.arrs.org)) 2009 categorical course syllabi series, "Ultrasound: Practical Sonography for the Radiologist," provides state-of-the-art information in abdominal, musculoskeletal, vascular and pediatric imaging and offers approaches for maximizing ultrasound use in daily practice.



## NEW PRODUCT

### Speech Recognition Software

NUANCE ([www.nuance.com](http://www.nuance.com)) introduces the RadWhere™ 3.0 speech recognition software with unique workflow, data-driven reporting and communication applications. The software also offers workflow management where reports are created with a variety of dictation styles, as well as the data extraction tools necessary for analyzing productivity and outcomes.

Designed to address the needs of healthcare networks with multiple Radiology Information System (RIS) software, PACS, 3D and teleradiology systems, RadWhere integrates these elements into a single worklist for the radiologist. It can launch an unlimited number of legacy and Web-based PACS viewers while intelligently returning orders to the appropriate RIS from a single workstation. Integration partners provide image routing capabilities that utilize the RadWhere worklists to further streamline the radiology workflow.

**RSNA News**

Information for *Product News* came from the manufacturers. Inclusion in this publication should not be construed as a product endorsement by RSNA. To submit product news, send your information and a non-returnable color photo to *RSNA News*, 820 Jorie Blvd., Oak Brook, IL 60523 or by e-mail to [rsnanews@rsna.org](mailto:rsnanews@rsna.org). Information may be edited for purposes of clarity and space.



# RSNA.org

## Renew Your Membership, Update Your Information

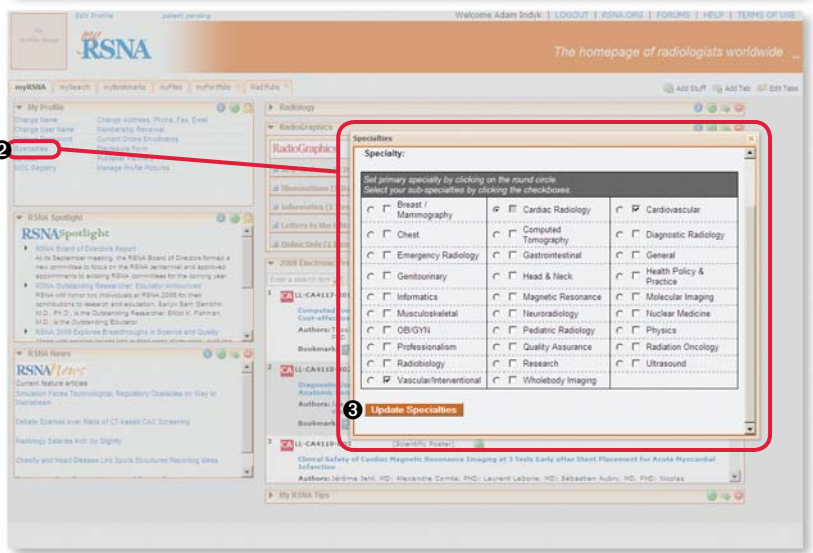
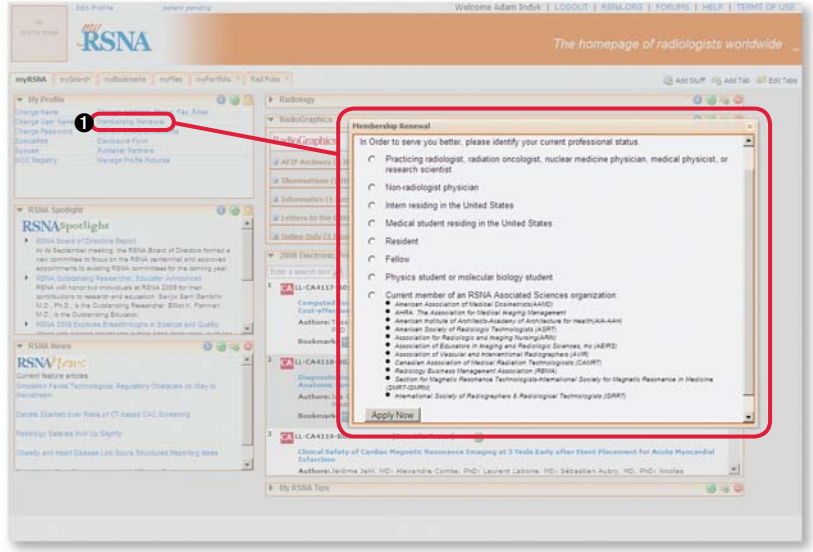
**M**EMBERS using myRSNA® to pay 2010 RSNA membership dues quickly and easily online can also take the opportunity to update member profile and specialty information.

Because online access to *Radiology* and *RadioGraphics* is tied to membership status, if your payment has not been received by December 31, 2009, your online subscriptions will be automatically inactivated.

To use myRSNA to pay your membership dues, click “myRSNA” at the top of the *RSNA.org* homepage or go to *myrsna.org*. Enter your user name and password and then click Membership Renewal in the My Profile section. **1** Before beginning the renewal process, take a moment to update your profile with current contact information. Users can also update specialty information at this location by clicking the round circle for primary specialty and the checkboxes for subspecialty.

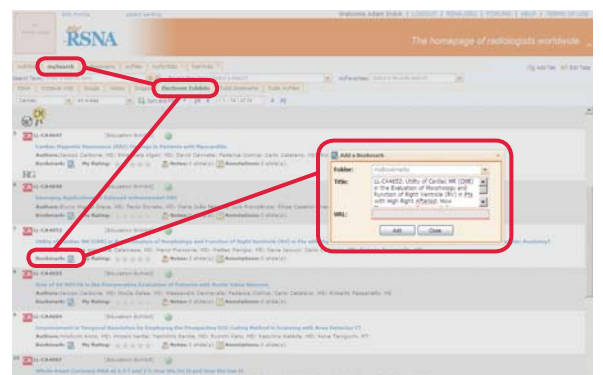
Specialty information can also be updated by clicking on Specialties in the My Profile section **2** and selecting your primary specialty and subspecialty. After entering your information, click Update Specialties **3** to save these changes to your file. Updating your information ensures you receive important RSNA information without delay.

For more information or to renew your membership by phone, contact the RSNA Membership Department toll free at 1-877-RSNA-MEM or at 1-630-571-7873, or send an e-mail to [membership@rsna.org](mailto:membership@rsna.org).



### Permanently Access 2009 Electronic Exhibits

RSNA members can access RSNA 2009 presentations online for one year at *myRSNA.org*, but if you bookmark the presentations, they'll be added to your files permanently. Go to mySearch to locate the Electronic Exhibits tab, click on the presentation and select, “Add to My Bookmarks.” You will have permanent access to bookmarked presentations otherwise available through mySearch for only one year.



CALENDAR

# Medical Meetings January – May 2010

**JANUARY 11-15**

Integrating the Healthcare Enterprise (IHE®) North American Connectathon, Hyatt Regency Chicago  
• [www.ihe.net/Connectathon](http://www.ihe.net/Connectathon)

**JANUARY 23-26**

Indian Radiological & Imaging Association (IRIA), 63rd Annual Congress, Karnavati Club, Ahmedabad • [www.iria.in](http://www.iria.in)

**FEBRUARY 13-18**

International Society for Optics and Photonics, (SPIE), Medical Imaging 2010, Town and Country Resort and Convention Center, San Diego • [www.spie.org/medical-imaging.xml](http://www.spie.org/medical-imaging.xml)

**FEBRUARY 21-26 VISIT THE RSNA BOOTH**

Society of Gastrointestinal Radiologists (SGR) and Society of Uroradiology (SUR), Abdominal Radiology Course, Omni Resort at Champions Gate, Orlando, Fla. • [www.sgr.org](http://www.sgr.org)

**FEBRUARY 28-MARCH 3**

Society of Thoracic Radiology (STR), Annual Meeting, Hotel del Coronado, San Diego • [www.thoracicrad.org](http://www.thoracicrad.org)

**MARCH 1-4**

Healthcare Information and Management Systems Society (HIMSS), Annual Conference and Exhibition, Atlanta  
• [www.himssconference.org](http://www.himssconference.org)

**MARCH 4-8 VISIT THE RSNA BOOTH**

European Congress of Radiology (ECR), Austria Center, Vienna  
• [www.astro.org](http://www.astro.org)

**MARCH 13-18**

Society of Interventional Radiology (SIR) 35th Annual Scientific Meeting, Tampa Convention Center, Florida • [www.sirweb.org](http://www.sirweb.org)

**MARCH 20-23**

The 13th Asian Oceanian Congress of Radiology (AOOCR), Taipei International Convention Center, Taiwan  
• [www.aocr2010.org/congress.htm](http://www.aocr2010.org/congress.htm)

**MARCH 23-26 VISIT THE RSNA BOOTH**

Association of University Radiologists (AUR), 58th Annual Meeting in Joint Sponsorship with RSNA, Hilton San Diego Bayfront Hotel • [www.aur.org](http://www.aur.org)

**MARCH 24-27**

American Institute of Ultrasound in Medicine (AIUM), Annual Meeting, San Diego Marriott • [www.aium.org](http://www.aium.org)

**APRIL 9-12 VISIT THE RSNA BOOTH**

International Congress of Radiology, Shanghai International Convention Center, China • [www.icr2010.org](http://www.icr2010.org)

**APRIL 13-17**

Society for Pediatric Radiology (SPR), Annual Meeting, Boston Park Plaza Hotel & Towers • [www.pedrad.org](http://www.pedrad.org)

**APRIL 22-23**

The Canadian Association of Radiologists (CAR), International Guidelines Symposium, Montréal, Quebec • [www.car.ca](http://www.car.ca)

**APRIL 22-25**

The Canadian Association of Radiologists (CAR), 73rd Annual Scientific Meeting, Hyatt Regency Hotel, Montréal, Quebec  
• [www.car.ca](http://www.car.ca)

**APRIL 29-MAY 1**

American Brachytherapy Society (ABR), Annual Meeting, Hyatt Regency, Atlanta Towers • [www.americanbrachytherapy.org](http://www.americanbrachytherapy.org)

**MAY 1-5**

American Radium Society (ARS), 92nd Annual Meeting, JW Marriott Cancun, Mexico • [www.americanradiumsociety.org](http://www.americanradiumsociety.org)

**MAY 1-7**

International Society for Magnetic Resonance in Medicine (ISMRM), European Society for Magnetic Resonance in Medicine and Biology (ESMRMB), Joint Annual Meeting, Stockholm International Fairs, Sweden • [www.ismrm.org](http://www.ismrm.org)

**MAY 2-7**

American Roentgen Ray Society (ARRS), Annual Meeting, Manchester Grand Hyatt San Diego • [www.rrs.org](http://www.rrs.org)

**MAY 6-7**

SNM Molecular Neuroimaging Symposium, National Institutes of Health/Natcher Auditorium, Bethesda, Md. • [www.snm.org](http://www.snm.org)

**NOVEMBER 28-DECEMBER 3**

RSNA 2010, 96th Scientific Assembly and Annual Meeting, McCormick Place, Chicago • [RSNA2010.RSNA.org](http://RSNA2010.RSNA.org)