

# Daily Bulletin

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Sarah S. Donaldson, M.D.

## Patients are True Beneficiaries of the "Power of Partnership"

Although challenges remain, radiologists who join with colleagues and patients to deliver the best healthcare possible are demonstrating the true "Power of Partnership" and the value of the specialty, said RSNA President Sarah S. Donaldson, M.D., during her President's Address on Sunday.

"IT'S MY VISION TO HAVE PARTNERSHIPS internally with other radiologists, externally with our colleagues outside of radiology and jointly with our patients, who are our most important partners," Dr. Donaldson said.

Pediatric cancer care is an example of multidisciplinary cooperation that has yielded successful results, said Dr. Donaldson, who subspecializes in pediatric radiotherapy. "Not long ago, childhood cancer was a fatal disease; in fact, data from the mid-1970s show that just over half of the

afflicted children survived only five years," she said. At that time, radiation oncology was primitive. Medical linear accelerators were in early development and the pediatric oncology discipline didn't exist. Before cross-sectional CT and MR imaging were available, radiologists used mainly plain films. "Then, radiologists were generalists," Dr. Donaldson said. "Our training programs were unified, and we were at the nexus of patient care."

Radiology expanded rapidly with advances in technology. Radiologists subspecialized and training programs separated as therapy split from diagnosis, Dr. Donaldson

said. "The good news was that within radiation oncology, the new technology offered improved accuracy and understanding that allowed us to apply higher doses of radiation with improved cancer cure rates," she said.

Ironically, the very treatment that improved cancer cure rates created a new problem—radiation injury to normal tissues, challenging radiation oncologists to reduce toxicity while still achieving desired cure rates. "We had to rely on each other," Dr. Donaldson said of radiologists and radiation oncologists. "We cooperated, we collaborated and we developed research programs that created more precise therapy. Today, more than 80 percent of children with cancer are cured using multidisciplinary, risk-adapted therapy."

That experience, Dr. Donaldson said, taught her the extraordinary power of partnerships. "It's a time that requires us to focus on producing value not volume, and outcomes not output," she said.

In order to target a tumor, radiologists must integrate images from all imaging modalities, seeing tumors in every dimension and understanding how tumors move, their heterogeneity, their blood supply and their molecular pathways. Dr. Donaldson shared an image of a hepatic lesion in a patient with primary colorectal cancer. The abnormality was not well defined by CT and was deemed inappropriate for radiofrequency ablation.

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## Multiparametric MR Aids Earlier Detection of Prostate Cancer Recurrence

MULTIPARAMETRIC MR (mp-MR) can enable earlier detection of cancer recurrence and improve treatment planning in patients who experience an increase in prostate specific antigen (PSA) after undergoing treatment for prostate cancer, according to the author of an education exhibit presented Sunday.

Prostate cancer is treated most often with surgery and radiation therapy as first-line therapy. In many cases, patients experience elevated levels of PSA after treatment, but the elevated levels are not always indicative of local recurrence or extensive metastatic disease, said Varaha Tammiseti, M.D., of the University of Texas Health Science Center at Houston.

"Elevated PSA levels don't tell if there is a recurrence, and if there is recurrence, they don't tell you if the cancer has spread outside of the prostate," Dr. Tammiseti said. "Some patients get blind therapy



Varaha Tammiseti, M.D.

without evidence of a recurrence."

The education exhibit demonstrates how mp-MR combines different MR imaging techniques to provide more accurate information about both anatomy and function in patients with PSA relapse.

"Conventional imaging such as bone scans and CT are helpful only when disease is significantly advanced or metastatic, at which time treatment options are palliative rather than curative," said Dr. Tammiseti. "With MRI we combine the advantage of the high-contrast resolution of MR with functional parameters like information on how tightly cells are packed, how blood flows in tissue and the chemical makeup of tissue. Therefore, with MRI we can detect recurrence at an earlier point than other modalities, speeding the onset of appropriate treatments."

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## Bridging the Divide Between Radiology, Interventional Oncology

DEEPER COLLABORATION between radiology and radiation oncology is necessary to realize the full potential of the two specialties whose paths diverged nearly 50 years ago, said Damian E. Dupuy, M.D., who presented the Annual Oration in Diagnostic Radiology as part of the RSNA Opening Session on Sunday.

"Our patients and the medical community will reap the benefits of a stronger collaboration," Dr. Dupuy said in his presentation, "We Must Stand on the Shoulders of Giants."

Dr. Dupuy contrasted the role of the two specialties from the 1970s to today. "In the good old days, it was 'we image and diagnose' and 'you treat,'" said Dr. Dupuy, director of tumor ablation at Rhode Island Hospital and a professor of diagnostic imaging at the Warren Alpert Medical School of Brown University in Providence, R.I. "Today, we must look at our strengths



Damian E. Dupuy, M.D.

and weaknesses and work together to treat patients."

In his appeal for collaboration, Dr. Dupuy invoked the words of Anthony L. Zietman, M.D., M.B.B.S., a professor of radiation oncology at Harvard Medical School and presenter of the RSNA 2012 Annual Oration in Radiation Oncology. Dr. Zietman has noted that radiation oncology is very good at irradiating the microbes of

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### Radiation Safety

## Tip of the Day

Maximum monitor luminance affects the eye's sensitivity to contrast and high spatial resolution, when interpreting digital images. ACR-AAPM-SIIM Technical standards suggest maximum luminance > 350 cd/m<sup>2</sup> for diagnostic monitors and > 420 cd/m<sup>2</sup> for mammography.

American Association of Physicists in Medicine

### INSIDE MONDAY



#### Partnership Opportunities Abound

Explore the gamut of partnership-focused RSNA programming. 10A



#### Radiology's Role in Treating Obesity

Catheter-directed approach leads to weight loss in patients. 16A

### RSNA 2013 APP UPDATES

In the past few days RSNA has made several corrections to the RSNA 2013 Meeting App. Attendees who downloaded the app before Nov. 26 should follow these instructions to ensure the best experience:

- **Uninstall the app.** Note: You may receive a notice stating all your data will be deleted. Accepting this warning will not remove courses or exhibitors from the CreditEval area.
- After you uninstall, **re-download the RSNA 2013 app and install it again.** If you experience further issues with the RSNA 2013 App, please visit the Mobile Connect booth located in RSNA Services, where personnel are happy to provide support.

# 3D Reconstruction Can Unlock Vertigo Mysteries

Three-dimensional reconstruction of high-resolution MR imaging sequences can be used to measure volume in the vestibular system in patients with vertigo, and help explain the symptoms, said the presenter of a Sunday session at RSNA 2013.

**V**ERTIGO is a common symptom in patients seeking medical help from ear, nose and throat physicians, said Nagy N. Naguib, M.Sc., of the Johann Wolfgang Goethe University Hospital in Frankfurt, Germany, and the Department of Radiology, Alexandria University in Alexandria, Egypt. In fact, according to Dr. Naguib, vertigo and headache account for two of the most common complaints of patients seeking medical help.

“While MRI is a useful tool in the evaluation of vertigo patients, there are still some cases that don’t show any detectable structural changes on MRI,” Dr. Naguib said. “We thought it would be helpful to assess the volume of the vestibular system as a part of patients’ evaluation for cases presenting with vertigo and referred to radiologists for MR imaging assessment.”

The research began as an attempt to make use of the available software and available resolution delivered by MR imaging in order to obtain a 3D reconstruction of the inner ear structures. The aim of these

ing radiologist and referring clinician with an easy way to evaluate 3D images of the inner ear structures, which are located in the three planes and have a complex anatomy, Dr. Naguib said.

In performing the reconstructions, Dr. Naguib and colleagues noticed that in certain cases some of the semicircular canals seemed to be interrupted, were absent, or looked thinner than usual. While some of these structural differences—such as a missing semicircular canal—are easily evaluated, others require more experienced readers.

“Based on this we tried to assess all cases with an objective method of measurement—namely the volumetric assessment of the 3D figure obtained,” Dr. Naguib said. “The sequence used for the reconstruction is already integrated in many of the examination protocols for the inner ear, and the new application of this routinely performed sequence represents the core of the current research.”

Dr. Naguib and colleagues retrospectively studied 155 patients with a mean

age of 48.9 years, 61 of whom presented with vertigo and 92 of whom presented with other diseases of the ear and normal vestibular function. In patients with vertigo the mean volume of the semicircular canals was 0.258 cm<sup>3</sup> and the mean volume of the vestibule was 0.069 cm<sup>3</sup>. In patients without vertigo, the mean volume of the semicircular canals was 0.306 cm<sup>3</sup> and the mean volume of the vestibule was 0.075 cm<sup>3</sup>.

Researchers concluded that the reduced volume of the vestibular system in patients presenting with vertigo could account for their symptoms.

Dr. Naguib pointed out that most studies addressing the subject in the past have relied on assessing the bony part of the inner ear using CT and that this method—



Nagy N. Naguib, M.Sc.

while beneficial—does not accurately reflect the status of the contents of the bony cavities.

In addition, use of 3D reconstructions can be more than just a tool to impress other clinicians, Dr. Naguib said. “We think adding 3D reconstructions might open the horizon for other studies addressing the subject of inner ear pathology in general, and the subject of vertigo in particular. It’s important to have the ability to assess the structural changes in an objective way that might be associ-

ated with vertigo rather than relying only on the subjective experience of the reader.”

## System Aids Breast Cancer Detection in Women with Dense Breasts

**A** UNIQUE risk-assessment imaging system and model presented on Sunday at RSNA 2013 accurately assesses the likelihood of breast cancer, especially in women with dense breasts.

The metabolic imaging and risk assessment (MIRA) model works as an adjunct to mammography in enabling early detection of breast cancer.

“One of the main issues with mammography is that it is very difficult to get an accurate reading for women with dense breasts,” said presenter vice-president of research and development at Real Imaging, Ltd., a medical imaging company based in Israel’s Airport City. “You cannot replace mammography, but you can add an additional modality to aid the physician, particularly for women with



David Izhaky, Ph.D.

dense breasts,” he said.

Dense breast tissue appears as a solid white area on mammograms, while the non-dense (fatty) tissue appears as dark areas. Tumors are also dense tissues. Because X-rays don’t penetrate dense tissue as well as they do fatty tissue, relying on mammograms alone to help detect tumors can become troublesome.

“What you get in the mammogram of a woman with dense breast tissue is the same contrast you would get for the tumor,” Dr. Izhaky said.

“It’s very difficult for the physician to see the difference in the contrast in the image between the tumor and the healthy tissue.”

Another drawback of mammography is that results are based on human interpretation, which can lead to error such as missed

diagnoses of breast cancer. And the current risk assessment models for breast cancer rely on genetic susceptibility and family history, in addition to mammographic breast density.

Dr. Izhaky and his team targeted those issues in developing the computerized, noninvasive imaging modality used in the study, which comprised 3D breast vascular maps of 339 women. Of those women, 209 were healthy, 36 had benign lesions and 94 had biopsy-proven breast cancer. Researchers used receiver-operating characteristic (ROC) analysis and bootstrapping to assess the diagnostic accuracy of the breast cancer likelihood. They found an overall 84.1 percent area under the ROC curve, which increased to 86.5 percent when looking at dense-breast examples.

“We believe we have the first risk-assessment tool purely based on imaging biomarkers,” Dr. Izhaky said.

The tool would be essential in early detection and prevention strategies, which

depend on the ability to accurately identify individuals with significantly increased breast cancer risk. “Our technology attempts to provide a dynamic assessment analyzing the chances that a woman harbors a breast cancer at a specific time, based on objective metabolic signatures,” Dr. Izhaky said. “If assessed as high risk, such a woman would need immediate further workup to detect and localize the cancer.”

Researchers plan to initiate the clinical trial phase in the U.S., which Dr. Izhaky estimated could start in February 2014. “In 10 years, most imaging modalities will provide risk assessment for the presence of pathology,” he said. “Providing the risk is by no means intended to exclude physicians from the clinical decision process, rather to provide them with a non-biased objective assessment in order for the physician to decide on the most appropriate workup for the patient, adopting a personalized, tailored approach.”

### BREAST DENSITY ISSUE ADDRESSED

**Numerous RSNA 2013 sessions take on the hot topic of breast density and its impact on the effectiveness of mammograms.**

Breast density has made headlines as many U.S. states have passed or are considering laws that require written notification of women, after screening mammography, of their tissue density and the need to discuss screening options with their primary care physicians. A federal breast density notification law is pending, and the U.S. Food and Drug Administration is also considering modifications to national mammography reporting guidelines to include breast density notification. See these RSNA 2013 sessions for a variety of perspectives on the breast density topic:

#### Special Interest Session

Breast Density: Risk Assessment, Communication, and Approaches to Supplemental Imaging

• **SPSI24—Monday, 4:30–6:00 p.m., E451A**

#### Integrated Science and Practice Session

Breast Imaging (Nuclear/Molecular Imaging)

• **SSG01—Tuesday, 10:30–Noon, E451A**

#### Scientific Paper Sessions

Breast Imaging (Screening and Density)

• **SSJ01—Tuesday, 3:00–4:00 p.m., Arie Crown Theater**

Breast Imaging (Ultrasound Screening)

• **SSQ01—Thursday, 10:30–Noon, Arie Crown Theater**  
**Physics (X-ray Imaging)**  
 • **SSG15—Tuesday, 10:30–Noon, S404AB**

#### Scientific Posters and Education Exhibit

View Scientific Posters and the Education Exhibit throughout the week in the Lakeside Learning Center.

Virtual Meeting registrants may view digital posters and the education exhibit from outside McCormick Place.

#### Posters

• **LL-BRS-SU3A—Breast Density Bill: Is This a Good Idea?**  
 • **LL-BRS-TU6A—Breast Density and Its Correlation with Invasive Breast Cancer Prognostic Indicators**  
 • **LL-BRS-TU7A—Dedicated Dual-Head Molecular Breast Imaging (MBI) as an Adjunct to Mammography in Patients with Dense Breast Tissue and/or Elevated Risk for Breast Cancer**  
 • **LL-BRS-TU9A—Seeing Through the Fog: A Review of the Hot Topic of Breast Density**

• **LL-BRS-TU6B—Effect of Reduced Radiation Dose on Breast Density Estimation in Digital Mammography**  
 • **LL-CHS-MO4B—Breast Density: Comparison of Chest CT with Mammography**  
 • **LL-BRS-WE1B—The Yield of Pre-operative Breast MRI in Patients with Fat Density Breasts**  
 • **LL-BRS-WE7B—Cost-Effectiveness of Tomosynthesis in Screening Mammography: Analysis by Breast Density and Patient Age**  
 • **LL-BRE-TH7A—The Density Dilemma**

• **LL-BRS-TH5B—What Do Women Think? Knowledge and Opinions of Women Regarding Breast Density Legislation and Supplemental Whole Breast Ultrasound**

#### Exhibit

• **LL-BRE2437—Breast Density: Methods of Assessment, Implications for Clinical Practice, and Practice Module**