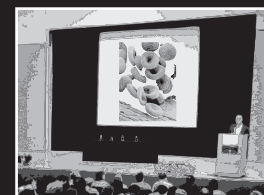


# Conference Scene

Exploring the future of imaging



## 110th Annual Meeting of the American Roentgen Ray Society (ARRS) San Diego, CA, USA, 2–7 May 2010

The 110th Annual Meeting of the American Roentgen Ray Society (ARRS) was held at the Manchester Grand Hyatt Hotel in San Diego, CA, USA, on 2–7 May 2010. Approximately 2500 radiologists from around the world attended instructional courses, scientific paper presentations and forums on a variety of topics. Researchers presented information regarding the latest developments in radiation safety, women's imaging, CT scans and other cutting-edge imaging techniques that are increasingly replacing more invasive and more costly procedures.

### Breast imaging

Advances in breast imaging, particularly the increasing use of MRI, are impacting the way physicians diagnose and evaluate suspicious breast masses.

#### ■ MRI for breast cancer staging & reduction of local recurrence rates

Two studies from the University of Rome, Italy, found positive results with MRI in staging and preventing local recurrences of breast cancer. Led by researcher Valeria Dominelli, one study found that MRI has important applications in the preoperative evaluation of patients with newly diagnosed breast cancer and subsequent treatment plans [1]. Dominelli and colleagues recruited 164 patients with biopsy-proven breast cancer diagnosed on clinical examination, conventional mammography and/or ultrasound, and analyzed how bilateral contrast-enhanced MRI influenced the surgical management choices for those patients. For 32 of the patients, breast MRI altered the previously proposed therapeutic plan. In the 164 patients evaluated, conventional mammography/ultrasound detected 175 lesions; contrast-enhanced MR mammography revealed 51 additional lesions in 34 patients; multifocal and multicentric cancer was detected in seven and four additional patients, respectively; contralateral foci in 21 additional patients; and pectoral muscle infiltration in two additional patients. The sensitivity and accuracy for detecting and identifying malignant lesions

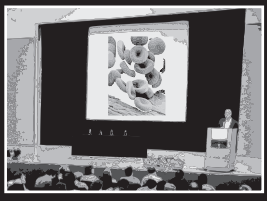
were 100 and 93.4%, respectively, for contrast-enhanced MR mammography compared with 77.3 and 72.1% for mammography/ultrasound, respectively.

Dominelli commented, "Breast MRI positively impacts patient-management decisions and should be recommended for mapping tumor extent in patients with newly diagnosed breast cancer. The correct assessment of the disease can help the surgeon plan the most appropriate surgical treatment, possibly reducing the need for re-intervention".

In a second, retrospective study, Dominelli and colleagues found that the use of preoperative breast MRI prior to surgical intervention for the treatment of breast cancer can potentially reduce the number of local and regional cancer recurrences at follow-up. In 49 women who were part of a larger study, recurrences occurred from 7 to 47 months after surgical removal of the entire initial tumor, with margins free of disease. Ten of the 49 had undergone contrast-enhanced MRI prior to surgery. MRI revealed multifocal or multicentric disease that was undetected by other imaging modalities in three of those cases, and surgery revealed additional disease foci in two of the remaining 39 patients. Researchers noted that while local and regional recurrences after breast-conserving surgery are rare, young age and breast density pose a greater risk for patients. Based on these findings, Dominelli recommended the utilization of breast MRI in patients with breast cancer for a better evaluation of the extent of the disease.

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### ■ Noncontrast high spectral & spatial MRI for separating benign & malignant breast lesions

Even when used without a contrast agent, high-resolution, single-slice, high spectral and spatial (HiSS) MRI matches the performance of conventional contrast MRI in separating benign and malignant breast lesions according to researchers at the University of Chicago (IL, USA) [2].

This pilot study imaged five patients of varying breast sizes at 1.5 T, with HiSS acquisitions performed after the standard clinical protocol, and lasting an average of 8.5 min. Maximum intensity projection images of HiSS data were compared to maximum intensity projections of conventional clinical images, along with single-slice images through three lesions. HiSS imaging resulted in improved lesion conspicuity, margin definition and internal definition as compared with conventional clinical MRI. Researchers concluded that HiSS may provide better lesion characterization and increase breast MRI specificity.

While still a research tool and not yet part of standard practice, HiSS has the potential to be used as a diagnostic procedure that will help avoid biopsies for some women with breast cancer. “We don’t believe that HiSS will ever fully replace breast lesion biopsy as a diagnostic procedure, but we hope that it will help some women who do not have cancer avoid biopsies. For now, a comparable performance of HiSS is an exciting result, as it offers an alternative to those patients with allergies to contrast materials or poor renal function,” said lead author Milica Medved.

### CT scans

A number of presentations focused on the potential effects of radiation exposure from CT scans. CT scans account for more than 50% of the radiation patients receive in the healthcare setting.

### ■ Computer-based system automatically tracks CT radiation dose

To track specific radiation-dose exposure, researchers at Weill Cornell Medical Center and Columbia University Medical Center in New York, USA, randomly selected 518 CT dose reports and

processed them using a computer-based Valkyrie system they have developed. Used in this way, the system, which extracts radiation dose information from conventional CT scans, will eventually provide a longitudinal record of patient healthcare-related radiation exposure. “Our initial tests showed that Valkyrie accurately extracted dose information from 518 of the 518 CT dose reports,” said lead author George Shih.

### ■ Younger patients have greater radiation risks with abdominal CT scans

A study performed at the Medical University of South Carolina in Charleston, SC, USA, that looked at the overall risks associated with abdominal/pelvic CT scans found that the estimated radiation risk for a 31-year-old (0.91 per 1000) was approximately double that for a 74-year-old (0.47 per 1000). Similar risks were found for men and women (median radiation risk to 25 males was 0.61 per 1000 and for 26 females was 0.74 per 1000).

“Estimating the risks associated with ionizing radiation is complex,” said James Koonce, lead author of the study. “Many variables, such as patient size, age, and the region of the body being imaged... all affect the total risk. Clinicians ordering imaging tests must use their best clinical judgment to select patients with a reasonable pretest probability that the diagnosis afforded by CT will give valuable information to affect patient management.”

### ■ Modified technique reduces patient radiation exposure with chest CT

Chest CT scans are typically used for indications including pneumonia, chest trauma and vascular disorders, and after abnormal chest x-rays. “However, the rising use of CT in general has increased concerns about radiation-induced cancers, especially among younger patients who are often being scanned for benign indications,” said Priyanka Prakash, lead author of a study at Massachusetts General Hospital in Boston, MA, USA [3]. Prakash and colleagues found that applying the automatic exposure control (AEC) technique to chest CT scans can reduce patient radiation exposure by up to 20%.



The study evaluated 98 patients who were scanned using the AEC technique adapted simultaneously for patient age, weight and clinical indication. Evaluation showed that stratification of chest CT exams performed with AEC adapted in this way resulted in a 6–20% reduction in radiation dose when compared with the previous weight-based AEC protocols, and a 40–50% reduction when compared with fixed scans without AEC.

### Emergency imaging

#### ■ 256-slice CTA expedites triaging of emergency department patients with chest pain

More than 5 million US patients per year come to the emergency department with chest pain as the chief complaint, usually necessitating admission for further costly diagnostic testing. Researchers at the University of Maryland, Baltimore, MD, USA, found that emergency department use of 256-slice CT angiography (CTA) had a diagnostic concordance of 100%, and can help physicians triage patients with indeterminate chest pain without the need for additional diagnostic testing.

The study, which included 11 patients who underwent 256-slice CTA for the evaluation of their indeterminate chest

pain, found that seven had a negative CTA and a final clinical diagnosis of insignificant chest pain; two had insignificant coronary plaque; and two had moderate coronary disease but received final presumptive diagnoses of noncardiac chest pain. In addition, two pulmonary findings and one breast mass were discovered incidentally.

“Traditional management of chest pain may require observation prior to a radio-nuclide stress study or stress echocardiogram before discharge, increasing the length of hospital stay and cost. By contrast, 256-slice cardiac CTA can be performed safely and early in the observation period with rapid and accurate results,” said lead author Minh Lu.

### Financial & competing interests disclosure

*The author has no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.*

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