

# Trending Topics

BY JENNIFER ALLYN

**Radiologists seeking a roadmap to the future of radiology need look no further than RSNA 2017. In keeping with this year's theme, "Explore. Invent. Transform." attendees will discover myriad scientific presentations and education exhibits that are shaping the future of imaging.**

To help attendees plan their schedules, RSNA's Scientific Program, Refresher Course and Education Exhibits Committees and Subcommittee chairs offer a preview of the trends, hot topics and cutting-edge research in each of the subspecialties available at RSNA 2017.

With full participation in the meeting, each physician can earn up to *98.50 AMA PRA Category 1 Credits*™.

This year, machine learning (ML) is a common theme across all subspecialties, according to David H. Kim, MD, chair of the RSNA Scientific Program Committee. "RSNA 2017 is the place to learn about machine learning and its potential applications, ranging from aiding the radiologist in diagnosing a specific condition to improving ancillary activities that leverage the radiologist's capabilities."

"Attendees will be pleased with the quality as well as the wide range of education exhibits at this year's annual meeting," said Sanjeev Bhalla, MD, chair of the Education Exhibits Committee. "Not only are there exhibits showcasing new technologies, like deep learning, 3-D printing and artificial intelligence (AI), there are also unique opportunities to learn

about alternative agents in PET/CT, dual-energy CT, diffusion in MR and a wide variety of updates on the use of standardized reporting algorithms."

Refresher courses contain educational content from a comprehensive array of anatomic and imaging modalities, said John Eng, MD, chair of the Refresher Course Committee. This year, many courses will feature shorter presentations with more topics and many course tracks will include sessions that combine scientific and educational content, Dr Eng said.

"In addition, RSNA's own Diagnosis Live™ audience engagement technology is finding its way into a greater number of courses," Dr. Eng said. "Case-based and 'Essentials of' courses always draw large audiences and we expect the same this year."

Other common themes across all subspecialties include 3-D printing, contrast media, precision medicine and radiomics. A full day of sessions is devoted to imaging techniques for diagnosing dementia including dynamic susceptibility contrast MR, arterial spin labeling and resting state functional connectivity MRI.



## Breast Imaging

Many of the 2017 breast imaging sessions focus on how deep learning, quantitative imaging and big data affect screening and diagnostic workflow, including the Hot Topic Session, "Deep Learning for Mammography."

Multiparametric breast MRI, digital breast tomosynthesis in a diagnostic setting and multimodality imaging for dense breast tissue are also popular topics. Hands-on opportunities are available during sessions on MRI-guided breast biopsy and ultrasound (US)-guided interventional breast procedures. In addition, "Abbreviated MRI Exam: Breast MRI in 5 Minutes" will be a Hot Topic Session.

Education exhibits include a number on patient-centered care and the radiology pathology correlation of common and not-so-common disorders of the breast. Several exhibits are case-based with pictorial reviews of benign and malignant entities of the breast.

## Cardiac Radiology

Attendees interested in integrating technology with medicine can attend the two-part hands-on scientific sessions on 3-D printing in heart disease, "Teaching Congenital Heart Disease with 3-D Printed Models." The first session focuses on double outlet right ventricle, while the second session addresses twisted heart and other related conditions.

New and developing trends in cardiovascular education exhibits include CT fractional flow reserve in coronary artery assessment and expanded applications of cardiac MRI 4-D flow, strain and stress dynamics.

## Chest Radiology

Lung-related sessions are a popular topic in 2017. Along with the Hot Topic Session, "Machine Learning and Artificial Intelligence in Lung Imaging," sessions focusing on lung nodules, sarcopenia in lung malignancy and in asthma, as well as interstitial lung disease via lung US surface wave elastography are of particular interest.

An interactive session invites attendees to read cases of diffuse lung disease. Attendees should also look for new sessions on quantum particle swarm optimization and lung density analysis on quantitative chest CT.

Updates will also be presented in radiomics, radiation dose reduction and thoracic malignancy.

## Emergency Radiology

Topics of interest include chest and forensic radiology, neuroradiology and updates on whole-body CT for trauma in emergency radiology (ER).

The Hot Topic Session, "Dual-Energy CT (DE-CT) in the Emergency Department," focuses on the use of DE-CT for abdominal and pelvic trauma, neuro trauma and pulmonary embolism.

Imaging of cardiothoracic emergencies, including acute coronary syndrome, thoracic trauma and pulmonary embolism, are high-interest sessions. Treating injuries in young athletes continues to be a hot topic, with sessions focusing on imaging for shoulder trauma, meniscal tears and the rotator cuff.

## Gastrointestinal Radiology

Liver-related sessions are among the trending topics, including presentations on elastography and updates on LI-RADS.

Advances in abdominal CT, including low kV scanning and oral and IV contrast considerations are also key topics. Other sessions focus on non-alcoholic fatty liver disease and incidental pancreatic cystic lesions and a revival in fluoroscopy. Gastrointestinal radiology joins with genitourinary radiology for a joint Hot Topic Session, "Abbreviated Abdomen MRI Protocols."

Education exhibits focus on contrast-enhanced US and dual-energy CT for liver disease diagnosis. Other highlights include deep learning imaging for the diagnosis of serrated polyps in CT colonography, imaging of long-term sequelae in hepatopancreaticobiliary IgG-4 related diseases and novel MRI techniques for incidental and genetically predisposed paraneoplasms.

## Genitourinary Radiology/ Uroradiology

Emerging technologies for prostate imaging, including multiparametric prostate MRI, are among this year's highlights. Attendees are invited to review cases and use PI-RADS v2 category assessment to detect and localize cancer.

There are two Controversy Sessions in genitourinary radiology: "Controversies in Intravenous Contrast Media" and "Imaging of the Pelvis: When is Ultrasound Enough?"

A joint Hot Topic Session focuses on gastrointestinal radiology on abbreviated abdomen MRI protocols, primarily for the pancreas, uterus and cervix. The two subspecialties will also join for a Pediatric Series that features sessions on imaging for abdominal wall defects and urinary tract dilation. Attendees should also look for an update on PI-RADS.



Kim



Bhalla



Eng

## Health Service, Policy and Research/Policy and Practice

A number of sessions focus on the future of radiology in the changing healthcare landscape, including how the scale-up phases of Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) and Merit-Based Incentive Payment System (MIPS) and various alternative payment models will affect radiology.

Several education exhibits describe how the MIPS performance categories are used to create value-based reimbursement in radiology and how radiologists can determine the pace of change while participating in MIPS.

The session “Value-based Imaging in the ACO Model,” offers an update on how imaging and radiology currently relate to new value-based care models. Exploring how federal policy can be applied in breast imaging, interventional radiology and quality and safety in radiology is the focus of one physician payment reform session. Another session tackles emerging topics in patient-centered research and care and the role comparative effectiveness research plays in patient engagement.

## Informatics

Machine learning and data science, 3-D printing, AI and radio-mics continue to be popular topics in informatics. A session on AI and deep learning will feature an IT security keynote speech related to the recent cyberattacks on healthcare infrastructure. A 3-D printing hands-on, open-source session will demonstrate the basics of 3-D printing, including how to segment a medical imaging scan with free and open-source software and export that image into a digital 3-D printable model.

The 3-D Printing Showcase in the Learning Center will include theater poster presentations on 3-D printing throughout the week, including a demo area with additional information.

## Molecular Imaging

The Molecular Imaging Symposium begins with the basics and moves on to oncology, neurology and cardiovascular applications. Other sessions focus on emerging technologies in prostate MRI, including hyperpolarized C-13 MR molecular imaging, theranostics and immune imaging probes. Education exhibits of interest include imaging for infection, acute inflammation and chronic inflammation. A special invited poster exhibit highlighting molecular imaging programs can be viewed near the MI Classroom (South Level 5).

## RSNA 2017 Highlights

### BREAST IMAGING

- ◆ Hot Topic Session: Deep Learning for Mammography — SPSH40
- ◆ Hot Topic Session: Abbreviated MRI Exam: Breast MRI in 5 Minutes. — SPSH50

### CARDIAC RADIOLOGY

- ◆ Teaching Congenital Heart Disease with 3-D Printed Models. — RCB24
- ◆ Cardiac (Coronary Artery Disease: Outcomes and Risk Stratification) — SSJ04

### CHEST RADIOLOGY

- ◆ Hot Topic Session: Machine Learning and AI in Lung Imaging. — SPSH20
- ◆ HRCT Texture Feature Selection and Imaging Pattern Prediction of IPF using Quantum Particle Swarm Optimization — SSK05-04

### EMERGENCY RADIOLOGY

- ◆ Hot Topic Session: Dual-Energy CT in the Emergency Department — SPSH53
- ◆ Essential of Trauma Imaging: MRI of Meniscal Tears — MSES51B

### GASTROINTESTINAL RADIOLOGY

- ◆ Science Session with Keynote: Gastrointestinal (HCC Screening and LIRADS) — SSA08
- ◆ Deep-Learning Super-Resolution Imaging for Enhancing the Diagnosis of Serrated Polyps in CT Colonography — GI274-ED-X

### GENITOURINARY/OBSTETRICS/GYNECOLOGY

- ◆ Controversies in Intravenous Contrast Media 2017: Getting Your Questions Answered — RC407
- ◆ Hot Topic Session: Abbreviated Abdomen MRI Protocols — SPSH30

### HEALTH SERVICE, POLICY AND RESEARCH/POLICY AND PRACTICE

- ◆ Value-based Imaging in the ACO Model — RC253
- ◆ Comparative Effectiveness Research: Translating Science into Health Policy and Practice — RC727

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## Multisystem/Special Interest

One area of interest focuses on how oncologic imaging is evolving with new therapies, imaging techniques and methods to measure disease response. Several sessions discuss the role of immunotherapy in treating cancer and the imaging findings associated with immune modulation therapy.

Common themes in education exhibits include the genetics of malignancies and imaging of diffuse infections and syndromes with numerous imaging manifestations. Other sessions focus on the need for understanding regional anatomy to properly staging pelvic cancers and providing updates in the imaging of implantables and foreign bodies and their complications.

## Musculoskeletal Radiology

Machine Learning is a trending topic in musculoskeletal (MSK) radiology.

One session will focus on ML's clinical applications in MSK imaging, while the Hot Topic Session, "3-D Imaging in Musculoskeletal: Acquisitions, Printing and Applications," will explain how 3-D models can be used in musculoskeletal imaging and how to tailor CT and MR protocols to render MSK anatomy.

Attendees with a competitive spirit will not want to miss the two Diagnosis Live™ sessions: "Game of Bones: Radiology in the Seven Kingdoms," that will review imaging features and complications of a variety of common and uncommon injuries, and a joint Diagnosis Live™ session with neuroradiology.

Education exhibits include fast MRI for knee imaging, MRI and high-intensity focused US to ablate osteoid osteoma and CT structural analysis to predict bone failure.

## Neuroradiology

On Monday, a full day of programming will focus on dementia starting with, "Emerging Technology: Imaging of Dementia," which will cover applications of dynamic susceptibility contrast MR, arterial spin labelling and resting state functional connectivity MRI.

Other dementia-related sessions include the Special Interest Session, "The Imaging of Cognition – Dementia," focusing on emerging technologies including FDG use in PET, amyloid PET/CT for detecting plaques, MRI and tau PET/CT.

Big data in neuroradiology, including how it affects clinical practice and clinical trials is another series topic. Gadolinium deposition in human tissues, including the brain, and its potential clinical implications is a new topic this year.

Education exhibits include deep learning and ML techniques for improving diagnostic confidence, intracranial vessel wall MRI, arterial spin labeling, astrophotography imaging of tumors and intraoperative ultrasound in spine surgery.

## Nuclear Medicine

A session on neurodegenerative disease imaging will coincide with Monday's full day of sessions on imaging dementia. Other sessions of interest focus on head and neck cancer imaging and oncology PET.

The Hot Topic Session, "New and Emerging Theranostic Agents for Prostate Cancer," will address the various PET

radiotracers for imaging prostate cancer as well as the evolving opportunity for new treatments to be used as radiotherapeutic drugs.

Education exhibits focus on PET/MRI and emerging technology platforms associated with PET/CT oncology, including its uses in infection identification. New exhibits cover PET radiotracers, pediatric thyroid imaging, cardiac amyloidosis and gallium-68.

## Obstetric/Gynecologic Radiology

Fetal and neonatal imaging are topics of interest this year. Sessions focus on imaging of diaphragmatic hernia and bowel obstructions as well as fallopian tube catheterization using uterine models and experts demonstrating the use of fluoroscopic guidance techniques.

Obstetrical imaging in the ER continues to be a trending topic. Look for sessions on US for first trimester pregnancy complications, ectopic pregnancies, adnexal torsion and post-partum complications.

Attendees may want to pay special attention to exhibits on 3-D US in the female pelvis, detecting, characterizing and staging the spectrum of gynecologic malignancies with the latest classification systems and advanced imaging techniques including PET/MRI.

## RSNA 2017 Highlights

### INFORMATICS

- ◆ Deep Learning & Machine Intelligence in Radiology — RC153
- ◆ 3-D Printing Hands-on with Open Source Software: Introduction (Hands-on) — RCA21

### MOLECULAR IMAGING

- ◆ Theranostics: Tracking Stem Cell Transplants in Femoral Osteonecrosis of Pediatric Patients — SSQ12-02
- ◆ Infection and Inflammation — SSK12

### MULTISYSTEM/SPECIAL INTEREST

- ◆ Safety of MRI in Patients with Conditional or Non-Conditional Pacemaker or Other Implantable Cardiac Electronic Devices (ICED): A Systematic Review — SSK04-01
- ◆ Understanding Tumor Response Criteria: RECIST 1.1, irRC and irRECIST: Radiologists and Oncologists Perspective — MS153-ED-WEA1

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## Pediatric Radiology

This year's sessions cover a broad spectrum of issues, from neonatal to gastrointestinal imaging, with a focus on the increasing need for integration of novel contrast agents. The Pediatric Series session, "Pediatric Safety and Quality," focuses on the use of intravascular contrast material in children and dose reduction strategies. A session on pre- and post-natal imaging of anorectal and ambiguous genitalia will include a self-assessment module (SAM) for immediate credit.

Education exhibits cover a range of new topics including the use of augmented reality in pediatric tumor resection, US of the thorax for pneumothorax, pediatric brain tumor genetics, MR elastography and contrast-enhanced US.

## Physics

Radiomics and quantitative imaging are popular physics topics, with sessions focusing on measurement and quantification of quality in value-based care and mini-courses to be held throughout the meeting. Those concerned about cyberattacks can learn more at the "Cybersecurity for Imaging Department and Imagers" session.

Attendees should look for updates on photon-counting during a symposium that will cover pencil-beam scanning and motion management. There is also a variety of sessions on image quality in digital radiography from the basics to specific anatomical imaging.

## Radiation Oncology and Radiobiology

Tailoring cancer therapy to each patient's unique clinical experience, or precision medicine, is a common theme. Numerous sessions cover radiation oncology at specific disease sites.

Also trending is an update on the cutting-edge discipline of immuno-oncology and how these techniques can be combined with percutaneous and transcatheter interventional oncologic therapies in a clinical setting.



Look for a Hot Topic Session on the role of proton and heavy ion therapy in solid tumors, such as thoracic cancers and lymphoma.

Educational exhibits of interest include 3-D printing in head and neck cancers, multiparametric MRI for prostatic carcinoma and post-radiation mimics of malignancy.

## Vascular/Interventional Radiology

New this year in vascular radiology is the application of 4-D flow, including how it can be used in the chest, abdomen and throughout the cerebrovascular system. This session and a session on thoracic aortic emergency are self-assessment sessions.

MR angiography (MRA) and CT angiography (CTA) are also topics of interest this year.

One session covers biomarkers for vascular disease and MRA at 3T or higher, while another covers dual-energy and kVp CTA and contrast vs. radiation dose in CTA.

Hands-on opportunities are offered in the session on using Doppler US during carotid and abdominal examinations.



## RSNA Subcommittee Chairs

Information for this preview was provided by the RSNA Scientific Program and Education Exhibits Subcommittee Chairs:

### Scientific Program Subcommittees

**Donna J. Cross, PhD**, Molecular Imaging  
**Patricia M. de Groot, MD**, Chest  
**Martin L. Gunn, MBChB**, Emergency Radiology  
**Marta E. Heilbrun, MD**, Health Services Policy & Research  
**Andrew Karellas, PhD**, Physics  
**Edward Y. Kim, MD**, Radiation Oncology and Radiobiology  
**Gordon McLennan, MD**, Vascular and Interventional  
**Linda Moy, MD**, Breast  
**Robert Orth, MD, PhD**, Pediatric Radiology  
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**Dushyant V. Sahani, MD**, Gastrointestinal Radiology  
**George L. Shih, MD, MS**, Radiology Informatics  
**Ashok Srinivasan, MD**, Neuroradiology  
**Martin Torriani, MD**, Musculoskeletal Radiology  
**Zhen J. Wang, MD**, Genitourinary Radiology  
**Chadwick L. Wright, MD**, Nuclear Medicine

### Education Exhibits Subcommittees

**Timothy J. Amrhein, MD**, Neuroradiology  
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**Matthew A. Frick, MD**, Emergency Radiology  
**Rebecca M. Howell, PhD**, Physics  
**Edward Y. Kim, MD**, Radiation Oncology and Radiobiology  
**Marc D. Kohli, MD**, Radiology Informatics  
**Rachna Madan, MD**, Policy and Practice  
**Karen Y. Oh, MD**, Obstetrics/Gynecology  
**Stephen Thomas, MD**, Multisystem/Special Interest  
**Kirubahara R. Vaheesan, MD**, Vascular/Interventional  
**Sadhna Verma, MD**, Uroradiology  
**Vani Vijayakumar, MD**, Nuclear Medicine

## RSNA 2017 Highlights

### MUSCULOSKELETAL RADIOLOGY

- ◆ Hot Topic Session: 3D Imaging in Musculoskeletal: Acquisitions, Printing, and Applications — SPSH51
- ◆ Game of Bones: Radiology in the Seven Kingdoms (Diagnosis Live Case-based Competition) — SPDL40

### NEURORADIOLOGY

- ◆ Neuroradiology Series: Big Data in Neuroradiology — RC205
- ◆ Gadolinium Deposition — SSM16

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### NUCLEAR MEDICINE

- ◆ Controversy Session: PET/MR: Is There Added Value in Oncology? — SPSC20
- ◆ RSNA/ESR Hybrid Imaging Symposium: Hybrid Imaging in the Female (An Interactive Session) — MSSR42

### OBSTETRIC/GYNECOLOGIC RADIOLOGY

- ◆ Emergency Obstetrical Ultrasound — RC310
- ◆ Malignant Lesions of Fallopian Tube: Imaging Pathologic Correlation — OB002-EB-X

### PEDIATRIC RADIOLOGY

- ◆ Intravascular Contrast Material Use in Children: Safety Update — RC613-01
- ◆ Focused Thoracic Ultrasonography for the Elucidation of Radiolucent Areas in Critically Ill Neonates and Pediatric Patients' Chest X-Ray — PD119-ED-TUB6