

RSNA 2018
TOMORROW'S
RADIOLOGY TODAY

Daily Bulletin

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Radiotherapy Has Potential to Convert Cancer Cells Into In Situ Vaccine

By Michael Bassett

Radiotherapy is promising in cancer immunotherapy due to its ability to convert the tumor into an individualized, in situ vaccine.

That was one of the main takeaways of RSNA's 2018 Annual Oration in Radiation Oncology, "Radiotherapy to Convert the Tumor into an In Situ Vaccine," presented Wednesday by Silvia C. Formenti, MD, the Sandra and Edward Meyer Professor of Cancer Research and chair of Radiation Oncology at Weill Cornell Medical College.

"It has been known that in order to achieve a maximum response to ionizing radiation therapy in cancer, that a patient needs an intact immune system," Dr. Formenti said. "We've

shown that the effect of radiation is sensed by the immune system and can be harnessed to inform the immune system about cancer."

During her talk, Dr. Formenti, also radiation oncologist-in-chief at New York-Presbyterian Hospital and the associate director of the Meyer Cancer Institute, described a history of research in which she and her colleague at Weill Cornell, Sandra Demaria, MD, have investigated the "abscopal" effect, whereby ionizing radiation can reduce tumor growth



outside the field of radiation.

"Irradiated tumors can become like an individualized in situ vaccine for the patient," Dr. Formenti said, with the idea being that treating one metastatic tumor with radiation will have an effect on other metastases that were not irradiated.

This effect has been long reported, said Dr. Formenti, "but it turns out to be extremely rare when you use radiation alone." That was probably due to the fact that the radiotherapy dose and fractionation used to ablate

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Jackson is RSNA President

Valerie P. Jackson, MD, is RSNA president for 2019. An expert in the field of breast imaging, Dr. Jackson is the executive director of the American Board of Radiology (ABR), a position she has held since 2014. She previously served on ABR's board of trustees from 2001 to 2010.

As president, Dr. Jackson will develop programs and initiatives that support RSNA's mission to promote excellence in patient care and health care delivery through research, education and technologic innovation.

"The RSNA annual meeting is the leading forum for the introduction of medical imaging technologies, and the increasingly international attendance at the meeting allows people from all over the world to share knowledge and ideas," Dr. Jackson said. "RSNA continues to grow as a world leader in informatics and has become a critical convener for artificial intelligence, machine learning and deep learning. While the focus of my career has been predominantly in education, I plan to work hard to continue to advance RSNA in all of these areas."

Dr. Jackson received her medical degree in 1978 from the Indiana University School of Medicine, Indianapolis and



Jackson

completed her residency at the Indiana University Medical Center in 1982. Dr. Jackson is the Eugene C. Klatte Professor Emeritus and has had numerous academic appointments at Indiana University School of Medicine over the years, including lecturer, professor and chair of the Department of Radiology and Imaging Sciences.

An RSNA member since 1982, Dr. Jackson has served the Society in numerous roles, including chair of the Refresher Course Committee from 2009 to 2012 and chair of the Breast Imaging Subcommittee of the Scientific Program Committee from 2003 to 2006. She was a member of the Public Information Advisors Network from 1997 to 2017 and a member of the *RSNA News*

CONTINUED ON PAGE 13A

Mahoney is RSNA Chair

Mary C. Mahoney, MD, was named chair of the RSNA Board of Directors for 2019. Dr. Mahoney is the Benjamin Felson Endowed Chair and Professor of Radiology at the University of Cincinnati (UC) College of Medicine in Cincinnati, Ohio. Since 2016, Dr. Mahoney has been chief of imaging services at UC Health in Cincinnati and is on the medical staff of several Cincinnati area institutions, including UC Medical Center and West Chester Hospital in West Chester, Ohio.

As chair, Dr. Mahoney will lead the board in its continued focus on presenting the leading radiology research, education and technologies to meet the changing needs of RSNA members and to improve patient care.

"I am honored and excited to be named chair of the RSNA Board of Directors," Dr. Mahoney said. "This is a critical time for our profession's future, and RSNA has already embarked upon leading key initiatives to ensure radiology's indispensable position in improving patient care. I look forward to overseeing the Society's strategic expansion as we continue to meet the needs of our members."

Over the years, Dr. Mahoney has served RSNA in many capacities. She was



Mahoney

the scientific session presiding officer from 2003 to 2009. She has served on many committees, including the Research and Education (R&E) Foundation Public Relations Committee and the Public Information Advisors Network. She has chaired the Public Information Committee, Patient-Centered Radiology Steering Committee and the *Radiology* Editor Search Committee. She joined the RSNA board in 2014. She currently serves as an editorial board member for *RSNA News* and since 2002, has been a manuscript reviewer for *Radiology*.

Dr. Mahoney has published more than 70 peer-reviewed articles and 15 book chapters and has co-authored two books with an emphasis on breast imaging. She has served as a

CONTINUED ON PAGE 13A



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Thursday At a Glance



Fei-Fei Li, MD

Plenary Session

2:00-3:00

(Arie Crown Theater)
Toward Ambient Intelligence in AI-Assisted Health Care Spaces.

Fei-Fei Li, PhD

Dr. Li will discuss her team's work on endowing health care spaces with ambient intelligence,

using computer vision-based human activity understanding in the health care environment to assist clinicians with complex care. Dr. Li is a professor in the Stanford University Computer Science Department and co-director of the upcoming Stanford Human-Centered AI Institute.

7:15-8:15

RSNA Diagnosis Live™

Neuro Nightmares: Headscratchers from Overnight (E451B)

Controversy Session

In Stenotic Vascular Disease, Diameter Stenosis is All that Matters (E350)

Hot Topic Session

Beyond FDG: Advancing PET Imaging of the Human Disease (E353A)

8:30-10:00

Educational Courses

8:30-NOON

Series Courses

10:30-NOON

Scientific Paper Sessions

11:00-2:00

Machine Learning Theater Presentations

(North Building Hall B)

12:15-1:15

Scientific Poster Discussions

(Learning Center)

1:30-6:00

Interventional Oncology Series

(S405AB)

IO Practice and Clinical Trials

1:30-2:00

Fast 5

(Arie Crown Theater)

2:30-4:00

Educational Courses

3:00-4:00

Hot Topic Sessions

Cardiometaabolic Imaging (E353C)

Biomarker and Personalized Medicine in Lung Cancer Imaging (E350)

Imaging of Inflammation (S404AB)

Immunotherapy for Cancer — A Demanding New Imaging Frontier (S503AB)

Prostatic Artery Embolization for Primetime (S402AB)

4:30-6:00

Educational Courses

View the full program and add sessions to My Agenda on the RSNA 2018 App or at Meeting.RSNA.org.



Friday Edition of *Daily Bulletin* Available Online

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Daily Bulletin

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The RSNA 2018 *Daily Bulletin* is the official publication of the 104th Scientific Assembly and Annual Meeting of the Radiological Society of North America. Published Sunday, November 25–Thursday, November 30.

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Patients, Referring Physicians Have Conflicting Opinions on Direct Reporting of Results

By Melissa Silverberg

Discrepancies often exist between what patients want and what referring physicians think is best when it comes to accessing patient information.

That was the finding of a Wednesday session, “A Contemporary Survey of Patient and Referring Physician Preferences for Direct Radiologic Reporting of Results,” led by presenter Janice Thai, MD, of Staten Island University Hospital.

Researchers conducted an anonymous survey of 368 patients who had undergone imaging procedures at Northwell Imaging Center in New York. Of the patient respondents, 81.5 percent preferred that all results be communicated from the radiologist on the same day. Survey results showed that patients were more likely to strongly agree with waiting to review results with the referring physician if the results were

abnormal, as opposed to normal.

Of the 168 referring physicians mailed a similar survey, 36 percent preferred same day communication by the radiologist to the patient along with a report sent to their office, while 12.4 percent preferred that radiology reports be sent to their office with a summary report sent to the patient.

The survey also showed that 64 percent of referring physicians did not want the radiologist to review results with their patients and 87.6 percent did not want a report sent to the patient by the radiologist, even after the report was sent to their office.

Transformational Change in Roles Necessary

Researchers said they were not surprised by the conflicting results.

“Radiology as a whole is moving toward patient-centered care, which means we want to cater to what the patient wants,” Dr. Thai said. “This survey reflects contemporary trends we are seeing where the patients overwhelmingly prefer something that the referring physician often does not want.”

Physicians may be concerned about anxiety among their patients, making sure they understand their results and com-

municating quickly about a plan of care. But in a world where most information is available on demand, patients often want access to their health care results as soon as possible. Dr. Thai said 66.4 percent of patients surveyed said waiting for results gives them anxiety.

“We have two differing preferences here,” Dr. Thai said. “We need to define: What is the role of the radiologist in patient management and care?”

There are some areas of radiology where patients are used to getting results or a summary right away or within 48 hours via a patient portal. For example, breast imaging centers typically give patients mammography results before the referring physician has seen them. But, researchers said, this has been the norm for decades and is not how results are typically delivered in other areas of radiology.

“There is a natural tension between radiologists and referring physicians’ attitudes. I believe both need to make a transformational cultural change in the way they look at their roles,” said researcher Arnold Brenner, DO, a diagnostic radiologist at Staten Island University Hospital. Dr. Brenner said new technology, such as on-line portals where patients and doctors



Thai

share information, can play a role in bridging the gap.

“We should be able to develop innovative approaches that allow radiologists to realize faster reporting of results and allow referring physicians to expedite appropriate care,” Dr. Brenner said.

Thursday's



American Association of Physicians in Medicine

Physics Quiz

Which CT scan type in a PET/CT study has the lowest dose: Attenuation correction, localization, diagnostic, or all are about the same [Answer on page 13A.]

Can AI Add Value to Radiology? Informatics Experts Share Latest Findings with Overflow Crowd

By Richard Dargan

Judging by the quality and quantity of papers published in major medical journals – and the overflow crowd attending the session – this year has seen significant advances in imaging informatics, according to two leading experts who spoke Wednesday.

At the packed session, Charles E. Kahn Jr., MD, editor of the new RSNA online journal, *Radiology: Artificial Intelligence*, and deputy editor, William Hsu, PhD, shared some of the most significant studies on informatics published in scientific journals in the last year.

One study highlighting the use of deep learning (DL) for the reconstruction of images from MRI described how the method — automated transform by manifold approximation — or AUTOMAP, could improve upon the performance of existing acquisition methods.

“This is a unified framework for image reconstruction that exploits the network’s inherent ability to compensate for noise and other perturbations and it really goes beyond MRI reconstruction,” said Dr. Hsu, an associate professor of radiology at the University of California in Los Angeles (UCLA).

“There’s a lot of interest in applying similar approaches to reconstruct CT images.”

Dr. Hsu also shared results from studies on machine learning (ML) models for the annotation of radiology reports and the use of algorithms to reduce errors due to reader variability that further underscore the great potential of artificial intelligence (AI).

“Can AI add value to radiology?” Dr. Hsu asked. “I think most of us would agree it can. We can enhance diagnostic accuracy, optimize worklists, perform initial analyses of cases in high-volume applications impacted by observer fatigue, extract information from images that are not apparent to the naked eye and improve the quality of reconstruction.”

Still, significant challenges remain, including a shortage of quality data, according to Dr. Kahn, professor and vice chair of radiology, at the University of Pennsylvania’s Perelman School of Medicine in Philadelphia.

“Most people who have done work in this area have discovered that about 70 to 80



Kahn

percent of the work that you do is not building the model or testing it,” he said. “It’s curating, cleaning and massaging the data to get it into shape.”

Recent studies have shown the potential for DL to address this dearth of quality of data. A study shared by Dr. Kahn looked at the potential of institutions to distribute DL models rather than patient data, an approach that would lessen the need for the labor-intensive work of de-identifying images.

“That would solve for many of us the problems that we face in terms of building something like ImageNet with data from each of our institutions,” Dr. Kahn said.

Radiology Study on Training Algorithms

New research reached eye-opening conclusions about the optimal number of images needed to train an algorithm. A study in *Radiology* that looked at the automated classification of chest radiographs found that the DL model’s accuracy improved significantly

when the number of images used to train the algorithm jumped from 2,000 to 20,000. However, accuracy improved only marginally when the number of training images increased from 20,000 to 200,000.

“That’s actually a useful thing, that maybe we don’t need to have millions of images in order to train the system,” Dr. Kahn said. “Maybe having a modest number would be a good start, along with other approaches that you could perhaps superimpose on top of that.”

As for mining the data itself, Dr. Kahn pointed to Natural Language Processing (NLP) as a promising avenue of research. NLP is the overarching term used to describe the process of using of computer algorithms to identify key elements in everyday language and extract meaning from unstructured spoken or written input.

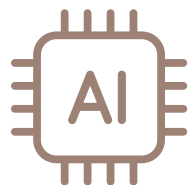
“NLP is using various systems to help mine data out of electronic health records,” he said. “Most of the information in electronic health records is text, and a lot of the resultant information is in the form of narrative text.”

Links to the papers shared at the session and related studies can be seen online at <http://bit.ly/Imaging2018>.

That’s actually a useful thing, that maybe we don’t need to have millions of images in order to train the system.

Charles E. Kahn Jr., MD

Radiology: Artificial Intelligence

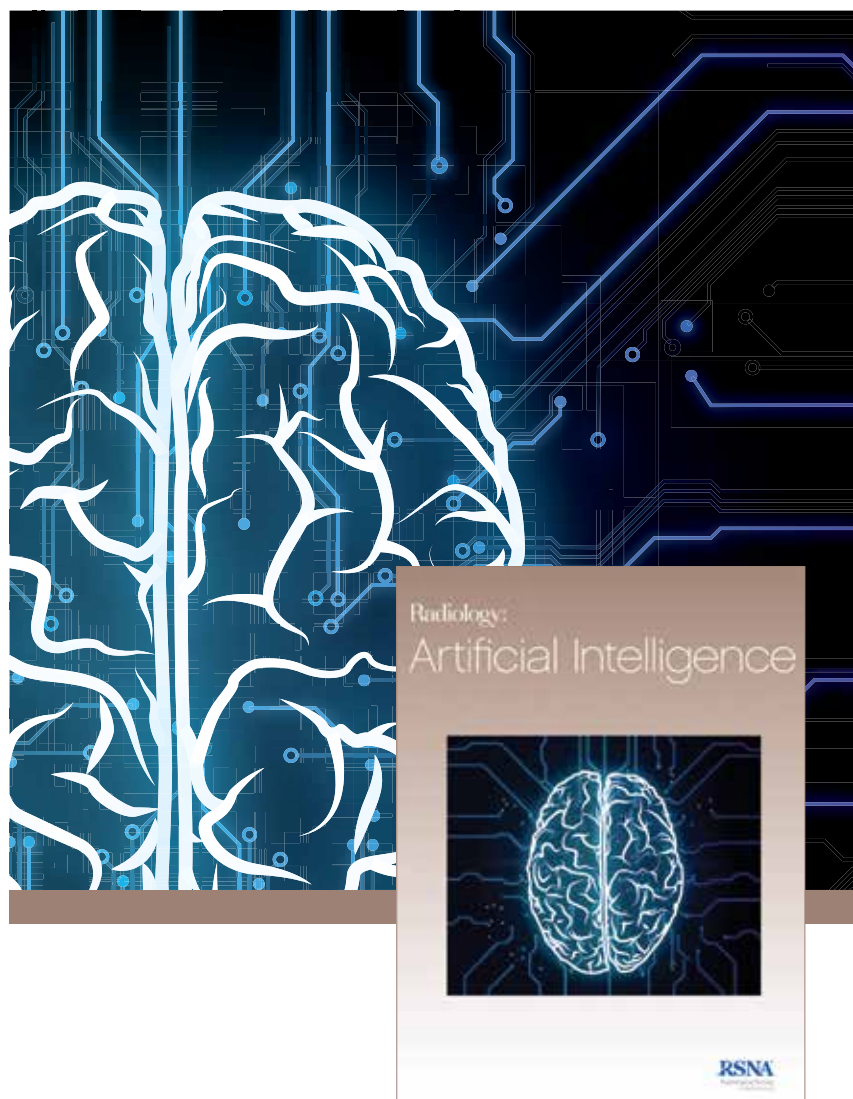


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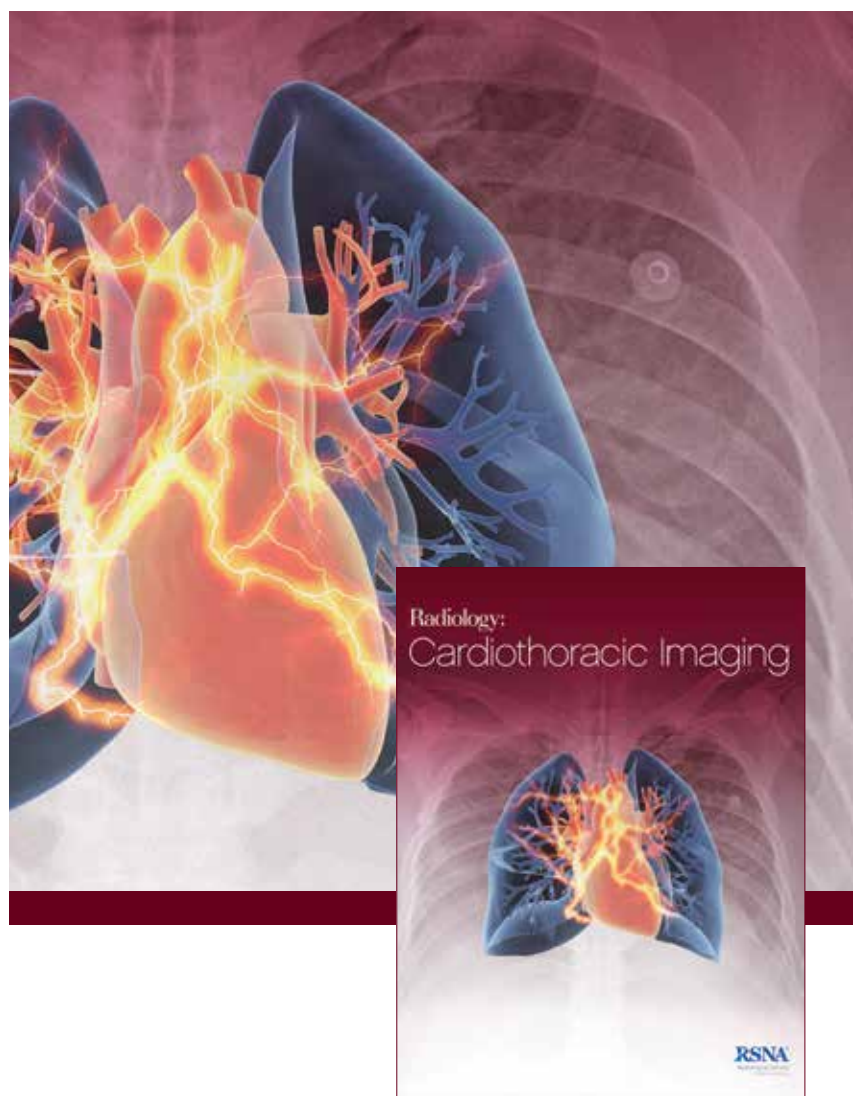


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Fast MRI Shows Promise for Improved Patient Experience

By Michael Bassett

A “perfect storm” of an increased emphasis on patient-centered care, decreasing reimbursements and improving technology has set the stage for radiologists to make MRI more efficient.

This helps explain the evolution of fast MRI, according to Soterios Gyftopoulos, MD, associate professor in musculoskeletal radiology and orthopedic surgery at NYU Langone Medical Center. He moderated a Wednesday “Hot Topics” session devoted to fast musculoskeletal MR imaging.

The emphasis on patient-centered care comes into play, Dr. Gyftopoulos said, with the fact that fast MRI provides a better experience for the patients. “Most people don’t want to be in an MR scanner for 30 minutes,” he said. “It’s an uncomfortable location. It’s noisy and you can’t move.”

Instead, fast MRI dramatically decreases the amount of time it takes to perform an exam.

“The patient only has to stay still for 4 or 5 minutes, and radiologists still get the same amount of imaging information they need to make an accurate diagnosis,” Dr. Gyftopoulos said.

Patient Comfort Helps Image Quality

It can also improve image quality, he said, particularly in cases where radiologic technologists are dealing with difficult patients.

For example, in the past the technologists might have simply powered through the exam and completed the study with the help of the patient, but, possibly at the cost of image quality.

“Fast MRI can help with this by

This is a great way to appropriately use our imaging time. I think it’s the way to go if you are a fan of 2D imaging.

Jan Fritz, MD

being a problem solver,” he said, explaining that technologists now know to run a fast protocol in these cases. “This has resulted in better quality exams for these patients.”

And in a time when imaging centers and departments are under increasing pressure due to reimbursement cuts, fast MRI provides them with a way to become more efficient, perform more exams and increase revenue, Dr. Gyftopoulos said. “Which, in turn, allows us to invest in better equipment and facilities, in our resident and fellowship programs, and in research that can change the field of imaging.”

Speaking on emerging techniques for fast MR imaging, Jan Fritz, MD, associate professor of radiology and radiologic science, Johns Hopkins University, noted that one of the workhorses in current 2D MR imaging practice is parallel imaging acceleration, which is excellent for speed, but pays a penalty in signal-to-noise, he said.

One promising technique, he said, is to combine parallel imaging with simultaneous multi-slice (SMS) acquisition. In a study published last year in *Investigative Radiology*,

Dr. Fritz and his colleagues found that four-fold-accelerated, high-resolution turbo spin echo MRI of the knee, through the combination of parallel imaging and SMS, resulted in 50 percent shorter acquisition times compared to regular parallel imaging acceleration, with similar image quality.

“This is a great way to appropriately use our imaging time,” Dr. Fritz said. “I think it’s the way to go if you are a fan of 2D imaging.”

How Fast Can MRI Go?

Dr. Fritz compared three MR images of a meniscus tear — one 2D image acquired in slightly less than 4 minutes, a 3D image acquired in four minutes, 46 seconds, and a 3D image acquired in 90 seconds with compressed sensing.

There was visible degradation in the 90-second image, Dr. Fritz said, but, arguably, you can still see the posterior meniscus tear, and you can do an isotropic data set with 0.5 isotropic resolution in 90 seconds.

“I think this is where we are going,” he said. “At some point MR imaging is going to get incredibly fast.”



Gyftopoulos



Fritz

MRI Sheds Light on Sports-Related Shoulder Injuries

By Richard Dargan

Repetitive, powerful overhead motions in sports like baseball, tennis and volleyball can lead to a host of abnormalities and injuries to the shoulder that have characteristic appearances on MRI, according to a leading expert in sports imaging who spoke Wednesday.

As part of a day-long RSNA/European Society of Radiology (ESR) Sports Imaging Symposium, Lynne S. Steinbach, MD, professor emerita of clinical radiology and orthopedic surgery at the University of California, San Francisco, discussed some of the scenarios that radiologists may face when studying images of the shoulders of athletes.

Dr. Steinbach focused her talk on baseball pitchers. The late cocking, acceleration and deceleration phases of throwing expose the shoulder to significant stress, she said.

“More than half of pitchers have shoulder injuries every year, usually from overuse,” Dr. Steinbach said. “The areas most often affected include the labrum, the rotator cuff, biceps, ligaments and the capsule.”

Dr. Steinbach played a video clip of Tim Lincecum, a former

Major League Baseball All Star, showing how pitchers develop an extended range of motion that helps them generate more velocity on the baseball. This external rotation exceeds physiological limits, leading to adaptations like tears in the rotator cuff and bone changes that eventually cause physiological problems.

“With this repeated, very forceful motion, you can get impingement of the tendons and labrum between the bones, which can wear on the undersurface to the tendons and tear up the labrum and the biceps,” Dr. Steinbach said. “The follow-through on the ball can thicken the capsule in the back of the shoulder and change the alignment of the shoulder.”

The result is a veritable laundry list of injuries — posterior superior glenoid impingement, superior labral from anterior to posterior (SLAP) tears and osseous stress

More than half of pitchers have shoulder injuries every year, usually from overuse. The areas most often affected include the labrum, the rotator cuff, biceps, ligaments and the capsule.

Lynne S. Steinbach, MD

injuries, among others — that can be picked up on MRI.

“These injuries have different names, but the main thing for radiologists is to just describe what you’re seeing,” she said.

Injuries in Young Athletes

During the interactive portion of the session, Dr. Steinbach presented cases related to the growing problem of throwing-related injuries in young athletes.

“We’re seeing 12-year-olds with rotator cuff tears from playing all year long,” she said. “There’s

even a condition called Little League Shoulder that develops when overuse causes stress to the growth plates in the shoulder. The bones remodel, and eventually this remodeling changes how the shoulder fits together.”

Audience members were asked to weigh in on several cases, including some involving abnormalities related to the apophyses, bony outgrowths that typically fuse with the bone by age 15 and serve as a site for tendon and ligament attachment. Radiologists should be aware of this problem, Dr. Stein-



Steinbach

bach said, and look for signs such as widening and high signal on T2-weighted sequences.

Other sessions in the RSNA/ESR Sports Imaging Symposium focused on lower extremity sports injuries, musculoskeletal interactive procedures and postoperative imaging of sports injuries.

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ATTENDEES SHARE THE SPIRIT OF RSNA

RSNA 2018 attendees gathered this week to show their commitment and enthusiasm for the field of radiology. Annual meeting attendees from around the world and across all career levels took time to build relationships and learn together.



2019 RSNA Board of Directors (from left): Bruce G. Haffty, MD, Liaison for Science, New Brunswick, NJ, Curtis P. Langlotz, MD, PhD, Liaison for Information Technology and Annual Meeting, Stanford, CA, Jeffrey S. Klein, MD, Liaison for Publications and Communications, Burlington, VT, Valerie P. Jackson, MD, President, Tucson, James P. Borgstede, MD, President-Elect, Colorado Springs, Mary C. Mahoney, MD, Chairman, Cincinnati, Umar Mahmood, MD, PhD, Liaison for International Affairs, Boston, MA, Matthew A. Mauro, MD, Liaison for Education, Chapel Hill, NC.



Training members network with radiology leaders including RSNA Board members Vijay M. Rao, MD, and James P. Borgstede, MD, during the Residents and Fellows Reception.



Attendees get creative at the RSNA Fun Photo Booth and enjoy live entertainment in the Discovery Theater.



RSNA honors outgoing President Vijay M. Rao, MD, during the President's Reception at the Chicago Cultural Center.

3D Printed Models Aid Craniofacial Surgery, Education

By Jennifer Allyn

For many years, surgeons working on the mouth, jaw, face, neck and skull for disease treatment or reconstruction had to rely on CT and MRI to assist them with the intricate surgical dance among the nerves and muscles of the face and jaw.

On Wednesday, Jonathan Morris, MD, assistant professor of radiology, Mayo Clinic, Rochester, MN, discussed how 3D printing has opened up a new and interactive way of examining clinical cases in real, three-dimensional space for craniomaxillofacial surgery and reconstruction.

"3D printing provides custom solutions that are patient-specific and will become the standard for craniomaxillofacial surgery and reconstruction, especially when there is a specific pathology," Dr. Morris said.

3D printing is helpful for surgeons to design an operation that will maximize benefits while reducing patient stress by providing a tool to show a patient exactly what the procedure entails.

"For many patients, 3D printing has opened up a world where they can actually

see a disease or cancer in their body for the first time," Dr. Morris said. "It gives the patient the opportunity to see the severity of their disease or the delicate positioning of a tumor, but most importantly improves their satisfaction with a procedure because they understand visually what will happen and what the recovery may be."

Jonathan Morris, MD

Onsite Technology Provides Added Benefits

There are also tremendous benefits to having a 3D printing lab onsite in a hospital. The 3D printing lab at Mayo Clinic has increased how quickly patients go from diagnosis to the operating room, because a 3D piece can be printed in days as opposed to weeks by an outside manufacturer.

"Onsite generated, patient-specific intra-operative models can improve outcomes

during craniomaxillofacial surgery, shorten time in the operating room, increase the number of patients who can be cared for in an operating suite and increase patient satisfaction," Dr. Morris said.

3D printing also has the added bonus of educating surgical residents and helping them see the previously internal process that a surgeon goes through when preparing for surgery.

"3D printing shortens the gap of trainees from knowledge to experience," Dr. Morris said. "Medical students can actually view what the pathology of a disease looks like and hold it in their hands instead of working with a fixed structure in a jar or a virtual reality simulation and learn as the surgeon walks them through the procedure."

Increased need for 3D printing for craniomaxillofacial surgeries will drive the future



Morris

of this technology and also the need for point-of-care manufacture of these models.

"Medicine has gone from having very little information pre-surgery to having a complete picture because of 3D printing," Dr. Morris said. "In the future, medicine will continue to push the limits of what is being printed, in what materials, color and at what complexity level."

Mass Appeal of 3D Printing Slow to Take Hold in Europe

By Nick Klenske

Many radiologists see 3D printing as an evolving part of their practice — an innovative new way to display imaging, contribute to patient care and offer clinical value to their medical and surgical colleagues. Yet despite these benefits, its use in radiology is not a global phenomenon.

"Compared to Europe, there are far more hospitals in North America that have in-house 3D printing labs," said presenter Philipp Brantner, MD, with the University Hospital of Basel, Switzerland, during a session on Wednesday.

Dr. Brantner noted that the RSNA 2018 agenda features more than 50 sessions on 3D printing, covering everything from the basics of starting a 3D printing lab to practical applications, quality assurance, research and education. In comparison, he said there were only 12 sessions on 3D printing during ECR 2018, the European Society of Radiology's annual congress.

So why the difference? Dr. Brantner attributes the aberration partly to a lack of funding and partly to the European Union's fragmented system of national regulations. But a key differentiator is the culture of

innovation and collaboration found in many U.S. hospitals.

"Most likely, the intention to explore the use of 3D printing is here in Europe, but it must be balanced against a health care system defined by cost pressures and a general lack of time for such endeavors," he said.

This isn't to say that 3D printing is non-existent in Europe. Because the threshold for getting started with 3D printing is low, there are a number of medical centers across the continent that have fully embraced the technology.

"With just a high-quality, low-cost printer and open-source software, we can already print basic 3D anatomical models," Dr. Brantner said. "These models can then be used to demonstrate the value of 3D printing to diagnostics, thus getting more referring physicians interested."

Where to Start? RSNA's 3D Printing Special Interest Group

To encourage further uptake of 3D printing in Europe, Dr. Brantner suggests participating in RSNA's 3D Printing Special Interest Group (SIG), whose 300 active members include radiologists, engineers, physicists, technologists and representatives from the 3D printing industry, can serve as a bridge across the pond.

"The 3D Printing SIG provides valuable resources for European hospitals looking to get started with 3D printing and to network with fellow 3D printing enthusiasts," Dr. Brantner said.



Brantner

He also noted that the European division of the SIG is currently supporting 3D printing topics in national and European radiology societies.

"Being embedded in the health care system, radiologists are uniquely positioned to manage the entire digital workflow — from imaging acquisition to the eventual 3D printed product," added Dr. Brantner. "With 3D printing here to stay, whether you are in Europe, the U.S. or somewhere else, it is essential that you be proactive in embracing the technology and integrating it into your practice today."

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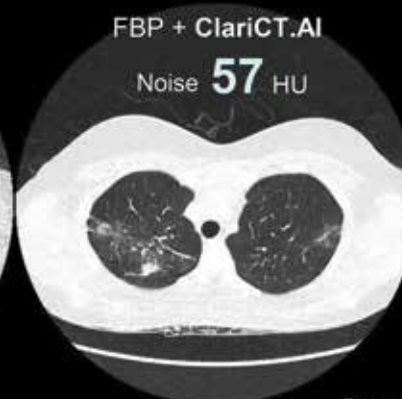
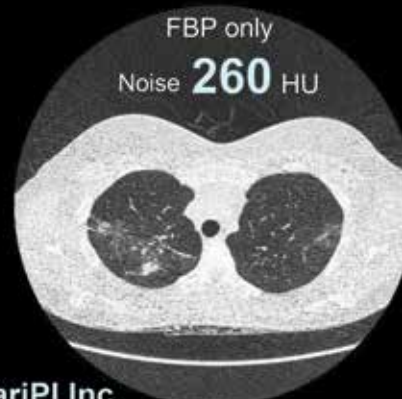


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Ablation Techniques Show Comparable Results In Hepatocellular Cancer Treatment

By Lynn Antonopoulos

Comparable outcomes of two ablation methods combined with advancements in thermal ablation technology may provide a better opportunity for clinicians to tailor treatment of hepatocellular cancer (HCC) to the individual patient.

Researchers in Germany conducted the MIRA study, a randomized, blinded, prospective study, comparing microwave ablation (MWA) and radiofrequency ablation (RFA) in the treatment of hepatocellular

cancer (HCC). Among the latest technologies in thermal ablation is a system combining MWA and RFA into a single unit.

"With the new development of a single-generator system, which fits all the scientific standards, we wanted to prove the performance of RFA versus MWA in localized HCC," said Thomas Vogl, MD PhD, head of the Department of Diagnostic and Interventional Radiology at Frankfurt University Hospital (FUH) during a Wednesday presentation.

Thermal ablation is often a first-line treatment in HCC where surgical resection is not an option. While RFA is the most frequently used method, advancements in MWA technologies allow for greater ablation volumes and

may result in a lower rate of local recurrences over time.

Led by Dr. Vogl, researchers performed CT-guided thermal ablation on 50 subjects with HCC: 39 male and 11 female. In total, there were 50 lesions with a mean diameter of 2.05 cm. Half of the subjects were treated with RFA while the others received MWA.

The team first performed MRI control to record the location of the HCC. Follow-up MRI was performed 24 hours after ablation and then every three months over the subsequent year recording changes in size, volume, necrotic area, diffusion and ADC value of the malignant lesions.

According to Dr. Vogl, the study results showed that 24 hours after ablation, the mean volume was 49.2 cm³ with 69.9 cm³ for patients treated with MWA and 28.3 cm³ for those treated with RFA.

The entire MWA group showed complete ablation, while the RFA group only had 88 percent complete ablation. Of the total population, only three of the patients had local recurrences — all three were in RFA subjects.

"At this early stage, the numbers may not be statistically significant, but we



Vogl

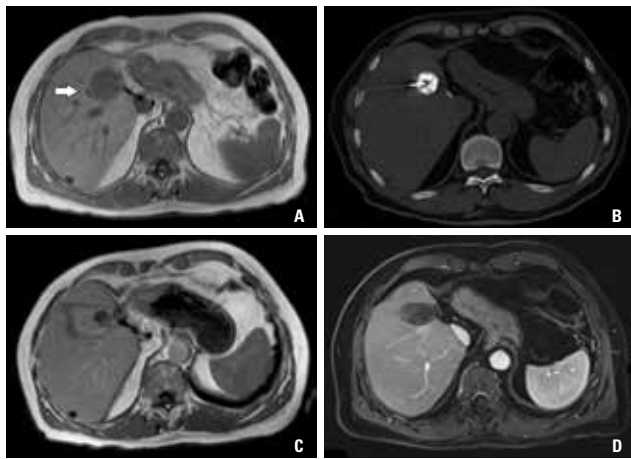
have to wait and see. Over time, we may see a higher rate of recurrence," Dr. Vogel said.

Determining mortality rates will also take time, but the study reflected a slightly better outcome for the MWA group at 4 percent versus 12 percent for the RFA group. After one year, the survival rates for the MWA and RFA groups were 96 percent and 88 percent, respectively.

Though both ablation methods revealed comparable mortality and complication rates, MWA demonstrated greater ablation volume and lower rate of local recurrences than RFA treatment.

"We were surprised how close the results were for both groups and how well both technologies fitted for the individual patients," Dr. Vogl said.

"The data show there is potential to use a single-generator system and individually decide which patients are better for RFA or MWA," he added. "Of course, financial aspects can play a major role in the selection because of the significantly lower cost of antennas and probes used in RFA versus MWA."



Microwave ablation: A- before, B- procedure, C- 24 hours after, D- 1- year follow up.



Radiofrequency ablation: A- before, B- 24 hours after, C- 1- year follow up.



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RSNA Journal Editors Offer Advice on Getting Published

By Melissa Silverberg

Radiologists looking for insights on getting published in RSNA's prestigious peer-reviewed journals *Radiology* and *RadioGraphics* got expert advice during a Wednesday session led by the journal editors.

At a minimum, David A. Bluemke, MD, PhD, editor of *Radiology*, and Jeffrey S. Klein, MD, editor of *RadioGraphics*, said submissions need to meet the mission of the publication and follow the authors' guidelines, but a few tactics can help an article really shine.

Radiology Accepts Less Than 10 Percent of Submissions

Published since 1923, *Radiology* features more than 300 pages of peer-reviewed, timely clinical research, both online and in print each month, along with authoritative reviews, editorials and commentaries, as well as experimental studies.

But getting published is no easy feat. *Radiology* accepts less than 10 percent of the articles submitted each

year, Dr. Bluemke said. Getting published in *Radiology* starts with selecting the right topic. "This can be the hardest part," he said.

Authors should ask themselves questions such as, is the topic is cutting edge? Does it offer new knowledge in an area that is relevant to readers? Then, authors should do

an extensive literature review to prove that it has not already been done before.

Next, Dr. Bluemke said, first impressions count, so write a strong abstract. "A poor abstract is the single most common mistake in a manuscript that is not accepted," he said.

A good abstract will be short and readable, but clearly define the paper's purpose, methods and results. The conclusion must make sense and tie back to the paper's purpose. A concise, catchy title is helpful, but that does not mean exaggerating with hype words.

Avoid words like 'novel,' 'never been studied before,' or 'the first' and let the research speak for itself, Dr. Bluemke said.

And authors shouldn't necessarily work on their abstract alone. In fact, Dr. Bluemke suggests getting extra sets of eyes on an abstract and paper before it is submitted to catch errors.

Even if an article meets all the necessary criteria and reviewers have strong comments, it might not be published, since the *Radiology* Editorial Board must prioritize

the journal's limited space.

In 2019, Dr. Bluemke said *Radiology* will be looking for more images, shorter articles, and alternative ways of telling stories, including through podcasts. For more information about submitting to *Radiology*, visit RSNA.org/Radiology.

RadioGraphics Offers Educational Focus

Launched in 1981, *RadioGraphics* is a more practice-focused publication and one of the premier education journals in diagnostic radiology Dr. Klein said.

While the journal does consider unsolicited submissions, more than 90 percent of the articles published in *RadioGraphics* are invited to submit based on education exhibits displayed at the RSNA Annual Meeting. The publication's editorial board identifies hot topics in advance and reviews posters and subspecialty panels during the meeting. This year, 19 subspecialty panels and 1,950 exhibits were reviewed by more than 400 panelists before extending invitations to submit to the journal.

As RSNA's CME journal, *RadioGraphics* articles must also include learning objectives and an activity such as a quiz with multiple choice questions.

"Writing good questions is one of the most problematic parts of our submissions," Dr. Klein said. He pointed authors to several primers the journal has published on the topic.



Bluemke, Klein

Strong organization and context that show the need for a particular article can also help it get noticed, he said.

In 2019, Dr. Klein said *RadioGraphics* plans to add a section with brief articles highlighting important updates and new information on previously published articles.

To learn more at RSNA 2018, the session, "*RadioGraphics*: Publication Information for Potential Authors," will be held on Thursday at 1:30 p.m. in Room E353A. More information is available at RSNA.org/RadioGraphics.

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Grist is R&E Foundation Chair

Thomas M. Grist, MD, is the chair of the RSNA Research & Education (R&E) Foundation Board of Trustees.

Dr. Grist is the John H. Juhl Professor of Radiology, Medical Physics and Biomedical Engineering and chair of the Department of Radiology at University of Wisconsin (UW) School of Medicine and Public Health in Madison, where he has been a member of the faculty since 1991. Dr. Grist was instrumental in establishing the Imaging Sciences Center in the Wisconsin Institutes for Medical Research, a state-of-the-art facility focused on developing imaging technologies and their translation to clinical practice.

A member of the R&E Foundation Board of Trustees since 2015, Dr. Grist has championed the mission of the Foundation as a leader and member of the Corporate Giving Subcommittee. He is a Silver Centennial Pathfinder, Presidents Circle member and a Platinum Visionary donor.



Grist

Specializing in cardiovascular radiology, Dr. Grist has delivered invited lectures around the world, is a prolific author and holds 16 patents. He is active in organized radiology and served as president of the International Society for Magnetic Resonance in Medicine. He was appointed to the University of Wisconsin Hospitals and Clinics Public Authority Board of Directors and elected to serve as chair of the UW Medical Foundation Council of Chairs.

The Board of Trustees also appointed Satoshi Minoshima, MD, PhD, Salt Lake City, UT, and Reginald F. Munden, MD, DMD, Winston-Salem, NC, to the Board and Ronald L. Arenson, MD, Mill Valley, CA, as secretary.

To learn more about the Foundation visit the R&E Foundation booth in the Connections Center or RSNA.org/Foundation.

Thursday's Physics Tip

Effective dose values reported in literature are a good guide, but dose for a specific patient at your institution may differ considerably from those values and should be calculated if accurate dose accounting is required

American Association of Physicists in Medicine

New Equipment Inspires Innovative Solution to Pediatric MRI Challenges

By Lynn Antonopoulos

In 2013, a new MRI scanner with an 'uncooperative protocol' feature was installed in the breast center at Maimonides Medical Center in Brooklyn, giving way to an idea.

"The new scanner technology shortened the length of time a patient must spend in it and corrected for movement, so our neuroradiologist suggested it might be useful for pediatric cases," said Fatima Janjua, MD, a third-year radiology resident at the institution.

This marked the beginning of a program delivering sedation-free MRI to children that now, in its third year, boasts a 97 percent success rate.

According to Dr. Janjua, successful sedation-free imaging depends on several factors. The child must be assessed for the potential to tolerate the study while awake, and the child and family must be adequately prepared for the process by a child specialist. Developmental challenges, prior health care experiences and length of the study were among the determining factors of a child's ability to tolerate the exam.

"We set the age between 6 and 11 years, but we did not exclude children below the minimum age if they were likely to tolerate MRI without sedation. This year, 14 percent of the successful studies have been of children less than 6 years old," said Dr. Janjua.

Family-Centered Approach is Key

In addition, she noted that a family-centered approach to the care environment is important. "In advance of the procedure, the family is given an education sheet translated into seven languages. It tells the parents what to expect and gives them time to prepare them-

selves and their child at home."

The study was conducted over an 18-month period and included 122 children ages 4 to 15. Of the total population, 113 children completed the MRI scan without anesthesia. "Four of the children were able to tolerate the study until contrast was attempted, but they were not able to tolerate the injection," Dr. Janjua said.

For MRI scans that were partially completed, only the images without contrast were submitted to the radiologist. The remaining five children were unable to tolerate any part of the study.

Partially completed examinations were related to the contrast injection process and to fear of the needle.

Dr. Janjua and her team solved the problem by placing the IV in the patients in another room before starting the MRI scan. That allowed for comfortable positioning and distraction to be used instead of pharmacological pain management.

Using a quality improvement tool to capture wait times and visit



Janjua

duration, the researchers demonstrated a reduction in overall visit durations for patients who underwent elective, sedation-free MRI exams versus those who had exams with sedation.

"We also saw increased referrals from the families who participated in the program as well as referring physicians," Dr. Janjua said.

The change in wait times for sedated-MRI exams also decreased after the initiation of the sedation-free program, despite the facility handling a stable total MRI exam volume.

In addition to sharing study results with other radiologists and department administrators, Dr. Janjua said it may be helpful to include flyers explaining the program in the offices of pediatric subspecialists like neurologists and endocrinologists and others who refer pediatric patients for MRI.

"It is important to have a child life program to provide necessary support," Dr. Janjua said. "Physician and family can discuss the techniques and benefits of the program and make referrals to the child life specialist."

Thursday's Answer

[Question on page 4A.]

A Attenuation correction CT scans cannot help with localizing tumor location or diagnosis, but use very low dose (e.g., 0.1mSv).



RSNA Receives MarCom Awards

RSNA received a Platinum MarCom Award, the top honor, for the 2017 Daily Bulletin, the official newspaper of the annual meeting. RSNA also received a Platinum Award for its 2017 newsroom press kit.

MarCom Awards are bestowed by the Association of Marketing & Communication Professionals, a prestigious international awards competition that recognizes excellence in marketing and communications. RSNA competed against approximately 6,000 entries from around the world to receive its awards.

Pictured left to right: Daily Bulletin Editorial Board members Jean-Marc Gauguier, MD, PhD, Edith Marom, MD, Mary C. Mahoney, MD (chairman, RSNA Board of Directors), Abraham H. Dachman, MD (editor), Carlos H. Torres, MD, and Tejas Mehta, MD, MPH.

CONTINUED FROM PAGE 1A

Jackson is RSNA President

Editorial Board from 2005 to 2008. She served RSNA as first vice president from 2008 to 2009 and was a member of the RSNA Centennial Committee. Dr. Jackson has been active on many committees of the RSNA Research & Education (R&E) Foundation and served on the R&E Foundation Board of Trustees from 2009 to 2015. She joined the RSNA Board of Directors in 2012 and served as president-elect in 2018.

Dr. Jackson has published more than 100 peer-reviewed articles and 20 books and book chapters with an emphasis on breast imaging and radiologic education. She has served as principal investigator on numerous funded grants, including several focused on radiologic education. Dr. Jackson has been a course director and presenter at the RSNA Faculty Development Workshop and is a highly regarded lecturer and educator, having given more than 320 scientific and educational presentations at meetings worldwide.

Dr. Jackson served as associate editor on the editorial board of Radiology from 1989

to 1998 and as consultant to the editor in 1999. She has also served as a manuscript reviewer for American Journal of Roentgenology, *Journal of the American College of Radiology*, *Investigative Radiology*, *Medical Physics* and *Academic Medicine*.

Dr. Jackson has held committee or leadership positions in a number of radiologic organizations, including the American College of Radiology (ACR), American Roentgen Ray Society, Association of University Radiologists, Radiology Research Alliance, Academy of Radiology Research, Society of Breast Imaging (SBI) and the Indiana Radiological Society (IRS).

The recipient of numerous honors throughout her career, Dr. Jackson delivered the Annual Oration in Diagnostic Radiology, "Screening Mammography: Controversies and Headlines," at RSNA 2002. She is a fellow of the ACR and has received the gold medals of the IRS, SBI and ACR. The Valerie P. Jackson Education Fellowship also recognizes her work with ACR.

CONTINUED FROM PAGE 1A

Mahoney is RSNA Chair

principal or co-investigator on numerous funded grants, including several focused on imaging modalities and biopsy. Dr. Mahoney has given many scientific research presentations nationally and internationally, and has been an invited lecturer at over 280 institutions and meetings worldwide.

She is a graduate of the Executive Leadership in Academic Medicine (ELAM) program for women leaders in medicine. She has been instrumental in building the Advanced Imaging Core Lab at UC College of Medicine and the multidisciplinary breast center within UC Cancer Institute.

She is currently on the editorial boards of *Cureus* and *Contemporary Diagnostic Radiology*, as well as serving on the editorial advisory board of *Radiology Business Journal*. Dr. Mahoney has been a Self-Assessment Module (SAM) reviewer since 2005 for the American Board of Radiology (ABR).

Dr. Mahoney has held committee or leadership positions in a number of other

organizations, including the Society of Breast Imaging (SBI) and the American Roentgen Ray Society. She served on the ABR Board of Trustees from 2010 to 2015 and the ABR Board of Governors from 2015 to 2018 and currently serves on the American College of Radiology (ACR) Board of Chancellors. Dr. Mahoney is a fellow of both ACR and SBI and is a member of the Society of Chairs of Academic Radiology Departments.

The recipient of many awards and honors throughout her career, Dr. Mahoney was recognized by ABR for her extraordinary service and dedication in 2008 and 2010.

After graduating magna cum laude from Brown University, Providence, RI, in 1979, Dr. Mahoney received her medical degree in 1983 from UC College of Medicine, and is a member of its honor society, Alpha Omega Alpha. She completed her diagnostic radiology residency—serving as chief resident from 1987 to 1988, followed by a fellowship—at UC Medical Center.

CONTINUED FROM PAGE 1A

Radiotherapy Has Potential to Convert Cancer Cells Into In Situ Vaccine

tumors wasn't optimal to stimulate the immune system, Dr. Formenti observed.

More importantly, she explained, by the time tumors are established and detectable, they have bypassed control of the immune system and developed a mechanism of resistance.

This led Dr. Formenti and her colleagues to think about combining radiation with some form of immunotherapy. In 2005, they published an article in *Clinical Cancer Research* in which they described their success using radiotherapy in a primary tumor in combination with an anti-CTLA-4 antibody to inhibit metastases in a mouse model.

Most recently, Dr. Formenti, Dr. Demaria and colleagues found that combining radiotherapy with the CTLA-4 immune checkpoint inhibitor ipilimumab could lead to the regression of metastatic tumors not specifically targeted by radiation. That study was published this month in *Nature Medicine*.

Specifically, the trial involved 39 patients with chemo-resistant metastatic non-small cell lung cancer who had one metastatic tumor irradiated while undergoing ipilimumab therapy. This combination therapy induced objective responses in 18 percent of the enrolled patients.

We've shown that the effect of radiation is sensed by the immune system and can be harnessed to inform the immune system about cancer.

Silvia C. Formenti, MD

In some cases, the patients had durable responses. For example, one 61-year-old patient who presented with brain metastases had all of his disease sites resolve by day 80 of treatment, and was still alive four years later.

"Abscopal effects of radiotherapy are immune-mediated," Dr. Formenti concluded. "And optimal radiotherapy dose and fractionation during immune checkpoint blockade enhance the chances for successful immunization."

Furthermore, she added that the combination of radiotherapy and immunotherapy leverage both innate and adaptive immunity with the induction of neoantigens that can be recognized in human beings and convert the tumor into a vaccine.

Annual Oration in Radiation Oncology Dedicated to Levitt

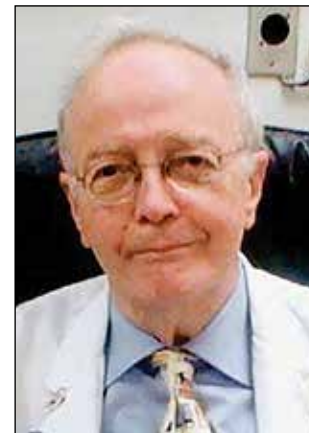
The Annual Oration in Radiation Oncology was dedicated to the memory of Seymour H. Levitt, MD, who died in September 2017.

Dr. Levitt was a compassionate and gifted clinician whose distinguished career affected the lives of countless patients and radiology trainees. His work significantly advanced the field of radiation oncology, particularly in breast and prostate cancer treatment.

A native of Chicago, he earned his medical degree at the University of Colorado in Denver, and completed his internship in internal medicine at Philadelphia General Hospital. After serving as a Captain in the U.S. Army in internal medicine in Germany from 1955 to 1957, Dr. Levitt completed residencies in internal medicine and radiology at the University of California, San Francisco, followed by a clinical fellowship with the American Cancer Society.

He spent most of his career at the University of Minnesota Medical Center in Minneapolis as professor and head of the Department of Therapeutic Radiology, where an endowed chair in clinical radiation oncology was created in his name.

As a member of the RSNA Board of Directors he served as the liaison for the annual meeting and as president in



Levitt

1999. Dr. Levitt steadfastly supported the RSNA R&E Foundation, and he was chairman of the Board of Trustees in 2003.

An international leader in radiation oncology, Dr. Levitt was awarded gold medals from RSNA, the American Radium Society, the American Society of Therapeutic Radiation Oncology, and the American College of Radiology. He delivered the RSNA Annual Oration in Radiation Oncology in 1985.



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