3D and 4D Fetal Ultrasound Advances Spark Research, Create Challenges

ALSO INSIDE:
Redesigning Reading Room Helps Combat Ergonomic Injuries
Residents Gain Critical Experience Through Academic Research Program
Quantitative Imaging Poised to Realize Full Potential in Cancer Research
Technical Challenges Hinder Use of Adrenal Vein Sampling
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National Strategy for Appropriate Medical Imaging Focus of ABRF Summit

A diverse array of stakeholders gathered to discuss a national strategy for safe and appropriate medical imaging at the American Board of Radiology Foundation’s (ABRF’s) fourth national summit, “Safe and Appropriate Imaging: Partnership for a Patient-Centered Approach,” held in March in Bethesda, Md. ABRF is a public/private/academic partnership whose mission is to demonstrate, enhance and continuously improve accountability to the public in the use of medical imaging and radiation therapy.

The March summit advanced the work of the foundation’s August 2012 summit in which leaders identified several current quality and safety gaps in medical imaging and described attributes of an optimized medical imaging system. Attendees of the March summit began jointly developing a national strategy and creating solutions that address those gaps.

According to Glenn S. Forbes, M.D., chair of the ABRF Board of Directors, “During and between the summits, the ABRF convenes representatives from five domains—healthcare providers, regulatory agencies, payors, equipment manufacturers, and the public/patients—and facilitates a diverse, inclusive, collaborative effort to define and optimize the pathway to safe and appropriate medical imaging.

“The unique nature of this assembly is the all-inclusive and diverse representation of the participants,” Dr. Forbes said. “Leadership from all large national entities refrained from performing adrenal vein sampling (AVS) before resuming the procedure in 1990. Read more about the interventional procedure that is underutilized despite its diagnostic accuracy on Page 13.

5-7 Number of years before a mature quantitative imaging methodology is expected to be established for predicting and/or measuring tumor response to therapies in clinical trial settings. Read more on Page 11.

16 The number of years the Mayo Clinic refrained from performing adrenal vein sampling (AVS) before resuming the procedure in 1990. Read more about the interventional procedure that is underutilized despite its diagnostic accuracy on Page 13.

500 Estimated cost in dollars of a sound-masking system for an approximately 500-square-foot radiology reading room, which can decrease associated distractions. Read more about other ergonomic solutions for the radiology reading room on Page 5.

15,000 Approximate number of fans on RSNA’s Facebook Page, one of the social media tools that keep members updated on all things RSNA. Read more about accessing these tools from ABRF.org on Page 24.

Sir Bestows 2013 Gold Medals

The Society of Interventional Radiology (SIR) recently presented gold medals at its annual meeting in New Orleans:

Wilfrido R. Castañeda-Zúñiga, M.D., is an emeritus professor of radiology at Louisiana State University School of Medicine and professor of radiology at University of Minnesota Medical School and University of Texas School of Medicine at San Antonio.

David A. Kumpf, M.D., is the director of interventional neuroradiology and a professor of radiology, neurosurgery and surgery at the University of Colorado Hospital.

Kenneth R. Thomson, M.D., is a professor and director of radiology at the Alfred Hospital in Melbourne, Australia.

Stern Receives SMRI Academic Excellence Award

The Mexican Society of Radiology and Imaging (SMRI) awarded its Academic Excellence Award to Eric J. Stern, M.D., during the society’s recent annual meeting in Mexico City. Dr. Stern is a professor of radiology, adjunct professor of medicine, medical education and bioinformatics, and global health and vice-chair, academic affairs at the University of Washington in Seattle.

Jadvar Named ACNM President

The American College of Nuclear Medicine named Hossein Jadvar, M.D., Ph.D., M.P.H., M.B.A., president for 2013-14. Dr. Jadvar is an associate professor of radiology biomedical engineering and the vice-chair of research at the University of Southern California Keck School of Medicine in Los Angeles. Dr. Jadvar is a past recipient of an RSNA Research & Education (R&E) Foundation Research Seed Grant.
American Board of Radiology Elects New Trustees

The American Board of Radiology (ABR) has elected Stephen M. Hahn, M.D., as a trustee for radiation oncology and J. Anthony Seibert, Ph.D., as a trustee for medical physics, both effective July 1. Dr. Hahn is chair and Henry K. Pancoast professor of radiation oncology at the University of Pennsylvania. Dr. Seibert has been a professor of radiology and medical physics at the University of California Davis Medical Center since January 1983 and is currently associate chair of radiology informatics.

SAR Bestows Honors

The Society of Abdominal Radiology (SAR) awarded its 2013 Walter B. Cannon Medal to RSNA Liaison for International Affairs, Richard L. Baron, M.D., at its recent annual meeting. Dr. Baron is dean for clinical practice and a professor of radiology at the University of Chicago Medical Center where he has served for 30 years. Richard L. Clark, M.D., an emeritus professor of radiology at the University of North Carolina School of Medicine in Chapel Hill, was awarded the 2013 Howard M. Paliard Medal.

Suek K. Patel, M.D., an attending physician in the department of radiology at Northwestern Memorial Hospital in Chicago, and Ali Shrikhande, M.D., a clinical professor of radiology at the University of California School of Medicine at Irvine, were respectively awarded the GU and GI Lifetime Achievement Awards.

Philip E. Palmer, M.D.

Philip E. Palmer, M.D., a pioneer in promoting the use of radiology and radiation therapy in Africa and developing countries, died January 3, 2013. He was 91.

Dr. Palmer was an emeritus professor of radiology at the School of Medicine at the University of California (UC) Davis in Sacramento. He joined the staff in 1970 as the first radiology department chair and spent the next 20 years of his professional career there, also serving as director of diagnostic radiology at the UC Davis Medical Center.

Prior to joining UC Davis, Dr. Palmer worked in Southern Rhodesia (now Zimbabwe) to introduce the use of new techniques in diagnostic radiology, including neuroradiology and angiography, and radiotherapy for cancer patients in the region. He also chaired the radiology department at the University of Cape Town in South Africa.

After retiring from UC Davis in 1990, Dr. Palmer spent 30 years as a consultant for the World Health Organization in Geneva and led a modernization of radiologic education and practices in Romania following the end of communism.

Dr. Palmer received the Roentgen Medal from the German Radiological Society in 1993. He received the first Bécule Medial, the highest award of the International Society of Radiology, and gave the first Bécule Lecture in 1996. Dr. Palmer served as RSNA second-vice president in 1994 and received the RSNA Special Presidential Award in 2000.

IN MEMORIAM

Philip E. Palmer, M.D.

Marian Godkisen Schuyler

Marian Godkisen Schuyler, who served as RSNA interim executive director from 1988 to 1989 prior to her retirement, died January 11, 2013. She was 82.

In the 1990s Schuyler worked side-by-side at RSNA with her husband George Schuyler, director of scientific meetings. He was presented with an RSNA Gold Medal at the 1988 Scientific Assembly for his accomplishments, specifically his assistance in moving the annual meeting from Chicago’s Palmer House to McCormick Place.

During her career, Schuyler worked in various capacities for the Central Intelligence Agency (CIA), ending her career there in covert operations. While working at the CIA, she attended evening classes at the University of Maryland, and spent the next 20 years of her professional career there, also serving as director of diagnostic radiology at the UC Davis Medical Center. She attended evening classes at the University of Maryland, and spent the next 20 years of her professional career there, also serving as director of diagnostic radiology at the UC Davis Medical Center.

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Radiologists transitioning from film-based to digital reading rooms are experiencing a host of new workplace maladies ranging from neck and back problems to repetitive motion disorders like carpal tunnel syndrome.

Experts from across the country created a charter, or design, (below) of an ergonomically optimized and low-stress clinical reading room at Veterans Affairs (VA) Maryland Healthcare System in Baltimore, one of the nation’s first filmless healthcare facilities. Dr. Siegel, who spearheaded “The Reading Room of the Future” project at the Baltimore VA, presented findings from the project at RSNA 2012.

“Ergonomics is a topic that has not received anywhere near the attention that it should,” said Dr. Siegel, also professor and vice-chair of Information Systems, Department of Radiology and Nuclear Medicine, the University of Maryland, Baltimore. “A relatively small amount of effort reaps huge benefits because improvement in an area where radiologists spend much of their time.”

Through trial and error, Dr. Siegel and colleagues discovered that redesigning the entire reading room is vastly more effective than simply adding computer workstations to the previous film-based environment. Initially a single, unpartitioned space, the Baltimore VA reading room now features areas where radiologists can work independently and others where they can collaborate when necessary.

“In a digital environment where we are interacting with computer workstations, it is really critical to rethink the entire design of the room in terms of lighting, sound, temperature and other elements,” said Dr. Siegel. “Nobody would drive a car where the air doesn’t move much and get stuck.”

“W e found that just using the sound-masking system, which costs about $500 for an approximately 500-square-foot room, can significantly decrease distractions associated with noise in and outside the room,” Dr. Siegel said. “In our experience it has been effective, and it can even increase the accuracy of the speech-recognition systems being used now.”

Because controlling temperature and ventilation is critical and can impact productivity, the facility’s new reading rooms have a sub-set of workstations equipped with individual controls for each user, Dr. Siegel said.

“Many of us work in environments where the air doesn’t move much and get stuck,” Dr. Siegel said. “Nobody would drive a car where they didn’t have air blowing or couldn’t control the temperature, but how many radiologists will sit in a room for 8 or 10 hours without being able to easily adjust the temperature or ventilation?”

Ergonomics Checklist Helps Prevent Injuries

A surge in such work-related complaints from radiologists led researchers at Cornell University in Ithaca, N.Y., to develop the Cornell Digital Reading Room Ergonomics Checklist in 2006.

“Some factors that were less important in a film-based environment become extraordinarily important in this new digital environment,” said Eliot Siegel, M.D.

Although not always accessed, ergonomic solutions that will not only reduce injuries but also maximize productivity are simple and often easy to implement, according to Eliot Siegel, M.D., chief of imaging at the Veterans Affairs (VA) Maryland Healthcare System in Baltimore, one of the nation’s first filmless healthcare facilities. Dr. Siegel, who spearheaded “The Reading Room of the Future” project at the Baltimore VA, presented findings from the project at RSNA 2012.

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3D and 4D Fetal Ultrasound Advances

While fetal sonograms were once used primarily to detect problems and measure growth, advances in 3D and 4D ultrasound technology now offer capabilities ranging from better visualization of congenital birth defects to dynamic, multiplanar views of the fetal heart.

At one time, advances on the research front, the growing availability of 3D and 4D ultrasound technology has also increased public access to these ultrasound services—increasing the potential for safety risks to both mothers and their fetuses, expert says.

The mainstream press has been filled with reports of the latest trend for expectant parents—“ultrasound parties,” where a technologist performs ultrasound in the home and 3D and 4D images are immediately shared with friends and family in a celebratory environment. Party attenders view still 3D ultrasound images of the fetus and 4D ultrasound images that appear to show fetal movement in real time.

A host of new independent ultrasound services and providers catering to the growing availability of 3D and 4D ultrasound technology has also increased public access to these ultrasound services. “I want to be clear that these ultrasound services in parents’ homes, ‘I want to be clear that these ultrasound services are helping parents turn what has traditionally been a private medical procedure into what one media outlet has dubbed ‘a new frontier in pregnancy overhauling,’” experts caution against using ultrasound for entertainment and stress that ultrasound should be performed on expectant mothers only when there is a clear diagnostic benefit.

Patients, of course, love 3D pictures, but as radiologists we have to be careful that we’re not turning ultrasound into a “party game” for the fun of it,” said Deborah Levine, M.D., co-chief of obstetric and gynecologic ultrasound in the Department of Radiology at Beth Israel Deaconess Medical Center in Boston. "Radiologists will perform a whole diagnostic study before ever seeing that 3D picture for the patient.”

As for companies that provide these ultrasound services in parents’ homes, “I want to be clear that radiologists we have to be careful that we’re not turning ultrasound into a ‘party game’ for the fun of it,” said Deborah Levine, M.D., co-chief of obstetric and gynecologic ultrasound in the Department of Radiology at Beth Israel Deaconess Medical Center in Boston. "Radiologists will perform a whole diagnostic study before ever seeing that 3D picture for the patient.”

Clinical 3D-4D Ultrasound Have “Mix and Match” Potential

Developed more than 30 years ago, 3D ultrasound technology has been widely used in clinical practice in the last decade and continues to widen its reach as researchers explore innovative new applications.

“Patients, of course, love 3D pictures, but as radiologists we have to be careful that we’re not performing an ultrasound for the fun of it,” Deborah Levine, M.D.

The technology provides physicians a “nice way to view surface characteristics of the fetus,” Dr. Levine said. “And there are certain anomalies that are easier to understand when you see them in 3D.” For example, 3D imaging can offer physicians a better view of birth defects such as a cleft lip and palate, she said.

Dr. Levine also pointed out the illustrative benefits of 3D ultrasound for patients and physicians. “An ultrasound expert may understand an anomaly in 2D images, but frequently patients and the doctors counseling those patients have an easier time understanding a 3D image,” she said.

“Most of us are classically trained with 2D ultrasound and most of the diagnoses are pretty straightforward,” Dr. Lee said. “But sometimes you come out of an exam shaking your head without being entirely sure about a certain finding. Whether you are talking about 2D, 3D or 4D ultrasound, there are several different imaging modalities you can use depending on what kind of answers you are seeking.”

There are many different tools available in 3D ultrasound, such as the multiplanar display, where physicians are able to see, for example, orthogonal views of the fetal brain and its cavities, simultaneously, Dr. Lee said. “Navigating through these volumes with multiplanar views can be really helpful,” he added.

Surface rendering of 3D ultrasound images allows physicians to view the features of a baby’s face or hands or other surface details that allow them to search for genetic syndromes. Tools like maximum intensity projection let doctors better visualize fetal bony structures such as the skull or vertebra, while 3D inversion mode gives them the ability to examine fluid-filled structures, such as the fetal stomach or brain ventricles that ordinarily appear black in ultrasound. Thick slice scanning provides physicians a better look at fingers and toes, and anomalies like cleft palate.

When it comes to ultrasound, spatial temporal image correlation (STIC) “is an innovative way to examine a moving heart, so that you can actually get into that dynamic multiplanar views of the heart,” Dr. Lee said. “And you can actually use all of these tools I’ve talked about to render the heart in 4D.”

All of these imaging tools, according to Dr. Lee, can be “mixed and matched. For example, in the case of an obstetric complication like vein previa, doctors can use 3D ultrasound to obtain a rendered view that can be combined with, for example, color Doppler. ‘We can mix and match these modalities to see things in different ways that traditional ultrasound can’t show you,’ Dr. Lee said.

3D Ultrasound Helps Assess Prenatal Nutritional Status

3D ultrasound also allows physicians to study, for example, estimating the reliability of fetal weight using fractional thigh volume measurements based on 3D ultrasound.

Obstetricians have long relied on estimated weight to make decisions about the growth and health of a fetus. Unfortunately, estimated birth weight doesn’t always do a terrific job predicting postnatal nutritional status,” Dr. Lee said. Assessing the soft tissue of fetal limbs is a new method of assessing prenatal nutritional status, said Dr. Lee, who has spent several years studying the reliability of fetal weight using ultrasound.

In a prospective study published in the March 2013 issue of Ultrasound in Obstetrics & Gynecology, Dr. Lee and colleagues determined that the precision of a fetal weight estimation model using fractional limb volume (in this case the thigh) abdominal circumference and biparietal diameter was superior to that of the commonly used Hadlock method (based on biparietal diameter, abdominal circumference and femur length).

“We have to develop new ways and novel approaches for determining which babies are truly malnourished,” Dr. Lee said. “That’s why we are using fractional limb volume as part of the fetal weight estimation procedure to assess the fetus before delivery.”

3D Ultrasound technology continues to widen its reach as researchers explore innovative new applications. Top: A 3D ultrasound view of a 13-week-old fetus; Bottom: A 3D ultrasound view of a 31-week gestational fetus.
Residents Gain Critical Experience Through Academic Research Program

More than 20 years ago, realizing that residences primarily focus on clinical training, a group of visionary radiologists set out to create an academic radiology research program offering residents exposure to research pivotal not only to their long-term careers but also in securing that first radiology position.

In 1990, the Introduction to Research program was established by RSNA, the Association of University Radiologists (AUR) and the American Roentgen Ray Society (ARRS). The program was renamed Introduction to Academic Research (ITAR) in 2008 to better reflect its content. Exposing second-year radiology residents to the wide world of teaching and research, ITAR is part of a comprehensive and ongoing effort to improve the quantity and quality of imaging research produced by radiologists.

“In the 1980s, very little research was being done and very few radiologists had National Institutes of Health (NIH) funding,” said C. Douglas Maynard, M.D., 2010 RSNA president and a founder of the ITAR program along with Robert Stanley, M.D., and Bruce J. Hillman, M.D. “We knew we needed to do something to better prepare our physicians to do more research.”

By reaching out to radiologists in training—before their career aspirations are finalized—ITAR focuses on mentoring residents and providing them with skill sets they can use throughout their careers. “Residents are primarily focused on clinical training; there is little exposure to academic radiology that isn’t offered by residency programs,” said C. Douglas Maynard, RSNA president and chair of radiology department.

“Residencies are primarily focused on clinical training; there is little exposure to academic radiology,” said John Eng, M.D., an associate professor of radiology at The Johns Hopkins University in Baltimore, a former volunteer ITAR director and a seminar attendee. “This program is a great way to give residents interested in an academic career more information so they can better make a career decision.”

Program Demand by Residents

Since 1990, approximately 1,760 residents from the U.S. and Canada have participated in ITAR, while others are waiting for their chance at an opening in the highly competitive program. Held each year at the RSNA and ARRS annual meetings, ITAR includes 15 hours of presentations, small group discussions, a dinner reception and networking opportunities spanning four and a half days. ITAR is open to just 40 residents at each meeting, each of whom must be nominated by their department chair or residency director and then selected by RSNA and ARRS.

To defray expenses, each resident’s radiology department receives a $1,000 stipend. “Due to class size limitations, we have to turn away people every year,” said Fiona Miller, director of RSNA’s research departamento. “This type of programming is difficult to find—a comprehensive course that is experienced in the setting of a prestigious medical meetings. It’s a big draw.”

In addition to highlighting the various roles of academic radiologists, ITAR focuses on mentoring residents and providing them with skill sets they can use throughout their careers.

Since 1990, approximately 1,760 residents from the U.S. and Canada have participated in RSNA’s Introduction to Academic Research Program (ITAR), which exposes second-year radiology residents to the wide world of teaching and research. Above: ITAR participants collaborate with RSNA’s Introduction to Research for International Young Academics (IRIYA) participants during a joint session in 2012.

I view our work as tending to the whole pipeline, from residents to junior faculty to RSNA Research & Education (R&E) Foundation scholars,” said Ruth C. Carlos, M.D., a professor of radiology at the University of Michigan, Ann Arbor, and an ITAR volunteer director. “That is how we will guarantee that radiologists will continue to conduct the molecular imaging, translational and outcomes research that will drive the field forward.”

Medical school faculty members are equally enthusiastic about the program. “We love it,” said Martha Mainiero, M.D., a professor of diagnostic imaging and residency program director at Brown University in Providence, R.I., and a past-president of the Association of Program Directors in Radiology (APDR). “I think the number one thing the seminar accomplishments is to get residents excited about research.”

Exposing residents to the breadth of imaging research under way is one of the major objectives of ITAR, Dr. Carlos added. “In practice, you know what your getting into, but in academia, there’s more latitude in shaping your career,” Dr. Carlos said. “We cover all the opportunities from directing a residency program to bench research to translational research to conducting randomized controlled trials to bringing novel techniques to the bedside.”

According to Dr. Mainiero and participating residents, ITAR provides a great overview of academic radiology. “When residents come back, they are always amazed,” said Dr. Mainiero. “They say they never realized how much research was being conducted.”

Seminar Topics are Useful, “Out of the Box”

ITAR speakers are all well-established in their fields and address highly sought topics such as data mining and planning clinical research, preparing a manuscript and developing a successful mentoring relationship. The seminar also offers a handful of “outside of the box” presentations, such as those offered at RSNA 2012 by Michael L. Richardson, M.D., a professor of radiology at the University of Washington in Seattle, and Richard B. Gunderman, M.D., Ph.D., a professor and vice-chair of radiology at Indiana University (IU) in Indianapolis.

In his 45-minute lecture on public speaking, Dr. Richardson covered the evils of the bullet-pointed slide, managing stage fright and sure-fire ways to rivet your audience to your every word (hint, says Dr. Richardson: tell a story). Two of the many comments residents made about Dr. Richardson’s talk in post-seminar compliments on their evaluation forms, “I never approach PowerPoint presentations the same way again” and “The lecture on how to make a better PowerPoint presentation was amazing and has universal applicability.”

Dr. Gunderman, who also teaches philosophy and psychology at IU, encouraged residents to pay close attention to their natural curiosities and the work activities that make them feel most alive, and find ways to devote more time to those endeavors.

“Dr. Gunderman’s talk reshaped the way that I approach and view my career,” one resident commented about the presentation. “Residents really get a lot out of the program and some write pages and pages of compliments on their evaluation forms,” Dr. Eng said. “They appreciate the opportunity to be around other residents with similar career aspirations and to hear from established radiologists who have written their textbooks.”

To help mentor residents, ITAR alumni are invited to return and participate in roundtable discussions, providing attendees with valuable feedback on the role as junior faculty member. “When I went to school there were no role models for what I wanted to do,” Dr. Richardson said. “This program is a great idea.”

Program Accelerates Radiology Research

In addition to anecdotal data, there is ample evidence that the ITAR seminar—in concert with grant writing workshops, research scholarships and other RSNA programs—has helped radiology make significant strides in research. In a 1998 study published in Radiology, Dr. Hillman and colleagues concluded that ITAR has encouraged the development of successful research careers and that seminar participants had higher levels of academic achievement earlier in their careers than residents who did not attend the program.

Over the last two decades, the amount of funding awarded to radiology departments from the National Institutes of Health (NIH) has significantly increased, from $75 million in 1995 to approximately $375 million in 2011, according to the 2012 Academy of Radiology Research Annual Report. As a percentage of the total NIH budget, imaging-related research has increased from 6.5 percent in 2001 to 12.2 percent in 2012, and is expected to continue to grow, according to the report.

“It’s important to produce radiologists who conduct imaging research, especially clinician-radiologists who understand the problems of referring physicians,” Dr. Carlos said. “Patient care takes a team and so does research.”
Quantitative Imaging Poised to Realize Full Potential in Cancer Research

An emerging discipline in radiology, quantitative imaging has enormous potential in oncology research as a means of predicting and measuring response to cancer therapy.

"Ideally, these tools wouldn't require human intervention in terms of collecting or analyzing data," Dr. Clarke said. "They would put the quantitative data in the hands of radiologists who could make decisions based on that information.

That goal means interfacing with the makers of commercial imaging systems to develop standards and tools acceptable for advancing industry-wide adoption, Dr. Clarke said. "We are encouraging industry participation in QIN in hopes that these large companies will take the tools developed by academic scientists, commercialize them and bring them to the clinical setting," he said. "A large number of QIN teams are interfacing with several large and small imaging and software companies."

Although they are separate organizations, QIN works in tandem with RSNAs Quantitative Imaging Biomarkers Alliance (QIBA) to interface with commercial vendors. Approximately 20-25 percent of QIN principal investigators are QIBA members.

Dr. Clarke describes QIN as a "research engine" for imaging technology development for the National Cancer Institute's Cancer Imaging Program. Approximately 20-25 percent of QIN principal investigators are QIBA members.

While Dr. Clarke describes QIN as a "research engine" for quantitative imaging, QIBA brings all of the stakeholders to the table to work on a common goal: to industrialize and disseminate quantitative imaging and the use of mature imaging biomarkers in clinical trials and clinical practice by engaging researchers, health-care professional and industry.

QIBA comprises members from several academic medical centers, the U.S. Food and Drug Administration (FDA), the National Institute of Standards and Technology (NIST), NCI, the American College of Radiology Imaging Network (ACRIN) and major imaging equipment manufacturers including GE, Phillips, Siemens and Toshiba, the Extended PhRMA Imaging Group and others. QIBA is supported by funding from the National Institute of Biomedical Imaging and Health (NIBIB).

"Qualitative imaging can potentially help determine as early as possible if one or more drugs are working so that therapy can be modified," Laurence Clarke, Ph.D.

"FDA qualification of quantitative imaging biomarkers will be an important step toward the ultimate RSNA goal of widespread clinical use of quantitative imaging biomarkers," Dr. Sullivan said.

"NCI is putting major resources into drug discovery and imaging plays a critical role in terms of prediction to drug response."

"Quantitative imaging can potentially help determine as early as possible if one or more drugs are working so that therapy can be modified."

"The ability to predict and/or measure therapy response should provide a more robust means for both therapy dose management and correlation of imaging results with other laboratory biomarkers."

But researchers excited by this potential are also frustrated by limitations in methods used to determine cancer treatment response, including reproducibility of measurements, incomplete data collection and poor radiologist-oncologist communication. To that end, NCI is conducting a number of initiatives within its Cancer Imaging Program designed to develop a broad consensus on quantitative imaging methods and to encourage the adoption of more standardized methods for quality assurance and quantitative imaging.

One such initiative—the Quantitative Imaging Network (QIN)—was designed to promote research and development of quantitative imaging methods for the prediction and/or measurement of tumor response to therapies in clinical trial settings, with the overall goal of facilitating the development of clinical decision support systems. QIN has made considerable headway since its founding in 2008.

"The QIN program was created to support multidisciplinary research teams to develop quantitative imaging methods to measure the response to therapy, using commercial or imaging platforms," according to Dr. Clarke, QIN science officer. "The teams will then optimize the performance of their quantitative imaging tools to get data collected from ongoing clinical trials. A goal of QIN is to provide the image, metadata, clinical outcome data and measurement results as a public resource using the NCI Imaging Archive (TCIA)."

Putting Quantitative Data in the Hands of Radiologists

Currently QIN researchers are developing advanced methods for collecting and analyzing data across commercial platforms with the goal of creating software tools that are operator-independent, Dr. Clarke said.

Although they are separate organizations, QIN works in tandem with RSNAs Quantitative Imaging Biomarkers Alliance (QIBA) to interface with commercial vendors. Approximately 20-25 percent of QIN principal investigators are QIBA members.

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RSNAs overall goal in organizing QIBA five years ago was to improve the clinical value of routine quantitative imaging—an aspiration often complicated by limitations in the technology involved, said RSNA Science Advisor Daniel Sullivan, M.D., a professor in the Department of Radiology at Duke University and chair of the QIBA Steering Committee.

The problem, Dr. Sullivan pointed out, is that while clinical trials are needed to show the value of quantitative imaging, imaging equipment must be able to provide the needed accuracy and reproducibility of quantitative imaging data. "But in response to that request, manufacturers say that they need to know the clinical value of quantitative imaging," said Dr. Sullivan. "It's a question of which comes first—the chicken or the egg."

Although QIBA is not an NCI initiative, the relationship between QIN and QIBA will ultimately facilitate NCI's goal of promoting the role of molecular imaging in drug trials. One goal is the "qualification" of the proposed molecular imaging protocols that can be incorporated into current or future drug trials submitted to the FDA.

"FDA qualification of quantitative imaging biomarkers will be an important step toward the ultimate RSNA goal of widespread clinical use of quantitative imaging biomarkers," Dr. Sullivan said.

Also critical to the process is the Cancer Steering Committee of the NIH Biomarker Consortium. Launched in 2006, the Biomarker Consortium was developed by the NIH and the Foundation of the NIH (FNIH) and is charged with coordinating public-private partnerships to advance the goal of standardizing and improving biomarkers. The Cancer Steering Committee focuses particularly on biomarkers, including imaging technologies, for use in development of new cancer therapies.

Quantitative Imaging Central to NCI goals QIN, which continues to expand and currently comprises 16 technical teams and five working groups, held its annual meeting in March at the NIH Natcher Campus in Bethesda, Md., to update members on current issues and discuss future direction.

While he doesn't expect a mature methodology to be finalized for another 5-7 years, Dr. Clarke stressed that quantitative imaging is central to realizing NCI's goals. In fact, imaging is now poised to be one of the first biomarker methods that may be standardized within a reasonable time line, he said.

"NCI is putting major resources into drug discovery and imaging plays a critical role in terms of prediction to drug response."

For more information on the Quantitative Imaging Network (QIN), go to im agingcancer.gov/program/diagnosis/quantitative/qin.

For more information on the Quantitative Imaging Biomarkers Alliance (QIBA), go to rsna.org/QIBA.aspx.

For more information on the Biomarkers Consortium, go to biomarkersconsortium.org.
Technical Challenges Hinder Use of Adrenal Vein Sampling

Despite its diagnostic accuracy, an interventional procedure that sheds light on a common adrenal gland disorder is underutilized—primarily due to challenges performing the procedure and interpreting results, according to recent research.

Adrenal Vein Sampling (AVS)—in which blood samples are taken from veins exiting the adrenal glands—is considered the gold standard for distinguishing aldosterone-producing adenomas from bilateral adrenal hyperplasia in patients with primary aldosteronism (PA). The distinction is crucial because aldosterone-producing adenomas are curable with unilateral adrenalectomy while bilateral hyperplasia is managed medically. However, AVS is technically challenging, experts say. “The challenge is mainly due to the right adrenal vein,” said Scott O. Terrotola, M.D., the Stanley Baum Professor of Radiology and associate chair and chief of interventional radiology at the Hospital of the University of Pennsylvania, Philadelphia. “It is variable in appearance, it looks like nearby liver veins and it is very short and tough to get purchase in.”

Although the 2008 Endocrine Society Clinical Practice Guidelines recommend AVS for additional diagnostic information in PA patients, recent research suggests that physicians are not adhering to those guidelines. A study of 20 major referral centers published in the May 2012 issue of the Journal of Clinical Endocrinology and Metabolism found that almost one-quarter of patients with PA over a six-year period were not submitted for AVS despite the procedure’s very low complication rate of between 0.51 percent and 0.61 percent. “AVS is not performed systematically because it is technically difficult to perform, not readily available at most centers and even more challenging to interpret,” said lead author Gian Paolo Rossi, M.D., chair of internal medicine at the University of Padua, Italy. “Doctors are convinced that it is not.”

Mayo Clinic Leads AVS Resurgence

AVS was first used in the 1960s but fell out of favor a decade later as physicians turned to abdominal CT to detect nodules on adrenal glands. Abdominal CT failed to live up to its initial promise, however, as many adrenal nodules were deemed either nonfunctioning or too small to be seen on CT. “The accuracy of abdominal CT in correctly detecting aldosterone-producing adenomas was only 35 percent,” recalled William F. Young, M.D., chair of endocrinology at the Mayo Clinic in Rochester, Minn. “As a result, almost one-quarter of patients sent to surgery based on the abdominal CT findings were not cured, while another quarter did not undergo surgery when it would have been curative.”

More centers returned to performing AVS as the inaccuracy of CT as a stand-alone approach became apparent. The Mayo Clinic resumed the procedure in 1990 after a 16-year hiatus. The clinic dedicates one radiologist to perform all AVS procedures, a strategy that helped make Mayo one of the leading centers in the country for PA patients. “Half of the patients who come to us have experienced failed AVS at another facility,” Dr. Young said. Also driving the resurgence of AVS is a growing awareness that AVS is not performed systematically. “AVS at another facility,” Dr. Young said. “AVS is not performed systematically because it is technically difficult to perform, not readily available at most centers and even more challenging to interpret,” said lead author Gian Paolo Rossi, M.D., chair of internal medicine at the University of Padua, Italy. “Doctors are convinced that it is not.”

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“AVS is not performed systematically because it is technically difficult to perform, not readily available at most centers and even more challenging to interpret.” Gian Paolo Rossi, M.D.

New Approaches Improve AVS Efficiency

The revived interest in AVS has challenged interventional radiologists to improve their proficiency.

Much of the current research in this area is focused on improving identification and sampling of the right adrenal vein, particularly for less experienced operators. Dr. Terrotola, who performs 40 to 50 AVS procedures a year with a more than 95 percent success rate, has suggested that the inferior accessory hepatic vein (IAHV) can be used as a guidewire to increase the success rate of the procedure. “The inferior accessory hepatic vein is almost always within one centimeter of the adrenal vein,” he said. “I teach my fellows to look for an IAHV, which is easy to find. If there is one—as in about 60 percent of the population—we turn the catheter posteriorly and the adrenal vein is usually right there. Further, correctly identifying the IAHV helps avoid misinterpreting it as a renal vein.”

In a study published in the September 2011 issue of the Journal of Vascular and Interventional Radiology, Dr. Terrotola demonstrated that right AVS was successful in 95 percent of patients with a visible IAHV. “Even very experienced interventionalists who have used the catheter say it is much better,” Dr. Terrotola said. A rapid cortisol assay is another promising avenue toward improved AVS efficiency. Cortisol is a steroid hormone produced by the adrenal gland. “You need to get a cortisol level to prove you’re in the adrenal vein, but you have to send it out to a lab,” Dr. Terrotola said. “You can’t get it done in a point-of-care setting.”

A rapidly available assay would allow radiologists to confirm that they are in the adrenal vein during the procedure rather than having to wait for lab results. A study in the May 2011 issue of European Journal of Endocrinology from the University Hospital Inselspital in Munich, demonstrated rapid cortisol assays improved the success rate of AVS from 55 to 85 percent, primarily due to improved targeting of the right adrenal vein, however turnaround time was still approximately one hour.

Researchers also have been exploring an image-based approach to AVS using C-arm CT, which is available in most modern angiography suites. By rotating the C-arm during an X-ray exposure, the equipment constructs a C-arm CT-type dataset for reviewing cross-sectional images. Although Dr. Terrotola suggested that this approach might not be the bedrock for inexperienced clinicians, there are drawbacks. “Personally I think the imaging approach is overkill and results in a lot of extra CT scans in this point-of-care setting.” Dr. Terrotola said. Referring to the multi-society campaign to reduce and optimize radiation dose.

No matter the technical challenges, experts agree that AVS is an essential tool in speeding appropriate treatment to patients with PA.

“There’s been a big resurgence of interest in AVS and our goal is to teach people how to perform it better,” Dr. Terrotola said. “If we can show more than 90 percent accuracy, then the world will beat a path to our doorstep.”

WEB EXTRAS

Access an abstract of the study, “Adrenal Vein Sampling: International Study (AVIS) for Identifying the Major Subtypes of Primary Aldosteronism” in the Journal of Clinical Endocrinology and Metabolism at www.endojournals.org/content/97/5/1606.

Access the Endocrine Society Clinical Guidelines at endo-society.org/guidelines/ index.cfm.

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Pericardial Disease: Value of CT and MR Imaging

Trans thoracic echocardiography, which combines structural and physiologic assessment, is the first-line technique for examination of patients suspected of having or known to have pericardial disease; however, cardiac CT and MR imaging are becoming increasingly popular for the study of this enigmatic part of the heart.

In a review in the May 2013 issue of Radiology (RSNA.org/Radiology), Jan Bulgaert, M.D., Ph.D., of Universiteit Hospitals Leuven, Belgium, and colleagues describe how CT and MR imaging have dramatically changed the current view on imaging of pericardial disease and how these techniques may contribute to the optimization of current patient care. The authors also discuss:

- Pericardial anatomy and physiology
- Imaging of normal pericardium
- Congenital and acquired pericardial disease
- The authors focus on the rapidly evolving insights regarding pericardial disease provided by modern imaging modalities, not infrequently necessitating reconsideration of evidence that has thus far been taken for granted.

"Since pericardial diseases have substantial morbidity and peri-mortem, both techniques (CT, MR imaging) have an increasingly important role in decision making, particularly in determination of the optimal treatment for patients with constrictive pericarditis," the authors write.

Imaging of Vascular Complications and Their Consequences Following Transplantation in the Abdomen

Transplantation in the abdomen is an established and effective treatment option in patients with end-stage organ failure. With the increase in organ transplantations being performed, especially living donor transplantations, radiologists have a critical role in graft monitoring and assessing complications.

In a review in the May issue of Radiology (RSNA.org/Radiology), Gavin Low, M.B.Ch.B., of the University of Alberta Hospital, Canada, and colleagues offer a basic description of the standard surgical techniques performed in the abdomen and discuss the imaging appearances of vascular complications and their consequences.

In an article in the May-June issue of RadioGraphics (RSNA.org/RadioGraphics), Gavin Low, M.B.Ch.B., of the University of Alberta Hospital, Canada, and colleagues offer a basic description of the standard surgical techniques performed in the abdomen and discuss the imaging appearances of vascular complications and their consequences.

The authors focus on the rapidly evolving insights regarding pericardial disease provided by modern imaging modalities, not infrequently necessitating reconsideration of evidence that has thus far been taken for granted.

"Since pericardial diseases have substantial morbidity and peri-mortem, both techniques (CT, MR imaging) have an increasingly important role in decision making, particularly in determination of the optimal treatment for patients with constrictive pericarditis," the authors write.

Typical appearance of a pericardial cyst. (a) Axial contrast-enhanced CT image shows presence of well-defined, oval-like, fluid-filled structure (attenuation: 3 Hu) in broad contact with pericardium. (b) Cyst has low signal intensity on T1-weighted spin-echo MR image (one heartbeat/30, 90° flip angle, 1.4 × 2.0-mm-in-plane resolution). No cystic wall is discernible on b–c. (Reproduced 2012;30:340-352 by RSNA. All rights reserved. Printed with permission.)

RadioGraphics' Call for Articles Celebrating RSNA's 100th Anniversary

As part of RSNA's 100th anniversary celebration at its 2014 and 2015 annual meetings, RadioGraphics is announcing a call for articles that address an important topic in the history of radiology.

The ideal article will incorporate material that highlights the role that RSNA or RadioGraphics has played in improving the specialty, whether in the imaging of disease or through providing quality patient care. Preference will be given to reviews that highlight the history of a particular modality, the evolution in imaging of a particular body part or region, or the progress in evaluating specific disease processes.

Authors should contact Jeffrey S. Klein, M.D., RadioGraphics Editor, or William A. Murphy, Jr., M.D., RadioGraphics Editorial Board Member, for historical papers recommended for consideration or their proposed material prior to submission.

All manuscripts intended for publication in 2014 must be submitted by September 3, 2013, with submissions for 2015 considered no later than September 2, 2014.

Guidelines detailing the length and format of these manuscripts can be found at Radiographics.rsna.org/site/pj/articles.xhtml.

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RadioGraphics 2012 Cases of the Day Now Online

A popular attraction at RSNA annual meetings, Cases of the Day from RSNA 2012 are now available online.

Cases of the Day—image-based case scenarios spanning 14 radiology subspecialties—are presented each day at the annual meeting. Participants review each case, submit a diagnosis and check the correct answer that is released the following morning. In the online format, participants who view the RSNA 2012 cases and submit diagnoses not only immediately see the correct answer but also receive instant feedback and can discuss the case with others.

Each Case of the Day is worth 1.00 AMA PRA Category 1 Credit®, which will be automatically transferred to the RSNA CME Credit Repository upon completion. Cases of the Day are free to RSNA members. Non-members may access online Cases of the Day for a fee of $15 per case.

Browse the newest online Cases of the Day at RSNA.org/education/trialview.html.

Browse the newest online Cases of the Day at RSNA.org/education/trialview.html.
Radiology in Public Focus

Press releases were sent to the medical news media for the following articles appearing in recent issues of Radiology.

Cardiovascular Risk among Stable Individuals Suspected of Having Coronary Artery Disease with No Modifiable Risk Factors: Results from an International Multicenter Study of 5,262 Patients

Antonios individuals suspected of having coronary artery disease (CAD) without modifiable risk factors, CAD is common with significantly increased hazards for major adverse cardiovascular events (MACEs) and mortality, according to new research. From an international multicenter cohort study of 27,125 subjects undergoing coronary CT angiography (CCTA) at 12 centers, Jonathan Leipsic, M.D., of St. Paul’s Hospital, University of British Columbia, Vancouver, and colleagues identified 5,262 patients without known CAD and without modifiable risk factors. In patients without medically modifiable risk factors, the presence of increasing burden of CAD was predictive of MACEs at the per-patient, per-vessel, and per-segment level across varying symptom and family history status. A relationship of increased CAD burden to all individual "hard" end-point components of MACE, including death, myocardial infarction and late target vessel revascularization is present.

"Coronary CT angiography allows for the identification of those at risk among patients without medically modifiable risk factors in a fashion not previously possible with traditional risk stratification tools alone," the authors write.

Mild Traumatic Brain Injury: Longitudinal Regional Brain Volume Changes

A single concussion may cause lasting structural damage to the brain one year after the injury, according to new research. Yongxia Zhou, Ph.D., of New York University School of Medicine, and colleagues investigated changes in global and regional brain volume in patients one year after mild traumatic brain injury (MTBI). The study comprised 28 MTBI patients (19 followed at one year) with post-traumatic symptoms after injury and 22 matched controls (12 followed at one year). Researchers used 3D MR imaging to determine regional gray matter and white matter volumes and correlated these findings with other clinical and cognitive measurements.

One year after MTBI, global brain atrophy was measurably larger than that in controls. The anterior cingulate white matter bilaterally and the left cingulate gyrus isthmus white matter—as well as the right precuneus gray matter—showed significant decreases in regional volume in patients with MTBI over the first year after injury. These findings were confirmed by a cross-sectional comparison with data in control subjects.

"Regional brain atrophy is not exclusive to moderate and severe traumatic brain injury and may be seen after mild injury," the authors write. "In particular, the anterior part of the cingulum and the cingulate gyrus isthmus, as well as the precuneal gray matter, may be distinctively vulnerable one year after MTBI."

Cortical Abnormalities in Patients with Migraine: A Surface-based Analysis

Cortical abnormalities occur in patients with migraine and may represent the results of a balance between an intrinsic predisposition—as suggested by cortical surface area abnormalities—and disease-related processes, as indicated by cortical thickness abnormalities, according to new research.

Roberta Mesina, M.D., of the Institute of Experimental Neurology, Vita-Salute San Raffaele University, Milan, Italy, and colleagues acquired T2-weighted and 3D T1-weighted MR images of the brain in 63 patients with migraine and 18 matched healthy control subjects. Using a general linear model approach, researchers conducted a vertex-by-vertex statistical analysis (P < .01) to assess between-group comparisons (migraine patients vs. control subjects, the aura effect, the effect of white matter hyperintensities) and the correlations between cortical thickness and surface area measurements and patients’ clinical and radiologic characteristics.

Comparing with control subjects, patients with migraine showed reduced cortical thickness (P < .01) and cortical surface area (P < .01) in regions subserving pain processing; conversely, cortical thickness and cortical surface area were increased in patients with migraine in regions involved in executive functions and visual motion processing (P < .01), results showed.

“Accurate measurements of cortical gray matter abnormalities might be useful in better characterizing patients with migraine and in understanding the pathophysiological processes underlying this condition,” the authors write.

Media Coverage of RSNA


New on RadiologyInfo.org

Visit RadiologyInfo.org, RSNA and the American College of Radiology (ACR)’s jointly-sponsored public information website, to read the latest additions to the Diseases and Conditions section:

• Peripheral artery disease
• Stroke
• Renal failure
• Anxiety

MAY PUBLIC INFORMATION ACTIVITIES FOCUS ON STROKE

In recognition of American Stroke Month in May, RSNA and the ACR are distributing public service announcements (PSAs) focusing on stroke imaging, interventional treatments for stroke and the importance of receiving stroke treatment quickly.

In addition to the PSAs, RSNA is also distributing the “60-Second Checkup” audio program to radio stations. This month, the program focuses on how brain angioplasty and stents have been found safe and effective for stroke patients.
RSNA/AUR/ARRS Introduction to Academic Radiology Program

Applications due
July 15

Sponsored by RSNA, the American Roentgen Ray Society (ARRS) and Association of University Radiologists (AUR), the Introduction to Academic Radiology program:
• Exposes second-year residents to academic radiology
• Demonstrates the importance of research in diagnostic radiology
• Illustrates the excitement of research careers
• Introduces residents to successful clinical radiology researchers

Successful applicants will be assigned to either a seminar held during the RSNA Scientific Assembly in Chicago, December 1–6, 2013, or the ARRS Scientific Meeting in San Diego, May 4–9, 2014.

More information and application/nomination forms for this program are available at RSNA.org/Research/educational_courses.cfm.
Questions can be directed to Fiona Miller at 1-630-590-7741 or fmiiller@rsna.org.

RSNA Derek Harwood-Nash International Fellowship

Applications due
July 1

The Derek Harwood-Nash Fellowship Program supports international scholars pursuing a career in academic radiology to study at North American institutions.

Accepted participants will receive a stipend of up to $10,000 from RSNA to be used toward travel, living expenses and educational materials for the 6- to 12-week fellowship period.

The application for this program is available at RSNA.org/Derek_Harwood-Nash_International_Fellowship.aspx. For more information e-mail CRI@rsna.org.

Medical Meetings May–June 2013

MAY 18–23
American Society of Neuroradiology (ASNR) 50th Annual Meeting and the Foundation of the ASNR Symposium 2013, San Diego Convention Center
• www.asnr.org/2013

MAY 19–22
Radiology Business Management Association (RBMA), 33rd Annual Conference, San Diego, California
• www.rbma.org

MAY 20–22
The Russian National Congress of Radiologists, Radiology 2013, Crocus Expo International Exhibition Centre, Moscow
• www.ru-radiology.ru

MAY 20–23
The European Society of Pediatric Radiology (ESPR), 50th Annual Meeting and 36th Postgraduate Course, Hotel Marriott Budapest, Hungary
• www.espr.org

JUNE 3–5
European Society of Pediatric Radiology (ESPR), 50th Annual Meeting and 36th Postgraduate Course, Hotel Marriott Budapest, Hungary
• www.espr.org

JUNE 4–7
European Society of Gastrointestinal and Abdominal Radiology (ESGAR), 21st Annual Meeting, Palais de Congresses de Catalunya Conference Centre, Barcelona, Spain
• www.esgar.org

JUNE 4–8
Ultrasonography meets Magnetic Resonance Congress and European Society of Magnetic Resonance in Neuroradiology (ESMRN) Congress, Imperial Riding School, Vienna, Austria
• www.esmrn2013.org

JUNE 5–9
Society for Imaging Informatics in Medicine (SIIM), Annual Meeting, Gaylord Texan Resort and Convention Center, Grapevine–Dallas, Texas
• www.siim.org

JUNE 8–11
Society of Thoracic Imaging (STI), 3rd World Congress of Thoracic Imaging, CEOX Convention and Exhibition Center, Seoul, Korea
• www.thoracic.org

JUNE 8–12
Society of Nuclear Medicine and Molecular Imaging (SNMMI), Annual Meeting, Vancouver, BC, Canada
• www.snmmi.org

Find more events at RSNA.org/calendar.aspx.
Residents & Fellows Corner

Retooled RF Buzz Sparks Conversation Among Trainees

Readers of RSNA's bimonthly e-newsletter designed exclusively for residents and fellows are now experiencing a whole new RF Buzz.

While still featuring important information about RSNA offerings, the retooled RF Buzz spotlights issues that engage trainees in deeper conversations on topics that matter most to them—now and as they enter practice.

The RF Buzz also features original articles with practical career advice from professionals in the specialty. The March edition featured "6 Moves Residents Should Make in Planning Their Future Careers," based on an interview with Nazia Jafri, M.D., a breast imaging fellow and recent residency graduate of the University of California, San Francisco, and a member of the RSNA News Editorial Board.

The colorful, image-rich format also offers more links to the RSNA resources that most interest trainees, including RSNA's radiology-specific job site, Career Connect, and select articles from Radiology, Radiographics and RSNA News.

Readers can access the most recent edition of RF Buzz at RSNA.org/Trainees.aspx, under Trainee Resources, Tools for Trainees.

RSNA.org

Stay Plugged Into Social Media on RSNA.org

Users logged onto RSNA.org to access the wide array of Society resources can also stay connected to RSNA's growing roster of social media links that keep you plugged into all things RSNA.

RSNA's Facebook Page connects users to interesting radiology-related articles and images along with program information, annual meeting updates, posts from fellow members and much more. Not a user? We invite you to join the more than 15,000 fans from across the globe who keep RSNA's Facebook Page buzzing.

Or click the RSNA Twitter icon to sample tweets from the more than 9,000 fans posting comments ranging from "I just returned from RSNA so I have trucks of laundry!"—and everything in between.

Users can also access RSNA's LinkedIn page for professional networking, a photostream of RSNA images on flickr, a library of RSNA videos on Vimeo and RSNA video uploads on YouTube.

COMING NEXT MONTH

We report on recent Radiology studies offering the latest malpractice statistics, including the demographics of medical malpractice suits against radiologists and the causes of medical malpractice suits against radiologists in the U.S.
Make Technology Work for You

See how RSNA’s free informatics tools and initiatives are designed to support the use of electronic health records and make your practice run smoothly.

Go to RSNA.org/Informatics