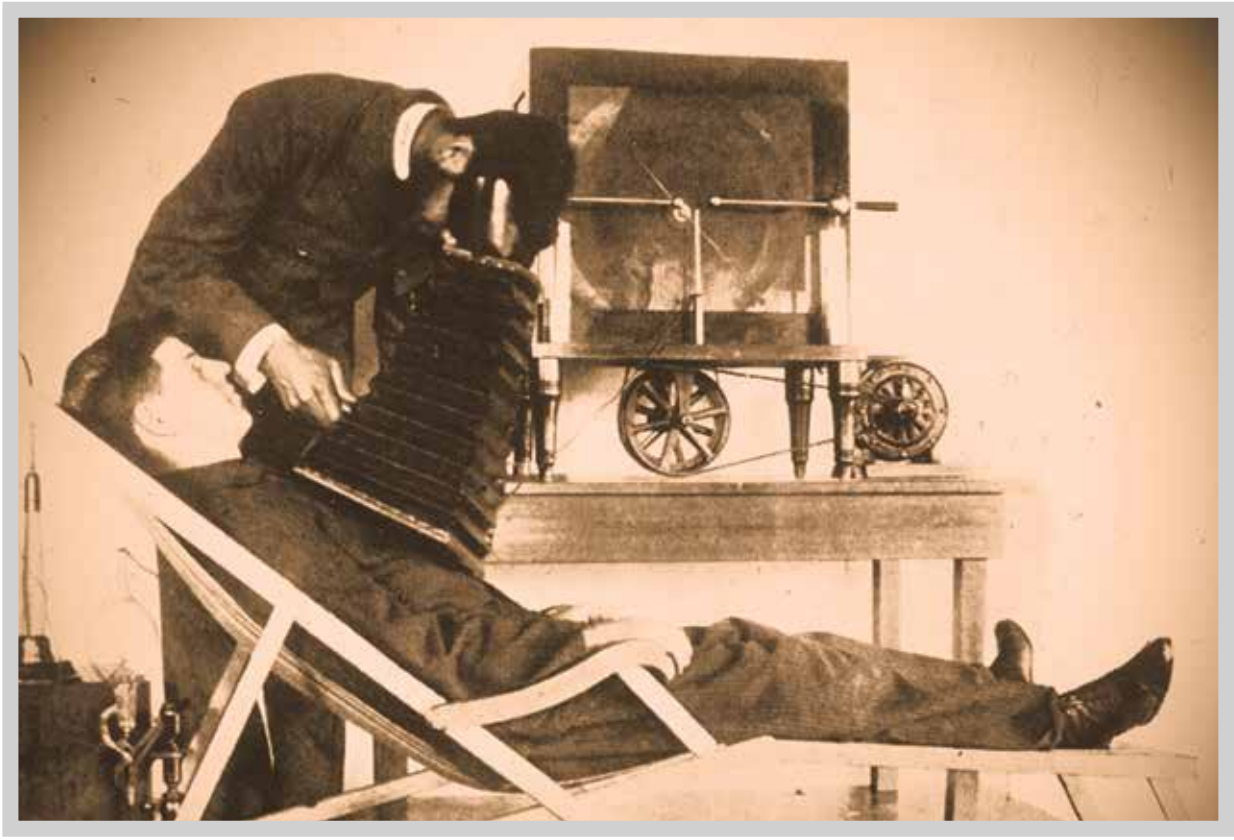
RSNA News™

June 2014 Volume 24, Number 6



Radiology's Remarkable, Revolutionary History

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Diffusion-tensor Imaging and ADHD

Making Headway in Concussion Research

Foundation Awards $3.7 Million

Landmark Imaging Provisions in New Law

RSNA Course Enrollment Begins July 9
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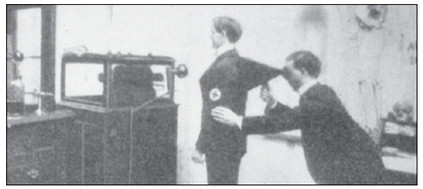

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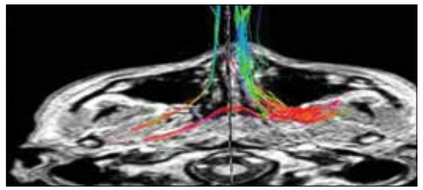

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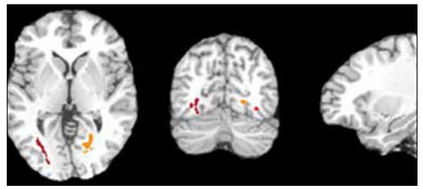

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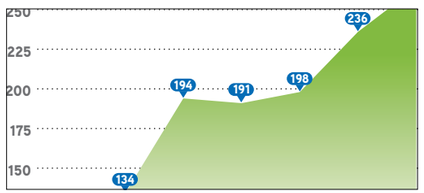

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RSNA MISSION

The RSNA promotes excellence in patient care and healthcare delivery through education, research and technologic innovation.

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Follow us for exclusive news, annual meeting offers and more!

RSNA 2014 DISTINGUISHED HONOREES

The RSNA Board of Directors has announced the distinguished award recipients to whom the Society will pay tribute at the 100th Scientific Assembly and Annual Meeting. They are:


Becker


Lichter


Pisano

GOLD MEDALISTS

Gary J. Becker, M.D.
Tucson, Ariz.

Allen S. Lichter, M.D.
Alexandria, Va.

Etta D. Pisano, M.D.
Charleston, S.C.


Jin


Schwaiger


Togashi

HONORARY MEMBERS

Zheng Yu Jin, M.D.
Beijing

Markus Schwaiger, M.D.
Munchen, Germany

Kaori Togashi, M.D., Ph.D.
Kyoto, Japan

ESR Honors Dignitaries at Annual Meeting


***From left*: Kazuro Sugimura, M.D., Ph.D., Herbert Y. Kressel, M.D., and Sarah S. Donaldson, M.D.**


***From left*: ECR President Valentin E. Sinitsyn, M.D., Ph.D., Peter Aspelin, M.D., Ph.D., Gerard D. Hurley, M.D., Adrian K. Dixon, M.D., and ESR President Guy Frija, M.D.**

2013 RSNA President **Sarah S. Donaldson, M.D.**, was named an honorary member of the European Society of Radiology (ESR) at the European Congress of Radiology (ECR) in Vienna in March. Dr. Donaldson is the Catherine and Howard Avery Professor of Radiation Oncology at Stanford University School of Medicine. She serves as associate residency program director of radiation oncology at Stanford Hospital and Clinics and is chief of radiation oncology service at Lucile Salter Packard Children's Hospital at Stanford.

Also receiving honorary ESR membership were **Herbert Y. Kressel, M.D.**, *Radiology* editor and the Miriam H. Stoneman Professor of Radiology at Harvard Medical School in Boston, and **Kazuro Sugimura, M.D., Ph.D.**, a professor of radiology and chairman of the Department of Radiology at Kobe University School of Medicine, Japan, and director of the Kobe University Hospital. RSNA awarded Honorary Membership to Dr. Sugimura in 2010.

Gold Medals were also bestowed at ECR 2014:

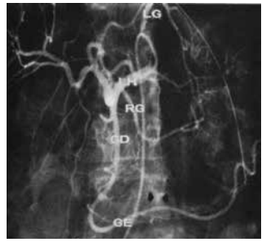
- **Peter Aspelin, M.D., Ph.D.**, a professor of medical radiology at the Karolinska Institutet and Karolinska University Hospital in Stockholm, Sweden.
- **Adrian K. Dixon, M.D.**, Master of Peterhouse, the oldest college at Cambridge University, where he serves as emeritus professor of radiology. Dr. Dixon is also a consultant radiologist at Addenbrooke's Hospital. RSNA awarded Honorary Membership to Dr. Dixon in 2011.
- **Gerard D. Hurley, M.D.**, a former consultant radiologist at Tallaght Hospital and the Charlemont Clinic in Dublin, Ireland. RSNA awarded Honorary Membership to Dr. Hurley in 1997.

CENTENNIAL SNAPSHOTS

During this year as RSNA celebrates its 100th Scientific Assembly and Annual Meeting, *RSNA News* will take a look back at milestones in the Society's history.

1933: Annual Meeting Held in Palmer House for First Time
What was to become the longtime home of the RSNA annual meeting was chosen by the RSNA leadership for its location in Chicago's central business district—known as The Loop—as well as for its favorable rates.

1972: Interventional Radiology Emerges in *Radiology*
The February issue featured an article describing selective arterial embolization as a method to control gastrointestinal bleeding. This was the beginning of the establishment of interventional radiology, which combined the acumen of diagnostic radiology with surgical skills.



1981: *RadioGraphics* Established
RSNA wanted to expand its educational offerings beyond the scientific assembly. A journal was considered more accessible than slides and audiotapes, and easier to promote internationally as well.
William J. Tuddenham, M.D., RSNA's editor of educational materials, became editor of the new journal, which began featuring notable scientific exhibits, now called education exhibits, from RSNA meetings.

1995: 100th Anniversary of X-ray Discovery
When RSNA 1995 convened at the end of the Roentgen centennial year, RSNA leaders chose the theme "Architects of the Future"—a focus forward rather than backward. A "Radiology Department of the Future" at the meeting showcased 21st century patient care by highlighting new ideas, equipment, techniques and concepts within futuristic settings.

2005: R&E Foundation 25th Anniversary Campaign Launched

At the annual meeting, Board of Trustees Chair **R. Nick Bryan, M.D., Ph.D.**, announced the Foundation's goal to raise $15 million by the Foundation's 25th anniversary in 2009. Created in conjunction with the start of the R&E Silver Anniversary Campaign was the Visionaries in Practice program, which enables radiologists working in private practice groups to offer annual support to the Foundation. More than $3 million has been donated through the VIP program since its inception.

2008: Focus on Structured Reporting Begins
RSNA convened representatives from more than 60 radiologic institutions and societies to propose a standard format for structured radiology reports. A white paper generated at the conclusion of the workshops guided RSNA's plan to establish a universal approach to structured reporting in radiology. Today more than 100 templates are available in the RSNA template library.

IN MEMORIAM

R. Brian Holmes, M.D.

RSNA's first president from Canada, R. Brian Holmes, M.D., who began international efforts through expanding the Society's reach to Canadian members, passed away January 15, 2014. He was 94.

Dr. Holmes graduated from the University of Western Ontario in a wartime accelerated program. After service with the Royal Canadian Army Medical Corps he obtained postgraduate training in radiology at Massachusetts General Hospital and the Massachusetts Institute of Technology. After his appointment as chair of radiology at the University of Toronto and radiologist-in-chief at Toronto General Hospital, he quickly established a Department of Radiological Sciences encompassing diagnostic radiology, therapeutic radiology, nuclear medicine and medical engineering. Dr. Holmes installed one of the original CT scanners in North America and the first in Ontario at Toronto General Hospital.


Holmes

Dr. Holmes served as dean of the faculty of medicine at the University of Toronto and as chair of the Ontario Council of Health. Later in his career he helped establish medical schools in the United Arab Emirates and Oman.

In addition to serving as RSNA president in 1976, Dr. Holmes led other organizations including the Association of Canadian Medical Colleges and the Canadian Association of Radiologists. He was the founding chair of the Council for Accreditation of Canadian Medical Colleges and the first Canadian voting member of its American counterpart. He was awarded gold medals from RSNA and the American College of Radiology (ACR) and received the Centennial Medal of the Canadian Association of Radiology.

RSNA Board of Directors Report

At meetings in January and March, the RSNA Board of Directors appointed volunteers to represent RSNA in various capacities and continued planning for RSNA 2014.

Richard L. Baron, M.D.
Chairman, 2014 RSNA Board of Directors

Strategic Plan

At the Board's retreat in January, a refreshed RSNA Strategic Plan for 2014-2019 was approved. The new plan can be found at *RSNA.org/RSNA_Strategic_Plan.aspx*. A focus of the retreat was the topic of education, and discussion centered on a vision of RSNA as a leading source of radiology education that includes resources for an organized, mentored educational process, a wider variety of education offerings, new audiences, alternative content delivery models, and new uses of technology.

RSNA Diagnosis Live™

Further development of RSNA Diagnosis Live and plans to expand its use are progressing, and it will be made available to radiology residency programs in July. RSNA Diagnosis Live is RSNA's interactive learning tool which gives participants an opportunity to "play along" by answering questions using their personal mobile wireless devices. For information, interested programs should contact Betsy Lockett at *blockett@rsna.org*.

Additional use cases are being implemented to expand utilization of Diagnosis Live for education programs by RSNA during the Annual Meeting and throughout the year.

Volunteers Represent, Support RSNA

The Board appointed volunteers to represent RSNA in groups including the American Medical Association Physician Consortium for Performance Improvement, American College of Radiology-RSNA Joint Task Force on Adult Radiation Protection and the planning committee of the 2015 American Society of Clinical Oncology Genitourinary Cancer Symposium.

Appointments were also made for the RSNA's Education Exhibits Awards Committee and Scientific Program Committee.

The Board reviewed the composition and charge of each committee and established some targets for the appropriate inclusion of members-in-training and corresponding members in the committee appointments process for the coming year.

Radiology's Perspective Provided

RSNA submitted comments to The Joint Commission on its proposed requirements that address the qualifications and competency for radiologists who provide diagnostic computed tomography (CT) services while RSNA Board Chairman Richard L. Baron, M.D., provided consultation to the International Atomic Energy Agency at a meeting focusing on the future of diagnostic imaging, held May 5–9 in Vienna.

International Relationships Highlighted in Programs, Collaborations

RSNA will co-sponsor the 2014 World Molecular Imaging Congress, to be held Sept. 17-20 in Seoul, Korea, and will present an RSNA educational showcase at Journées Françaises de Radiologie 2014, Oct. 17–20 in Paris.

A Regional Committee: Middle East/Africa was established, joining the Regional Committees for Latin America, Asia/Oceania and Europe in facilitating participation in RSNA activities and in coordinating outreach in the respective regions.

RSNA will provide financial support for three scholarships in 2014 for the Latin American School of Radiology, as well as RSNA membership for any non-member recipients.

The Board also has authorized an increase in the maximum number of visits through the International Visiting Professor (IVP) program from four to five annually. Learn more about the IVP program at: *RSNA.org/IVP.*

Bylaw Amendment

An amendment to the RSNA Bylaws will be proposed to clarify the provisions governing the filling of a vacancy on the Board of Directors. The amendment, which will be published in the October issue of *Radiology*, will clarify the process and ensure that the office of Chairman of the Board is filled by a tenured member of the Board with a minimum of disruption.

RSNA 2014 Just Around the Corner

Plans continue for RSNA 2014, with the Board exploring ways to expand the Virtual Meeting. Also to be included in this year's program is a mock trial on the topic of incidentalomas and failure to diagnose. Go to *RSNA.org/Annual_Meeting.aspx* for the latest on this year's annual meeting, including events to celebrate the RSNA Centennial.

Richard L. Baron, M.D.
Chairman, 2014 RSNA Board of Directors

Plans to expand RSNA Diagnosis Live™ at RSNA 2014 are progressing.

My Turn

Our History Makes Medicine's Headlines

"The future ain't what it used to be."

David M. Hovsepian, M.D., is the editor of *RSNA News*. He is a professor of radiology in the **Department of Radiology at Stanford University in California.** He also serves on the RSNA Public Information Committee and the Public Information Advisors Network.

Read **"Preserving, Celebrating Radiology's Revolutionary Road,"** starting on Page 5.

The legendary baseball player and manager Yogi Berra, in his characteristic way of turning a phrase, nailed it. As we get ready to celebrate the 100th anniversary of RSNA, the only thing we can predict about the next hundred years is that everything will change. The historic medical advances in the past century are in many ways the story of radiology. And our future, in that regard, looks to be no different.

Whenever surveys are conducted asking people to rank the medical advances they think have changed the world, the discovery of the X-ray and CT/MR imaging are usually near the top of the list. It's no surprise that the evolution of "modern medicine" is closely linked to improvements in diagnosis, with imaging playing a starring role at many key turning points.

The term "diagnostic imaging" was coined to distinguish what we do from laboratory medicine—but that has changed, because now we're imaging *molecules*. The sensitivity of testing for serum biomarkers has increased by orders of magnitude. As we enter the era of "precision medicine," in which therapies are tailored to individuals, radiology continues to remain vital—by adding "radiogenomics" and "theranostics" to the noninvasive, nondestructive armamentarium of advanced medical instruments.

And while we are in heady times indeed, the accomplishments of the pioneers of the past cannot be understated. Their iconic names and faces should not, as old film radiographs, be stored away in dusty warehouses, whose only lasting value is their silver content. To paraphrase U.S. President John F. Kennedy, things didn't just happen; we are where we are today as the result of men and women who dared to ask "why not?" and made things happen.

So, on the eve of RSNA's centennial, we pause to reflect on an illustrious hundred years and, as Kennedy so aptly put it, "celebrate the past to awaken the future."

Editor's Note

Talk to Us!

Did you know that RSNA now invites readers to leave comments at the end of *RSNA News* articles posted online? Our stories tell you what we know and think about the latest in radiology and RSNA programs and services; we want to know what you think, too.

Please visit our stories online to make observations, ask questions, answer other readers' questions and/or simply let us know what you think of the topics we're selecting for *RSNA News*. We value your opinion.

THIS MONTH IN THE *RSNA NEWS* TABLET

Get more of this month's news with the *RSNA News* Tablet edition, available for download through the App Store and Google Play.

As part of this month's story on concussion research, we feature a podcast with Michael L. Lipton, M.D., Ph.D., discussing his *Radiology* research and a video interview with Pilar Dies Suarez, M.D., discussing her RSNA 2013 research on attention deficit hyperactivity disorder.

Access the *RSNA News* tablet edition on the App Store at *itunes.apple.com/us/app/rsna-news/id444083170?mt=8* and Google Play at *https://play.google.com/store/apps/details?id=air.org.rsna.rsnanews&hl=en.*

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Preserving, Celebrating Radiology's Revolutionary Road

BY RICHARD S. DARGAN

The fascinating, often unpredictable history of radiology holds important lessons for today's radiologists, according to a number of experts who are working to preserve and celebrate the story of the profession.

"Understanding the history of radiology puts our work in context, helps us to avoid cynicism and gives us a sense of meaning," said Adrian M. Thomas, M.D., F.R.C.R., co-author of the 2013 book, "The History of Radiology" and a radiologist at the Princess Royal University Hospital in Kent, U.K. "We are not isolated individuals living in the present: We have a past and a future."

"It is all well to concentrate on the technical aspects of radiology, but it is also important to understand the cultural and historical aspects of what we do and how we got here, and to learn about the struggles of others and avoid mistakes of the past," added Arpan Banerjee, M.D., co-author of "The History of Radiology" and a radiologist at Birmingham Heartlands Hospital, U.K., and chairman of the British Society For the History of Radiology.

In 2011, Drs. Thomas and Banerjee helped found the International Society for the History of Radiology (ISHRAD), the first international society dedicated to the history of radiology and radiologic technology. The organization recently held its annual meeting in Vienna, where members outlined an agenda for the coming year that includes developing a book celebrating the International Day of Radiology (IDoR); a military radiology-themed meeting in Verona, Italy; a historical session at the meeting of the Argentinean Society of Radiology in Buenos Aires; and visit to RSNA 2014, the 100th Scientific Assembly and Annual Meeting (See sidebar, Page 7).


Thomas


Banerjee


Eisenberg

ON THE COVER

Paving the way: an early posteroanterior fluoroscopy examination.

For Dr. Thomas, the motivation to preserve history stems from what he calls "an awareness of the centrality of radiology to the patient pathway." He was in medical school the year CT was announced, and he trained in radiology at Hammersmith Hospital in London during the early days of the institution's groundbreaking MR imaging work.

"I have seen a complete transformation in patient care during my career," he said. "The younger generation is not aware of how much things have transformed."

Edison Jump Starts Radiology

Indeed, a look back at radiology history reveals a remarkable number of advances over a relatively short amount of time. In the year after Wilhelm Conrad Roentgen's 1895 discovery of the X-ray, several books and more than 1,000 papers relating to the X-ray were published. The medical possibilities of the technology were quickly apparent, although the 45-minute exposure times of early radiographs made fluoroscopy a more viable option—something the renowned inventor Thomas Edison recognized.

"Edison was the person who really jump started radiology," said Ronald L. Eisenberg, M.D., J.D., a professor of radiology at Harvard Medical School and Beth Israel Deaconess Medical Center in Boston and author of the 1992 book, "Radiology: An Illustrated History." "His display of the fluoroscope at the Electrical Exhibition in New York City in 1896 created a public sensation."

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The remarkable, revolutionary history of radiology began in 1895 when Willhelm Roentgen discovered X-rays. Above: (1) The Roentgen X-ray Laboratory of Mihran Kassabian (1901) at the Medical-Surgical College Hospital in Philadelphia; (2) X-ray bicycles served as mobile X-ray units; (3) early hand-held fluoroscope; (4) a radiograph of the hand of British Prime Minister, Lord Salisbury (made by Campbell-Swinton in 1896); (5) Roentgen; (6) Thomas Edison's display of the fluoroscope at the Electrical Exhibition in New York City in 1896 drew large crowds.

All images courtesy of Eisenberg R.L., "Radiology: An Illustrated History." St. Louis, Mosby, 1992

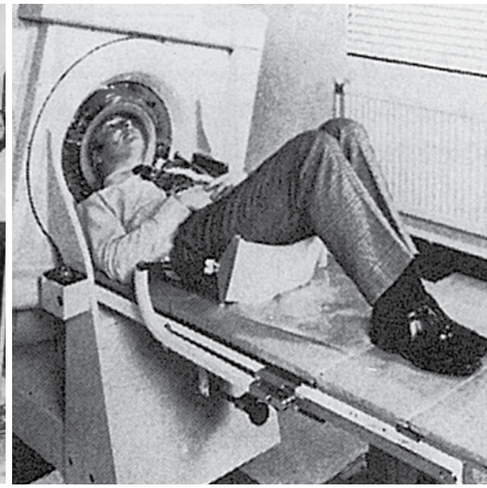
Alongside the breathtaking promise, dangers emerged. Edison's chief assistant, Clarence Dally, died from disease brought on by repeated exposure to radiation. Some scientists blamed electrical currents from the machines, but the experiments of a dentist named William Herbert Rollins proved that X-rays were the culprit. "Williams Rollins is one of the people who was very important to the history of radiology, but has largely been forgotten," Dr. Eisenberg said.

Madame Curie Pedals Her Way into History

With Rollins and others focused on improving the safety of X-ray examinations, the technology spread quickly. Soldiers in the Boer War (1899-1902) in South Africa pedalled stationary bicycles to generate electricity to run the X-ray machines. During World War I, Marie Curie developed and equipped 18 X-ray cars, known as "little Curies," with engines that supplied the current for the X-ray apparatus.

"Madame Curie was better known for developing the radiological car as a mobile X-ray unit than she was for the discovery of radium," Dr. Eisenberg said.

The early ranks of radiologists were made up of surgical interns who had grudgingly agreed to help run the X-ray machines. But the profession quickly grew in esteem thanks to the formation of professional societies like the American Roentgen Ray Society founded in 1900, and RSNA, formed as the Western Roentgen Society in 1915. Radiologists helped speed evolution of the specialty by availing themselves of the latest equipment, like the improved X-ray tube developed at General Electric's research laboratory by physicist William D. Coolidge in 1913.



Technology played a major role in the progression of radiology. *From left*: the first MR imaging scanner (circa 1977) and the first clinical prototype of a CT brain scanner (circa 1972).

"Early radiologists were able to see the potential of the Coolidge Tube to treat under the skin, and this led to a boon in radiation therapy," Dr. Eisenberg said.

The practice of incorporating new and improved technologies into medical practice continued throughout the 20th century. Medical ultrasound grew from radar and sonar, CT was made possible with computers and MR imaging arose from nuclear magnetic resonance research.

Continued on Next Page

100 YEARS RSNA READ ABOUT THE RSNA CENTENNIAL ON NEXT PAGE.

DATELINE: *RADIOLOGY BY THE NUMBERS*

1895	1900	1910	1913	1913	1915	1923	1929	1946	1958	1971	1974
Wilhelm Roentgen discovers X-rays	The American Roentgen Ray Society founded	Barium contrast used to study the GI tract	William D. Coolidge invents the Coolidge Tube	Gustave Bucky develops the anti-scatter grid that helps reduce harmful radiation doses	RSNA founded (originally formed as the Western Roentgen Society)	American College of Radiology is founded	Cardiac catheterization performed by German physician Werner Forssmann	Radionuclides for medical use produced at Oak Ridge National Laboratory	Scottish physician Ian Donald publishes groundbreaking paper on ultrasound	First patient examination using CT	First scans with PET tomograph.

TIMELINE CONTINUED ON NEXT PAGE.

Radiology played an increasingly critical role in times of war. *Top left*: Marie Curie at the helm of an X-ray truck known as a "little Curie" in 1917; a post-war image of the scanning of a patient in the fluid-filled World War II B-29 gun turret scanner (Image at right courtesy of Eisenberg R.L., "Radiology: An Illustrated History." St. Louis, Mosby, 1992.)

Continued From Previous Page

"The developers of the hardware for CT and MR were not radiologists," Dr. Eisenberg noted. "They had to coordinate their efforts with radiologists to transform basic science to a modality that would have clinical usefulness."

"All of the various discoveries fit together, enabling developments that were not necessarily predictable," Dr. Thomas added. "For example, the beginning of interventional radiology came at the end of a long series of developments including contrast media, the Seldinger technique, catheters and wires, plastics and X-ray television."

Brain Power Fuels Major Advancements

Technology played an important role in the progress of radiology, but ultimately it was the power of creative thinking that enabled major advances. The best ideas often came from unlikely sources, according to Dr. Banerjee.

"One thing that stands out in the history of radiology is how many of the pioneers were considered odd, bizarre people," he said. "They succeeded through great determination, often in the face of skepticism and hostility."

A prominent example was ultrasound pioneer Ian Donald, M.D., who earned the disparaging nickname "Mad Donald" for his interest in gadgets and his belief that technology previously reserved for detecting cracks in metal could be used on patients. Ultrasound has become the most commonly used imaging modality.

CT pioneer Sir Godfrey Hounsfield faced similar suspicion trying to launch his inventions in the clinical sphere. When told that the long-haired, mustachioed Hounsfield wanted an appointment, one doctor reportedly asked, "Why should I meet with such a crank?" Fortunately, James Ambrose, M.D., chief of radiology at Atkinson Morley's Hospital in London, recognized the potential of Hounsfield's work and set him up with an office and equipment. Hounsfield went on to win the Nobel Prize, becoming one of the few laureates without a university degree.

"Hounsfield was met with hostility initially, but people were astounded when they saw his findings," Dr. Banerjee said. "His work revolutionized how medicine is practiced around the world."

WEB EXTRAS

For more information on the International Society for the History of Radiology and to become a member, go to *ISHRAD.org*.

This summer, RSNA will debut its Centennial Website, *RSNA.org/centennial*, showcasing the Society's evolution over 100 years and inviting readers to add their experiences to the triumphs of the specialty.

Pioneers Paved the Way for Radiology's Future

The achievements of Hounsfield, Dr. Donald and others set the stage for the rapid advances of recent decades that have poised the profession for even more dramatic growth in the future.

"None of these advances would have happened without the discovery of X-rays and the curiosity and ingenuity of the pioneers," Dr. Thomas said.

"We may laugh today at how primitive things were in the beginning of radiology, but it may be that in 50 years people will be laughing at how primitive CT was," Dr. Eisenberg added. □

RICHARD DARGAN is a writer based in Albuquerque, N.M., specializing in healthcare issues.

RSNA Celebrates 100 Years of History

RSNA's pivotal role in the history of radiology will be celebrated at RSNA 2014, the 100th Scientific Assembly and Annual Meeting. Meeting attendees are invited to explore the Centennial Showcase, an onsite experience that lets attendees see, hear and touch the advancements that shaped radiology. Also on tap is the Sip & Savor Social, a "celebration of the century" featuring drinks, entertainment and tastings by some of Chicago's top restaurants. Admission to the Centennial Showcase is included with meeting registration. Tickets for the Sip & Savor Social are available for $40 and can be purchased during meeting registration.

Throughout 2014, *RSNA News* is featuring Centennial Snapshots—a look back at milestones in RSNA's history—and will report on RSNA's historic anniverary in a feature story in the October-November 2014 issue.

100 A Century of Transforming Medicine RSNA® 2014

DATELINE: *RADIOLOGY BY THE NUMBERS* *continued from previous page*

1977	1977	1980	1987	1998	2011
First human image obtained through MR imaging	Coronary angiography introduced	Diffusion MR imaging and spiral CT scanners developed	First MR angiography performed	PET/CT prototype introduced	PET/MR imaging hybrid scanner approved by U.S. Food and Drug Administration

Diffusion-tensor Imaging Aids in ADHD Follow up

BY MARY HENDERSON

After one year of treatment, children diagnosed with attention deficit hyperactivity disorder (ADHD) showed positive behavioral changes that were accompanied by functional recovery in neuronal pathways, as evidenced by new research using diffusion tensor imaging (DTI), according to Pilar Dies Suarez, M.D., chief radiologist at the Hospital Infantil de México Federico Gómez.

Suarez

These results are a follow-up to original research by a multidisciplinary team led by Dr. Dies Suarez that was presented at RSNA 2013. In that study, conducted between May 2012 and May 2013, Dr. Dies Suarez and colleagues performed DTI on 23 children ages 7 to 12, including 11 diagnosed with ADHD and 12 controls. Subjects included patients with symptoms consistent with one of two major subtypes of the disorder: impulsive ADHD and inattentive ADHD.

Children with impulsive ADHD exhibit typical hyperactivity without motor deficits and respond well to treatment with stimulants. Patients with inattentive ADHD are less hyperactive, have motor deficits and decreased muscle tone and respond better to behavioral therapy, Omega-3 fatty acids and atomoxetine therapies. Inattentive ADHD is the less well understood of the two disorders, Dr. Dies Suarez said.

"It has been widely described that the frontostriatal tracts are altered in patients with impulsive ADHD," Dr. Dies Suarez said. "We hypothesized the involvement of a second neural tract, likely a frontocerebellar circuit, that may explain the inattentive clinical type of ADHD."

In the initial research, Dr. Dies Suarez examined connectivity in the frontocerebellar tracts by conducting DTI studies on 11 children exhibiting symptoms of the attentive ADHD subtype.

Results showed that compared to healthy controls, the inattentive ADHD patients had fewer frontocerebellar tracts disproportionately on the left side, and increased fractional anisotropy (FA) values. Healthy controls exhibited a greater number of frontocerebellar tracts and normal FA values.

"These data reinforce that the dysfunction in ADHD patients is primarily on the right side of the brain," Dr. Dies Suarez said.

"Along with methodology, I would add that a collaborative parent-medical physicist relationship is important," Dr. Dies Suarez said. "Generally those kids are very kinetic, so trying to get them inside the magnet without head movement is challenging. Sedation isn't recommended to avoid the risks implicit to anesthesia."

DTI Effective in One-year Follow up

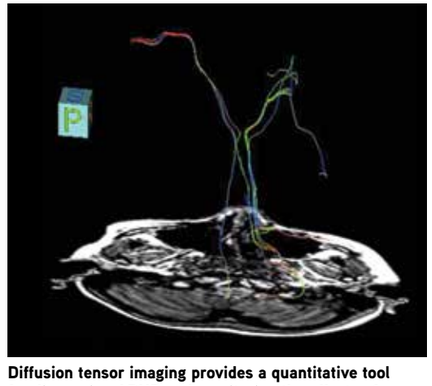
The 11 patients diagnosed with inattentive ADHD were re-examined with DTI after one year of one or more of the following treatments: atomoxetine and metildifenidato drug therapies and Omega-3 supplements.

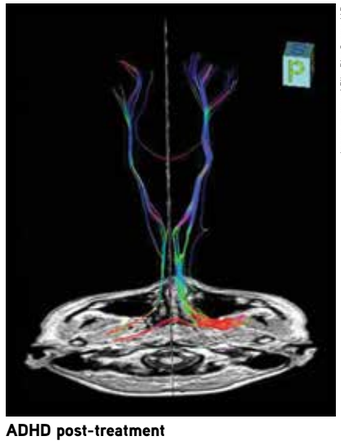
"Following one year of treatment, we found recovery of the frontocerebellar tracts, including both an increase in the number of tracts as well as normalized FA values in the ADHD patients," she said. "This recovery of function corresponded with positive behavioral changes."

The DTI study also enabled the research team to distinguish ADHD from other pathologies. "We believe children initially diagnosed with ADHD who did not respond to treatment are experiencing different kinds of problems," she said. "DTI gives physicians and parents a quantitative tool for diagnosing ADHD and monitoring the effects of treatment."

ADHD affects approximately 7 percent of the world population and is one of the most common childhood disorders. □

MARY HENDERSON is a writer based in Bloomington, Ind., specializing in health and medicine.





Images courtesy of Pilar Dies Suarez, M.D.

Diffusion tensor imaging provides a quantitative tool for diagnosing ADHD and monitoring the effects of treatment, according to new research. *Above*: ADHD pre-treatment

ADHD post-treatment

Imaging Sheds New Light on Concussion Consequences

BY ELIZABETH GARDNER

From peewee soccer to the National Football League (NFL), concern about the long-term risks of sports-related head injuries continues to grow.

Last summer, more than 4,500 retired NFL players, all suffering from chronic traumatic encephalopathy (CTE) and other chronic conditions related to concussion, sued the league alleging that it hadn't done enough to protect them. The lawsuit elicited a proposed settlement of $765 million, which is pending court approval.

To avert, or at least minimize, future injuries, researchers are using sophisticated imaging techniques to identify and measure the risks associated with such head trauma.

At Stanford University, researcher and nueroradiologist Michael Zeineh, M.D. Ph.D., will conduct a series of advanced imaging studies on 40 football players—half the university's team—along with a control group of volleyball players, over two years. In the project, "Multimodal MRI to Detect Brain Injury in Athletes," funded through a 2013-15 ASNR/RSNA Research Scholar Grant, Dr. Zeineh and colleagues will work to pin down the elusive effects of repeated concussions and subconcussion-level head injuries. Dr. Zeineh hopes to supplement previous studies showing lasting brain changes from such mild traumatic brain injuries (TBIs).

Lipton

Zeineh

Researchers will use advanced diffusion tensor imaging (DTI) to image changes in microstructure, quantitative volumetric techniques to measure changes in brain structure and susceptibility-based imaging to quantify iron deposition—all findings that may be associated with CTE. Players will use special mouth guards during practices and games to measure head acceleration during impacts and keep a tally of the number of impacts. They will also have their blood tested for changes in inflammatory and neurodegenerative biomarkers.

Conducting a longitudinal study is key, Dr. Zeineh said. "With no baseline pre-trauma imaging, these patients are usually compared to a control group to identify differences indicative of brain injury," he said. "Unfortunately, findings are obscured by the extensive variability in brain morphology."

"Heading" a Soccer Ball Linked to Brain Injury

Though there's growing evidence that repeated concussions and subconcussion-level head injuries—typical in sports like football and soccer—can leave lasting effects on the brain, that evidence raises many more questions: Who's most likely to be affected? What does the damage look like? How many impacts are too many? And what's the best way to safeguard the brain health of athletes?

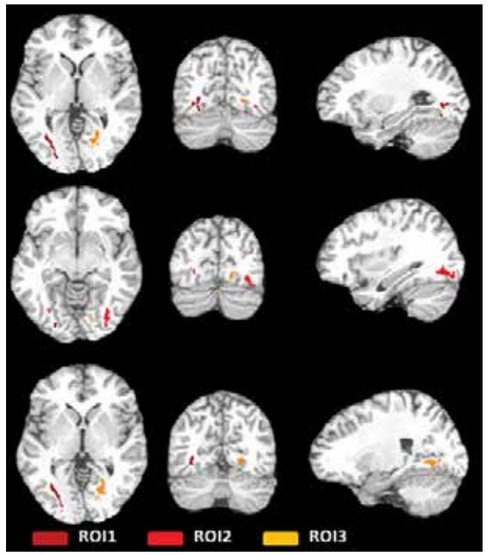
Michael L. Lipton, M.D., Ph.D., gave a jolt to the soccer community with his RSNA 2011 research on the practice of "heading," a fundamental soccer technique using the head to return or redirect the ball—demonstrating that heading was associated with changes in brain structure and function similar to those of mild TBI. The research was also published in the September 2013 issue of *Radiology*.

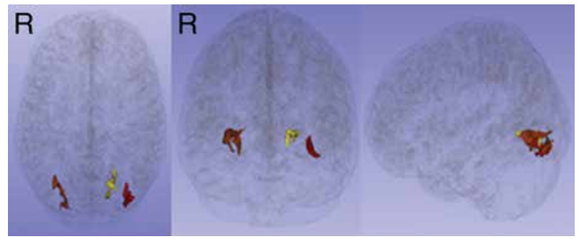
Dr. Lipton, associate director of the Gruss Magnetic Resonance Research Center at the Albert Einstein College of Medicine and medical director of MR imaging at Montefiore Medical Center in New York City, and colleagues used DTI to study 37 amateur soccer players (average age: 30.9 years), all of whom have played the sport since childhood. DTI produces a measurement, called fractional anisotropy (FA), of the movement of water molecules within and along axons, which make up the bundles of nerves in the brain's white matter.

They then compared the brain images of the most frequent headers with those of the remaining players and identified areas of the brain where FA values differed significantly.

"Between the two groups, there were significant differences in FA in three brain regions in the temporooccipital region," Dr. Lipton said. "Soccer players who headed most frequently had significantly lower FA in these brain regions."

> "It is important to recognize that relatively minor impacts can have non-minor consequences."
> **Michael L. Lipton, M.D., Ph.D.**





Michael L. Lipton, M.D., Ph.D., gave a jolt to the soccer community with his RSNA 2011 research showing that soccer "heading" was associated with changes in the brain structure and function similar to those of mild traumatic brain injury. *Above*: Three ROIs in the temporo-occipital white matter detected by the initial voxelwise linear regression of estimated prior 12 months of heading on FA, shown as color regions rendered in 3D images and superimposed on T1-weighted axial (*left*), coronal (*middle*), and sagittal (*right*) images from the Montreal Neurological Institute template. *At left*: FA at each ROI was significantly lower as a function of greater heading exposure. R = right.

The regions identified by the researchers are responsible for visuospatial attention, memory, multisensory integration and higher-order visual functions.

The paper elicited contrary reactions, Dr. Lipton said. "Some people were concerned, but at the same time asked, 'Isn't this all very obvious and intuitive?' Others were dismissive and said, 'What's the big deal? We've been doing this for a long time.'"

Threshold Effect Key to Research

Dr. Lipton said the paper's key finding is the evidence of a threshold effect. "It wasn't linear," he said. "Players with fewer than 800 headers over the prior 12 months didn't have elevated risk for either brain changes or cognitive effects. There's likely to be some amount that's not good for anyone, but there's also a range that seems to be well tolerated."

Dr. Lipton is now beginning a longitudinal study funded by the National Institutes of Health and the Dana Foundation examining several hundred amateur adult soccer players over several years. Researchers will measure how both the appearance and function of their brains change over time in proportion to the amount of heading and other head injuries they sustain. "The major limitation of current studies is that you can't make any explicit inference about causation," Dr. Lipton said. "We're looking at one point in time and seeing an association, but there's no proof that heading is the cause. Looking longitudinally, we can make that determination."

Both DTI and susceptibility-weighted imaging involve post-processing image analysis, which can reveal subtle forms of injury that may not be evident during a visual examination of the image. "It is important to recognize that relatively minor impacts can have non-minor consequences," Dr. Lipton said. "Using standard best-practice clinical protocols and high-quality CT or MR, a person with a brain injury may look normal, but that doesn't mean the brain is normal. Quantitative techniques can detect very subtle, maybe subclinical, signs of brain injury. It's going to be a big part of the future in diagnostic imaging."

Another question researchers are tackling is, "How do we determine when a player can return to the game after a head injury?" said Yvonne W. Lui M.D., neuroradiology section chief at Langone Medical Center at New York University. Dr. Lui's June 2013 *Radiology* research on brain volume changes associated with mild TBI found measurable brain atrophy a year later in 32 patients who had only one concussion. "It's hard to know with biomarkers whether someone has fully recovered."

Dr. Lui said anywhere from 15 to 30 percent of patients will have prolonged symptoms after a concussion. Figuring out who they are beforehand—through genetic factors or other biomarkers—will help steer the most vulnerable away from sports and activities that carry a high risk of head impacts. □

WEB EXTRAS

Access the September 2013 *Radiology* article, "Soccer Heading is Associated with White Matter Microstructural and Cognitive Abnormalities," by Michael L. Lipton, M.D., Ph.D., and colleagues, at *Pubs.rsna.org/doi/full/10.1148/radiol.13130545*.

Click Supplemental Materials in the article above to hear Dr. Lipton discuss his *Radiology* research in a podcast.

Access the June 2013 *Radiology* article, "Mild Traumatic Brain Injury: Longitudinal Regional Brain Volume Changes," by Yvonne W. Lui, M.D., and colleagues at *Pubs.rsna.org/doi/full/10.1148/radiol.13122542*.

ELIZABETH GARDNER is a writer based in Chicago specializing in medical technology and health IT issues.

R&E to Fund $3.7 Million in Grants

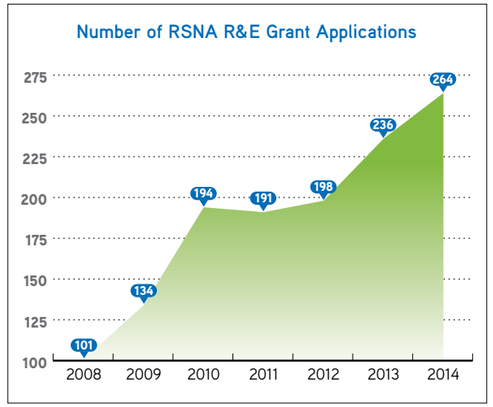
Earlier this year, the R&E Foundation Board of Trustees, chaired by James P. Borgstede, M.D., approved funding for 92 grants totaling $3.7 million, the highest amount ever awarded by the Foundation.

"The increasing number of applications submitted each year is evidence that the Foundation has established itself as a significant source of funds needed to drive radiology forward," Dr. Borgstede said. "Despite the increase in applications, the Foundation has been able to maintain a 25 percent funding line.


Borgstede

"This level of success would be impossible without the generous financial support received from countless individuals and the Foundation's corporate and private practice partners," Dr. Borgstede added. "We are incredibly grateful for their commitment to funding radiology's future."

Through its annual funding of radiologic investigators, the RSNA R&E Foundation continues to advance RSNA's mission to promote excellence in patient care and health delivery through education, research and technologic innovation. □



"This level of success would be impossible without the generous financial support received from countless individuals and the Foundation's corporate and private practice partners."

James P. Borgstede, M.D.

PAST RECIPIENT SPOTLIGHT

R&E Education Grants Fuel the Development of Unique Online Resources

ContrastRxn is a web-based program designed to teach contrast reaction management through interactive simulated scenarios for both trainees and practicing radiologists who need a refresher on how to manage contrast reactions.

With a 2012 RSNA/AUR/APDR/SCARD Education Research Development Grant, Carolyn Wang, M.D., Clinical Assistant Professor at the University of Washington, has shown this interactive teaching module to be as effective as the more expensive hands-on, high-fidelity simulation training.

"Due to the rarity of allergic-like reactions to contrast media agents, there is a lack of standardization in the training of radiologists in the management of these potentially life-threatening events," Dr. Wang said.

This web-based program is designed to enhance the training received by radiology residents and fellows using simulations of clinically relevant contrast reaction scenarios. The user navigates through various scenarios, determining the type of contrast reactions and deciding various treatment options, including administration of medication, and experiences real-time changes in patient status based on his/her choices. By exposing radiologists to simulations of contrast reactions they are less likely to compromise the safety of patients in the hospital and out-patient settings. It also has the potential to aid radiology residency programs to meet the milestone requirements for contrast reaction training in a widely available, cost-effective, and time efficient manner. □

ContrastRxn can be viewed at: *contrastRxn.com*


Dr. Wang's program serves as a resource for contrast reaction management by using simulated scenarios.

"Due to the rarity of allergic-like reactions to contrast media agents, there is a lack of standardization in the training of radiologists in the management of these potentially life-threatening events."

Carolyn Wang, M.D.

PAST RECIPIENT SPOTLIGHT

Combining Academics and Business

Researcher Develops Imaging Reporter Genes for Cellular Immunotherapy

Shahriar Yaghoubi, Ph.D., M.B.A., merged the fields of cellular immunotherapy for autoimmune diseases and molecular imaging to develop imaging reporter genes, which can help customize treatment for patients.

With a 2003 Agfa HealthCare/RSNA Research Fellow grant and the guidance of three scientific advisors at Stanford University, including world renowned molecular imaging expert Sanjiv "Sam" Gambhir, M.D., Ph.D., and immunology experts C. Garrison Fathman, M.D. and Remi J. Creusot, Ph.D., Dr. Yaghoubi was able to pioneer this new combined field.

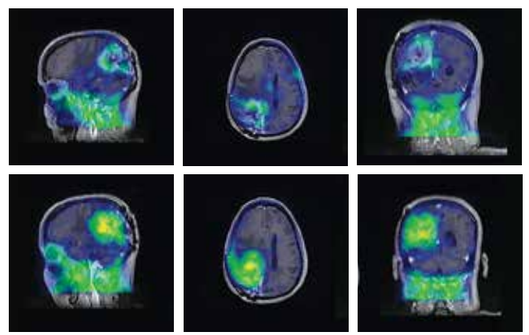
"The fellowship allowed me to work on a clinical trial that for the first time demonstrated imaging of cells in humans with a reporter gene technology. My interests have always been in academia, however, Dr. Gambhir and I both recognized that pairing business with science and following a path of entrepreneurship would suit me well," Dr. Yaghoubi said. It was that thinking that launched a startup company to commercialize molecular imaging technologies for the cell and gene therapy industries.


During the period of RSNA funding, Dr. Yaghoubi began work that led to the first Investigational New Drug approval from the U.S. FDA for an imaging reporter probe: [18F]FHBG.

That startup company is now known as CellSight Technologies, Inc., a privately held biotechnology company based in San Francisco. CellSight enables cell and gene therapies in living subjects through the use of imaging technologies, and offers custom imaging research services and prepackaged molecular imaging kits targeted at companies and academic institutions with the need for molecular imaging—Dr. Yaghoubi serves as the chief scientific officer.

CellSight is developing and providing mainly PET imaging technologies for tracking cell and gene expression kinetics in preclinical as well as clinical studies. Currently, the pre-clinical studies are all translational and CellSight's clients and collaborators are hopeful they will form the basis for imaging studies in clinical trials. Right now most of the projects are related to cancer, but the technologies are generally applicable to other diseases, such as cardiovascular and autoimmune diseases.

Dr. Yaghoubi remains active in research, currently serving as principal investigator on a joint National Institutes of Health (NIH) R01 grant between CellSight and the University of California, Los Angeles. □


[18F]FHBG head PET images superimposed over corresponding MRI images of therapeutic Targeted Cytolytic T Cells (CTL) illustrating increased [18F]FHBG accumulation after CTL infusions at the recurrent glioma tumor resection site. Images acquired approximately 2 hours after bolus intravenous [18F]FHBG injection.

New Law Mandates Use of Imaging Appropriateness Criteria

BY BETH BURMAHL

Beginning in January 2017, referring physicians must use physician-developed appropriateness criteria when ordering advanced imaging for Medicare patients, in an effort to reduce duplicate and/or unnecessary scanning and associated costs.

The new provision, which also directs the secretary of the U.S. Department of Health and Human Services (HHS) to identify clinical decision-support (CDS) tools to help physicians navigate the appropriateness criteria, was approved April 1 as part of the Protecting Access to Medicare Act of 2014, or so-called sustainable growth rate (SGR) "patch" bill. The new measure also maintains current overall provider reimbursement for the next 12 months, preventing a 24 percent SGR-mandated physician pay cut.

Using the CDS tools embedded with appropriateness criteria is designed to improve the accuracy of ordering advanced diagnostic studies and ensure the appropriate studies are done for the right reason on the right patient.

Calling it a long time in coming, radiology leaders are lauding the provision—and other American College of Radiology (ACR)-backed measures in the legislation—as a victory for imaging and a big step forward for healthcare reform overall. Other changes mandate greater transparency around payment policy and improve patient safety through stricter controls on radiation dose levels.

"The provision is a major step toward appropriate use of medical imaging," said James Borgstede, M.D., an expert in radiology economics, quality and safety and healthcare politics and the RSNA Board Liaison for International Affairs. "If referring physicians embrace this concept, it will provide significant improvement in patient care."

But that's a big "if" according to some radiology leaders who stress that implementing these initiatives will be considerably more involved than just contacting the IT department to install CDS tools. Buy-in and commitment from referring physicians will be critical to the initiative's success, said Vijay M. Rao, M.D., RSNA Board Liaison for Information Technology and Annual Meeting.

"We can't just provide a clinical support tool and expect it to work like a charm," said Dr. Rao, the David C. Levin Professor and chair of Radiology at Jefferson Medical College of Thomas Jefferson University. "We need to educate referring clinicians on the importance of using these tools appropriately and approach this as a fully realized program requiring time and commitment."

Timeline for Imaging Appropriateness

While the appropriateness criteria rule doesn't go into effect until 2017, the bill provides a timeline for putting the process in motion.

By November 2015, HHS must specify applicable appropriate use criteria for imaging services, using guidance from national professional medical specialty societies, including ACR, and other provider-led groups. ACR has long advocated for the use of clinical decision support systems.

Rao

Borgstede

When the law takes effect, physicians who provide imaging services will only be paid for claims that include information about which CDS tool was used and documentation that it meets the standard. This could pose a problem for radiologists, since it would become their responsibility to make sure the ordering physician used the CDS tool properly and reported it.

Because new provisions put the onus on referring physician, it remains to be seen how seamlessly the process will be integrated into daily practice. It's possible the task could fall into "the nuisance factor" category for physicians already dealing with significant workloads, said Dr. Rao, adding that CDS tools have been have yet to be tested on a large scale.

"We haven't really done due diligence on the effectiveness of CDS tools," Dr. Rao said. "As radiologists, we believe in the philosophy of reducing imaging tests, but for our clinical colleagues, we're not sure they're going to feel that way. That's why the education element in it is so important to effectiveness."

> "CMS wants us to practice evidence-based medicine, but they are making decisions on multiple procedure payment reduction without any data at all."
>
> **Vijay Rao, M.D.**

Radiology leaders are lauding the most recent SGR "patch" bill which includes numerous American College of Radiology-backed provisions including requiring referring physicians to develop appropriateness criteria when ordering advanced imaging for Medicare patients.

Data Sought for Multiple Procedure Payment Reduction

ACR also fought for a new provision that requires CMS to produce data used to justify a 25 percent multiple procedure payment reduction (MPPR) that was instituted in 2012 for a specific set of imaging procedures when they are provided to the same patient, on the same day, in the same session.

CMS contends the proposed cuts achieve efficiencies when multiple procedures are performed together. Calling the cuts "arbitrary," radiologists point out they are obligated to devote the same time and attention to each image, and that there is no real time or cost saving in taking multiple scans at one time.

"This is another important provision in the bill, because it requires CMS to produce the scientific data to justify their indiscriminate 25 percent reduction on multiple procedures, which they have never been able to do," said Dr. Borgstede, a professor of radiology and vice-chair of professional services, clinical operations and quality at the University of Colorado, Denver.

"Show us the data," Dr. Rao added. "CMS wants us to practice evidence-based medicine, but they are making decisions on multiple procedure payment reduction without any data at all."

CT Scanners Must Meet MITA Standards

Another ACR-backed provision creates stricter standards for managing CT dose. In January 2016, Medicare will begin reimbursing 5 percent less for CT scans that are acquired on technology that does not meet latest specifications for CT dose optimization published by the National Electrical Manufacturers Association's Medical Imaging & Technology Alliance (MITA) in April 2013.

Requiring CT scanners to meet the 2013 standard is critical to ensuring the safety of patients, Dr. Rao said. "It's our responsibility to expose our patients to the lowest radiation dose possible, and a lot of CT machines out there are outdated and are not properly maintained, so this is absolutely critical."

Dr. Rao said she would like to see such standards expanded to include standard X-ray machines, which have fallen off the radar at CMS despite their large volume. "CMS is focused on advanced imaging because of reimbursement and cost, but when you look at the volume of plain X-rays, it really adds up, and there are no standards out there." □

BETH BURMAHL is the managing editor of *RSNA News*.

WEB EXTRAS

Access the full text of the Protecting Access to Medicare Act of 2014 at *Beta.congress.gov/bill/113th-congress/house-bill/4302*

Access the MITA NEMA XR 28 Supplemental Requirements for User Information and System Function Related to Dose in CT at *medicalimaging.org*.

IMAGING PROVISIONS INCLUDED IN HEALTHCARE LAW

The "Protecting Access to Medicare Act of 2014," (H.R. 4302) includes the following ACR-backed provisions:

- Maintain current overall provider reimbursement for the next 12 months (avoiding a 24 percent across the board cut to provider payments statutorily mandated by the SGR formula).
- Mandate that cuts to medical services greater than 20 percent (in comparison to the previous year) are phased in over a two-year period.
- Require CMS to produce data used to justify a 25 percent multiple procedure payment reduction, instituted in 2012, to certain imaging procedures provided to the same patient, on the same day, in the same session.
- Delay implementation of ICD-10 provider payment codes as ACR works to prepare radiology providers for the transition to this new system.
- Improve patient safety through stricter controls on radiation dose levels delivered by CT machines.

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Developing Quantitative MRI Biomarkers to Improve Pancreatic Cancer Treatment

With a 2013 Philips Healthcare/RSNA Research Seed Grant, **Elizabeth M. Hecht, M.D.**, assistant professor of radiology and director, cross-sectional vascular imaging at Columbia University College of Physicians and Surgeons, New York City, will investigate whether dynamic contrast-enhanced MR imaging (DCE-MRI) in combination with diffusion-weighted imaging (DWI) can predict specific features of pancreatic ductal adenocarcinoma (PDA) biology including mean vascular density, cell density and fibrosis.

"By correlating MRI with microscopic features of PDA, we expect to be able to develop quantitative MR imaging biomarkers for vascular permeability and desmoplasia." Dr. Hecht said. "These biomarkers could be used to improve selection of chemotherapeutic agents and monitor synergistic therapies that target tumor stroma in an effort to enhance susceptibility of tumor to chemotherapy."

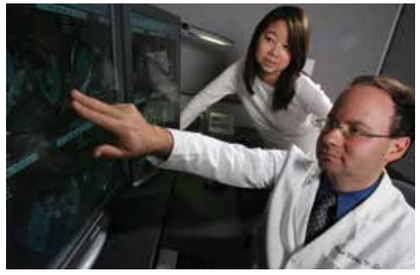
Martin R. Prince, M.D., Ph.D., professor of radiology at Cornell and Columbia Universities and Chief of MR Imaging at New York-Presbyterian Hospital, Weill Cornell Medical College, will serve as scientific advisor on this exciting project. Dr. Prince, himself a past R&E grant recipient, knows firsthand how an R&E grant can lead to a lifelong career in research. Together, Drs. Hecht and Prince are confident this pilot study will provide the preliminary data needed for future funding to explore the use of these new imaging biomarkers in clinical trials of therapies for pancreatic cancer.

Robert E. Kamieniecki, M.D.
Gretchen & Keith C. Kaplan, M.D.
Leena M. Ketonen, M.D., Ph.D.
Paul H. Kim, M.D.
Joana & Jacobo Kirsch, M.D.
Mahesh R. Kulkarni, F.R.C.R.
Linda R. LaTrenta, M.D.
Sangjune L. Lee, M.Sc., B.Eng.
Veronica V. Lenge de Rosen, M.D. & Daniel Rosen
Stephanie R. & Andrew R. Levine, M.D.
Michael Licata, M.D.
Willy J. Loretan, M.D.
Mary & Charles R. Lutteton, M.D.
Madhumala Madhavan, M.B.B.S., M.D.
Vasantha & Mahadevappa Mahesh, M.S., Ph.D.
Minna & Krikor Malajikian, M.D.
William R. Marsh, M.D.
Alan K. Marumoto, M.D., Ph.D.
Maura & Vincent G. McDermott, M.D.
Michael T. McGuire, M.D.
Jocelyn H. Medina, M.D.
Jose Fernando Mendoza-Cuadra, M.D.
William M. Molpus, M.D.
Van A. Montgomery, M.D.
Carrie C. Morrison, M.D.
Kambiz Motamedi, M.D.
Ndii K. Muriuki, M.B.Ch.B., M.Med.
Robyn C. Murphy, M.D.
Kirk V. Myers, D.O.
Hernando G. Ortiz, M.D.
Jose K. Palma, M.S., M.D.
Ralph C. Panek, M.D.
Divyesh G. Patel, M.D.
Angeline & Wilfred C. Peh, M.D.a
Oscar Perez Rocha, M.D.
Mabelle & Robert J. Pizzutiello Jr., M.D.
Joseph R. Polino Jr., M.D.
Catherine Prather, M.B.B.S.
Trisha Prescott, M.D.
Matthew C. Rainey, M.D.
Emilie C. Ralston, M.D.
Dorothea C. Reichelt
Carolina S. Reiser
John M. Rennick, M.D.
Michael Thomas E. Ricarte, M.D.
John P. Roberson, M.D.
Rick Rosebrock, M.D.
Christopher Rothstein, M.D.
Sudipta Roychowdhury, M.D.
Andrew Ryan, M.D.
Niloufar Khoobehi & Hamid Salamipour, M.D.
Ortencia Guzman Gutierrez & Fernando G. Salmon, M.D.
Fumie Sato, M.D.
Lisa M. Scales, M.D.
Deborah & Glenn A. Scheske, M.D.
Joy R. & Steven L. Schneider, M.D.
Garrett P. Schroeder, M.D.
Jacques Sellier, M.D.
Nogah Shabshin, M.D., M.B.A. & Uri Shabshin
Shirley A. & Renato M. Soriao, R.T.
Rafal L. Sosnowski, D.O.
Rachel & Brian N. Suddarth, M.D.
Susan G. & Richard J. Sukov, M.D.
Jeffrey L. Sunshine, M.D., Ph.D.
James S. Teal, M.D.
Bill Thompson, M.D.
Stacey & Gavin J. Udstuen, M.D.
Monica Bozzolo & Cristian Varela, M.D.
Stephanie R. Wilson, M.D. & Ken Wilson
Michael F. Zawaski
Salvina Zrinzo, M.D.

Technology Forum

RSNA Informatics: Tools and Technology for Better Patient Care

RSNA provides online tools and technology resources to help you streamline your work while improving the quality and safety of patient care.



From downloadable reporting templates to free software that lets you create instant teaching files, use these RSNA-developed tools to streamline the work you do every day. And these tools will help you thrive in the emerging world of electronic health records and "meaningful use."

Access these resources at *RSNA.org/Informatics*:

- MIRC® Teaching File System: Create rich cases quickly and easily
- RadLex, Reporting and Image Sharing: key components in linking radiology and the electronic health record (EHR)
- myRSNA®: The radiologist's personal website
- IHE: The movement to make electronic systems work together
- Meaningful Use: What it means for you

Education and Funding Opportunities

RSNA/AUR/ARRS Introduction to Academic Radiology Program

Applications due **July 15, 2014**

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 November 30–December 4, 2014, during the RSNA Scientific Assembly in Chicago, or the ARRS Scientific Meeting in Toronto, Canada, April 19-24, 2015.

More information and the nomination form for this program are available at *RSNA.org/ITAR.*

Final Call to Apply: RSNA Clinical Trials Methodology Workshop

January 10-16, 2015
Scottsdale/Ariz.
Applications due
June 15, 2014

Over the course of this 6½-day workshop, each trainee will be expected to develop a protocol for a clinical study, ready to include in an application for external funding. Participants will learn how to develop protocols for the clinical evaluation of imaging modalities. A dynamic and experienced faculty will cover topics including:

- Principles of clinical study design
- Statistical methods for imaging studies
- Design and conduct of multi-institutional studies
- Sponsorship and economics of imaging trials
- Regulatory processes

Applicants will undergo a competitive selection process for course entrance. Once admitted, trainees will participate in advance preparation, didactic sessions, one-on-one mentoring, small group discussions, self-study and individual protocol development. Familiarity with basic concepts and techniques of statistics and study design is required of all applicants.

Online application and additional information can be found at *RSNA.org/CT2015*.

RSNA Derek Harwood-Nash International Fellowship

Applications Due
July 1, 2014
for 2015 Program

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/DHN*. For more information e-mail *CIRE@rsna.org*.

RSNA Advanced Course in Grant Writing

Applications due
July 1, 2014

Applications are now being accepted for this course designed to assist participants—generally junior faculty members in radiology, radiation oncology or nuclear medicine programs—prepare and submit a National Institutes of Health, National Sciences Foundation or equivalent grant application. The course, to be held at RSNA Headquarters in Oak Brook, Ill., will consist of four two-day sessions: October 10-11, 2014; January 30-31, 2015; March 13-14, 2015; and May 1-2, 2015.

For more information and to download an application, go to *RSNA.org/AGW*.

Medical Meetings

June-August 2014

JUNE 12-14
European Society of Thoracic Imaging (ESTI), 22nd Annual Scientific Meeting, NH Grand Hotel Krasnapolsky, Amsterdam
• *www.myesti.org/congress-2014*

JUNE 18-21
European Society of Gastrointestinal and Abdominal Radiology (ESGAR), 25th Annual Meeting, Salzburg Convention Centre, Austria
• *www.esgar.org*

JUNE 26-28
European Society of Musculoskeletal Radiology (ESSR), Annual Scientific Meeting, Radisson Blu Hotel, Riga, Latvia
• *www.essr.org*

JUNE 26-29
13th International Congress on Pediatric Pulmonology (CIPP XIII), Site Oud Sint-Jan, Bruges, Belgium
• *www.cipp-meeting.org*

JUNE 28-30
International Diagnostic Course Davos (IDKD), 4th IDKD Intensive Course in Hong Kong, Musculoskeletal Diseases, Hong Kong
• *www.idkd.org*

JULY 9-12
Canadian Organization of Medical Physicists (COMP) 60th Annual Scientific Meeting, The Banff Centre, Alberta, Canada
• *www.comp2014banff.com*

JULY 10-13
Society of Cardiovascular Computed Tomography (SCCT), 9th Annual Scientific meeting, Manchester Grand Hyatt San Diego, California
• *www.scct.org*

JULY 17-18
Association of Educators in Imaging and Radiologic Sciences (AEIRS), Annual Meeting, Providence Biltmore, Providence, R.I.
• *www.aeirs.org*

JULY 20-24
The American Association of Physicists in Medicine (AAPM), 56th Annual Meeting, Austin Convention Center, Austin, TX
• *www.aapm.org*

AUGUST 10-13
The Association for Medical Imaging Management (AHRA), 42st Annual Meeting and Exposition, Gaylord National, Washington DC
• *www.ahraonline.org*

AUGUST 15-17
Interamerican College of Radiology (CIR) Interamerican Congress of Radiology, Cartagena, Columbia
• *www.webcir.org*
** Visit the RSNA Booth*

FIND MORE EVENTS AT *RSNA.org/calendar.aspx.*

Residents & Fellows Corner

Resident and Fellow Focus Debuts in *RadioGraphics*

The journal *RadioGraphics* has unveiled a new regular online feature *(pubs.rsna.org/page/radiographics/residentsfellows)* with content tailored specifically to trainees: image-rich, interactive presentations designed to give viewers a thorough understanding of an important topic in radiologic imaging. Each presentation is accompanied by an extended abstract that provides additional contextual information. See the following presentations in recent and upcoming issues:

- What Is That Cyst? Common Cystic Lesions of the Female Lower Genitourinary Tract (March-April 2014 issue)
- Bladder Injury: Types, Mechanisms, and Diagnostic Imaging (May-June 2014 issue)
- Imaging Evaluation of Peritoneum with Emphasis on Embryology, Surgical Anatomy and Differential Diagnosis (July-August 2014 issue)

Development of the new feature is overseen by Jennifer A. Harvey, M.D., a professor of radiology and head of the Division of Breast Imaging at the University of Virginia Health System, and Sanjeev Bhalla, M.D., a professor of radiology and chief of the Cardiothoracic Imaging Section at Washington University in St. Louis. "We're pleased to be able to offer these presentations as an engaging, challenging way to help residents and fellows keep pace with practice standards and important topics in radiology," Dr. Harvey said.

Journal Highlights

The following are highlights from current issues of RSNA's two peer-reviewed journals.

CT Angiography after 20 Years: A Transformation in Cardiovascular Disease Characterization Continues to Advance

Over a short 20-year span, CT angiography (CTA) has evolved from a fledgling imaging modality, incapable of encompassing most vascular territories, to a critical clinical tool that plays a dominant role in the diagnosis and management of disease within virtually every arterial bed in the body.

In an article in the June issue of *Radiology* (*RSNA.org/Radiology*), Geoffrey Rubin, M.D., of Duke Clinical Research Institute, Durham, N.C., and colleagues recount the evolution of CTA to a maturing modality that has provided unique insights into cardiovascular disease characterization and management. The authors present selected clinical challenges as contrasting examples of how CTA is changing the approach to cardiovascular disease diagnosis and management, including;

- Acute aortic syndromes
- Peripheral vascular disease
- Aortic stent-graft
- Transcatheter aortic valve assessment
- Coronary artery disease

The authors also explore recently introduced capabilities for multispectral imaging, tissue perfusion imaging and radiation dose reduction through iterative reconstruction with consideration toward the continued refinement and advancement of CTA.

".....the evolution of novel CT scanner geometries, alternative raw data reconstruction strategies, and sophisticated post processing techniques are paving the way for the further evolution of CTA to provide greater relevance in predicting the clinical importance of cardiovascular lesions and facilitating their effective management," the authors write.

Volume-rendered CT angiogram acquired in 2001 with a single 21-second 16 3 1.25-mm helical scan encompasses the arterial system from extracranial circulation through pedal arteries. The speed of acquisition increased approximately 25-fold over the 10 years since the first spiral CT angiogram in 1991.
(*Radiology 2014; 271;3:633-652*)

This article meets the criteria for *AMA PRA Category 1 Credit™*. SA-CME is available online only.

Critical Role of Imaging in the Neurosurgical and Radiotherapeutic Management of Brain Tumors

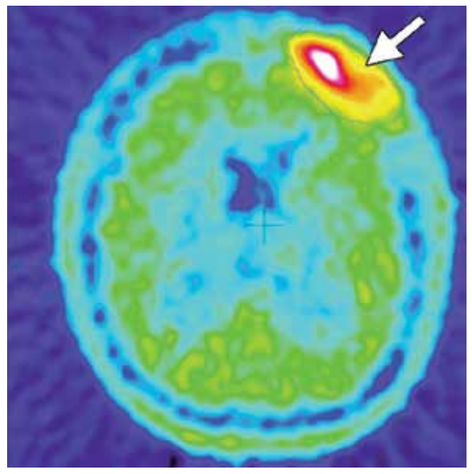
In the past 30 years, imaging has become the primary imaging modality in the evaluation of brain tumors. Along with conventional CT and MR imaging, more advanced imaging techniques are increasingly being used by referring neurosurgeons, radiation oncologists and neurooncologists to help guide patient management.

In an article in the May-June issue of *RadioGraphics (RSNA.org/RadioGraphics)*, Lily L. Wang, M.B.B.S., of the University of Cincinnati College of Medicine, and colleagues discuss how the evolution of new imaging technology has not only improved the preoperative assessment of tumors, but also has expanded surgical approaches, aided in radiation treatment planning, and become a critical tool in evaluating therapeutic outcomes. Specifically, the authors discuss:

- Diffusion-weighted imaging
- Perfusion MR imaging
- Spectroscopy
- Functional MR imaging
- Diffusion tensor imaging

The authors stress the critical role these imaging techniques play in aiding in the diagnosis and appropriate treatment of intracranial lesions.

"As quickly as new imaging techniques develop, our nonradiologist colleagues adopt them into their practices, underscoring the central role that radiology plays on the multidisciplinary brain tumor team," the authors write.



Residual tumor after near-total resection in a patient with meningioma. A carbon 11 (11C) methionine PET image shows residual intradiploic meningioma (*arrow*).
(*RadioGraphics* 2014;34;702–721)

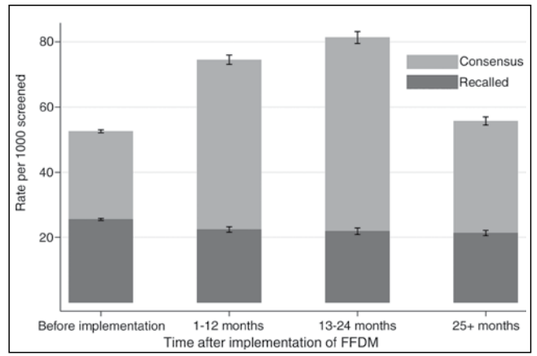
Radiology in Public Focus

A press release was sent to the medical news media for the following article appearing in a recent issue of *Radiology*.

Mammographic Performance in a Population-based Screening Program: Before, During, and after the Transition from Screen-Film to Full-Field Digital Mammography

After the initial transitional phase from screen-film mammography (SFM) to full-field digital mammography (FFDM), population-based screening with FFDM is associated with less harm due to lower recall and biopsy rates and higher positive predictive values after biopsy than screening with SFM, new research shows.

Solveig Hofvind, Ph.D., of the Cancer Registry of Norway, Oslo, and colleagues analyzed anonymized data for women aged 50–69 years enrolled in the Norwegian Breast Cancer Screening Program from 1996 to 2010. A total of 1,837,360 NBCSP screening exams were performed during the study period; 58.8 years was the average age at the time of screening.



Bar graph shows rates of screening examinations discussed in consensus (*whole bars*) and recall rates (*darker part of bars*) by screening technique and time after implementation of FFDM in subsequent examinations. Before implementation is SFM after SFM, 1–12 and 13–24 months is FFDM after SFM, and 25+ months is FFDM after FFDM.
(*Radiology* 2014;271;3:InPress)

The overall recall rate was 3.4 percent for SFM and 2.9 percent for FFDM. The biopsy rate was 1.4 percent for SFM and 1.1 percent for FFDM.

Both the rate of invasive screening-detected and interval breast cancer remained stable during the transition from SFM to FFDM and after FFDM was firmly established. The positive predictive value of recalled examinations and of biopsy procedures increased from 19.3 percent and 48.3 percent to 22.7 percent and 57.5 percent, respectively, after adoption of FFDM.

New on *RadiologyInfo.org*

Visit *RadiologyInfo.org*, the RSNA and ACR's jointly-sponsored public information website, to read the recently posted article:

- Carotid Artery Screening:
  Radiologyinfo.org/en/info.cfm?pg=screening-carotid.

Media Coverage of RSNA

In March, 353 RSNA-related news stories were tracked in the media. These stories reached an estimated 117 million people.

Coverage included *Yahoo! Health*, *ABCNews.com*, *FOXNews.com*, *ScienceDaily*, *DOTmed Business News*, *Auntminnie.com*, *Diagnostic Imaging* and *Medical News Today*.

Radiology EXTRA PODCASTS

Listen to *Radiology* Editor Herbert Y. Kressel, M.D., deputy editors and authors discuss the following articles in the April issue of *Radiology* at *pubs.rsna.org/page/radiology/podcasts*:

"Digital Mammography Screening: Association between Detection Rate and Nuclear Grade of Ductal Carcinoma in Situ," Stefanie Weigel, M.D., and colleagues.

"Mapping the Effect of the Apolipoprotein E Genotype on 4-Year Atrophy Rates in an Alzheimer Disease–related Brain Network," Christopher A. Hostage, M.D., and colleagues.

"Cardiac Arrythmias: Multimodal Assessment Integrating Body Surface ECG Mapping into Cardiac Imaging," Hubert Cochet, M.D., and colleagues.

JUNE PUBLIC INFORMATION OUTREACH ACTIVITIES FOCUS ON MEN'S HEALTH AND MORE

In recognition of Men's Health Awareness Month in June, RSNA is distributing public service announcements (PSAs) focusing on abdominal aortic aneurysm (AAA), the third leading cause of death for men over age 60.

The RSNA "60-Second Checkup" audio program will be distributed to nearly 100 radio stations across the U.S. June segments will focus on improving doctor/patient communications.

Annual Meeting Watch

News about RSNA 2014

Course Enrollment Begins July 9

The RSNA 2014 Advance Registration, Housing and Course Enrollment brochure will be mailed in late June. On July 9, the brochure will be available online at *RSNA.org/Attendees*. Use this brochure to make the most of your RSNA 2014 experience. The information is organized to help you complete your enrollment in just a few steps, find the courses you need, build your schedule and enroll quickly and easily online or via the print form.

Registration Fees

BY NOV. 7	VIRTUAL	COMBO	
$0	$100	$100	RSNA/AAPM Member
0	100	100	RSNA/AAPM Member Presenter
0	0	0	RSNA Member-in-Training, RSNA Student Member and Non-Member Student
0	300	300	Non-Member Presenter
180	300	480	Non-Member Resident/Trainee
180	300	480	Radiology Support Personnel
825	300	1,125	Non-Member Radiologist, Physicist or Physician
825	300	1,125	Hospital or Facility Executive, Commercial Research and Development Personnel, Healthcare Consultant and Industry Personnel
325	300	625	One-day registration to view only the Technical Exhibits

RSNA 2014 Registration

HOW TO REGISTER

There are two ways to register for RSNA 2014:

1 INTERNET
(fastest way)
Go to *RSNA.org/register*

2 TELEPHONE
(Mon.-Fri. 8 a.m. – 5 p.m. CT)
1-800-650-7018
1-847-996-5862

Register by November 7 to receive the discounted registration fee and full conference materials mailed to you in advance. International visitors must register by October 24 to receive these materials in advance. Registrations received after November 7 will be processed at the increased fee and conference materials must be obtained at the McCormick Place Convention Center.

For more information about registering for RSNA 2014, visit *RSNA.org/AnnualMeeting* e-mail *rsna@experient-inc.com*, or call 1-800-650-7018.

International Visitors

International Letters Available—Act Now for Visa

Personalized letters of invitation to RSNA 2014 are available by request during online registration. In addition, the International Visitors section of *RSNA.org/Visas* includes important information about the visa application process. Visa applicants are advised to apply as soon as they decide to travel to the U.S. and at least three to four months in advance of their travel date. International visitors are advised to begin the visa process now.

Flexible Booking Policies

New this year, simplified and penalty-free cancel and change policies up to 72 hours prior to arrival make it easier than ever before to book a room through RSNA.

A deposit equal to a one night stay including tax will be charged by the hotel for each room reserved. Reservations may be secured with a major credit card at the time of booking. The credit card must be valid through December 2014 and will be charged by the hotel approximately two weeks before the annual meeting. If the credit card is declined, the reservation may be cancelled by the hotel. Registrants can also send a check, money order or wire transfer (payable to RSNA) for the hotel deposit. (Attendees are responsible for all wire transfer fees)

Buy Bistro RSNA Tickets Now

Avoid long lines by purchasing Bistro RSNA tickets now. Advance tickets to Bistro RSNA—which provides a comfortable setting for attendees to eat, meet and network during the annual meeting—are only $20 a ticket.

Bistro RSNA is located in all Technical Exhibit Halls and the Lakeside Learning Center. The daily lunch menu includes salads, soup, entrée choices, vegetables, pasta and more. Menu price includes full meal, beverage choices and dessert.

Purchase tickets in advance during online registration at *RSNA.org/register*.

Exclusive Airline Discounts

American Airlines

AA.com offers a 5 percent discount on the lowest applicable published airfare. Use promotional code A25N4AZ when booking your reservation with *AA.com*. You can also call American (1-800-433-1790) and mention the American promotional code to be eligible for discounted fares. Service fees will apply when booking over the phone. Discounts are available on American Airlines, American Eagle and American Connection. Reservations involving any Oneworld Alliance or codeshare partner airlines must be booked via phone. International attendees should call their local American Airlines reservations number and provide the promotional code A25N4AZ.

United Airlines

United.com offers a 2 to 10 percent discount off published fares and class of service. Save an additional 3 percent if booked online. Use promotional code ZR28820672 when booking your reservation on *United.com*. You can also call United (1-800-426-1122) or your personal travel agent and mention the United agreement code 820672 and Z code ZR28 to be eligible for discounted fares. Service fees may apply. International attendees should contact their local United Airlines reservations office, book online or email *groupmeetings@united.com*.

Guarantee Your Seat!

Tickets are required for various meeting components, including refresher, multisession, informatics workshops and RSNA tours and events.

All ticketed courses must be confirmed prior to November 27 to guarantee a seat. RSNA ticketed courses fill up fast, so ensure you get the courses you need by enrolling at *RSNA.org/register*. There is no onsite course ticketing. Registrants without tickets will be allowed entrance into a course after all ticketed registrants have been seated.

First Spouse/Family Member Badge is Free

Full-conference professional registrants are entitled to one complimentary spouse/family member badge; each additional badge is $50. This badge is intended for use by a spouse or family member (16 and over) accompanying a full-conference professional registrant to the meeting. It allows access to Technical Exhibit halls, Lakeside Learning Center and classrooms—space permitting—after all professional registrants have been seated. CME credit is not tracked or awarded. A co-worker or industry associate is not eligible for this badge and must register as a professional and pay the applicable registration fee.

To uphold the professional and educational standards of the RSNA annual meeting, children under 16 years of age are not permitted in the exhibit halls or sessions. To take advantage of Camp RSNA for childcare, visit R*SNA.org/AnnualMeeting* for registration information.

The Value of Membership

RSNA 2013 Refresher Courses Now Online

Visit *RSNA.org/library* to find great RSNA online SA-CME content including new refresher courses recorded at the RSNA 2013 annual meeting.

Newly added refresher courses in a wide variety of subspecialties will feature a blue "New" tag in the online library. To quickly display all new content, click the blue "Browse New" button at the top of the library page. RSNA's online refresher courses can be viewed on tablet devices for on-the-go learning.

CME Opportunities are free to members

Each online refresher course includes an interactive CME test with immediate feedback on correct or incorrect answers. Users must correctly answer a minimum of 80 percent of the questions on the CME test to earn their CME certificate.

To browse new refresher courses and other SA-CME offerings from RSNA, visit *RSNA.org/library*. Check back weekly to take advantage of the newest online education as it becomes available from RSNA.

RSNA Education Delivers Weekly SA-CME Content in 2014

The RSNA Education Center has committed to providing a new online activity each week of 2014. From *RadioGraphics* CME tests to online refresher courses, RSNA's online education offers you the tools to earn the CME credits you need, even on-the-go. Offered for SA-CME credit, all of RSNA's online library content combines interactive learning with instantaneous question feedback. Engage in novel and thought-provoking learning with a streamlined design and functionality optimized for the digital age and your tablet device.

RSNA online offerings include a wide variety of activities and topics. Spanning 15 subspecialty areas, each activity focuses on a specific area or topic relevant to everyday practice. Explore online *RadioGraphics* and *Radiology* CME tests, Cases of the Day, recorded refresher courses from previous annual meetings and other supplemental online education.

Included with RSNA membership, users can access all of these educational tools and have the opportunity to earn SA-CME credit for each successfully completed activity. RSNA continuously updates its SA-CME offerings. Go to *RSNA.org/library* and click "Browse New."

RSNA.org

myRSNA is Your Online Toolbox

Are you taking full advantage of myRSNA—an exclusive RSNA member benefit? The site offers instant Web access to files, articles, presentations, portfolios and even the opportunity to earn CME while at work. Users can access knowledge at the point of care, providing support for better informed medical decisions.

Features include:

- **mySearch:** This sophisticated search feature lets you focus your search on peer-reviewed articles in the radiologic literature, on RSNA's information resources or on the broader Web.
- **myCommittees:** Consolidates the files, resources and calendars for committees you are involved with in one location.
- **myFiles & Bookmarks:** Upload and store your personal files and bookmarks. View them online anywhere with built-in players. No software required.
- **myPortfolio:** Access tools needed to document your ACGME learning experiences. Ideal for residents, program coordinators and career physicians alike, integrating Core Competencies with a professional learning map to track your advancement.
- **myDashboard:** Access the latest updates to your groups, files that have been recently shared with you, comments users have shared and much more.
- **myGroups:** Create groups and participate in discussions with colleagues from around the world who share your interests and upload files to enhance the conversation.

Visit *myRSNA.org* to explore a video overview of myRSNA tools and resources.

COMING NEXT MONTH

Read our report on RSNA and American College of Radiology initiatives to promote radiology's role in quality patient care.

100th SCIENTIFIC ASSEMBLY AND ANNUAL MEETING

RSNA® 2014

A Century of Transforming Medicine

NOV 30 *thru* DEC 05

McCORMICK PLACE, CHICAGO

The Celebration of a *Century*

- The finest education and never-before-seen science
- Groundbreaking technology from across the globe
- An interactive historic showcase of RSNA and radiology

This activity has been approved for *AMA PRA Category 1 Credit™*

MEMBER REGISTRATION
NOW OPEN

GENERAL REGISTRATION
OPENS JUNE 4

RSNA.org/register