Opportunities Abound for Radiation Oncology in the Era of Personalized Medicine

By Richard Dargon

Radiation oncology will lead the way into the future of personalized medicine by improving survival and quality of life for cancer patients, according to a renowned authority who delivered the Annual Oration in Radiation Oncology on Wednesday.

In her address, Daphne A. Haas-Kogan, MD, chair of the Department of Radiation Oncology at Dana-Farber Cancer Institute, Brigham and Women’s Hospital and Boston Children’s Hospital, all in Boston, highlighted some of the ways that radiation oncology is improving the odds for patients. A growing body of research shows that radiation therapy bolsters the effectiveness of immunotherapy, or treatment that enlists and strengthens the power of a patient’s immune system to attack tumors, now widely regarded as the “fifth pillar” of cancer treatment.

Radiation therapy and immunotherapy make good partners, Dr. Haas-Kogan said, because radiation works quickly while immunotherapy takes longer to kick in. “Immunotherapy provides fuel on an existing fire, but how do we generate the spark, the initial immune response against the tumor?” she asked. “That is where radiation comes into play.”

Prospective trials are emerging, Dr. Haas-Kogan said, including a recent New England Journal of Medicine study that found superior results for patients with non-small-cell lung cancer who had undergone chemotherapy and radiation therapy prior to treatment with the immunotherapy drug durvalumab.

Dr. Haas-Kogan, a member of the Blue Ribbon Panel appointed to inform the scientific direction and goals of the National Cancer Institute’s Cancer Moonshot, pointed out that 45 years after President Richard Nixon declared war on cancer, successful courses of radiation therapy and immunotherapy allowed President Jimmy Carter to discontinue treatment for melanoma that had metastasized to his brain and liver.

A major paradigm shift in radiation oncology is underway, Dr. Haas-Kogan said, toward MRI-guided radiation therapy. The higher soft tissue resolution MRI provides can improve target delineation, allowing more precise radiation therapy that is able to spare surrounding normal tissues, reduce toxicities and improve outcomes for many cancer patients.

“Just as the 2-dimensional x-rays we relied on in the 1980s were replaced by CT-guided radiotherapy, so will MR-guided radiation therapy render CT-guided radiation obsolete,” she said.

A new class of molecules called micro-RNAs is also expected to have an increasing prominently role in radiation therapy by helping predict the risk of long-term

CONTINUED ON PAGE 13A
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Thursday at a Glance

7:15–8:15
Controversy Session
Cancer Imaging: Does Second Opinion Subspecialty Interpretation Impact Patient Management? (E350)

Hot Topic Session
Abbreviated MRI Exam - Breast MRI in 5 Minutes (E450A)

8:30–10:00
Educational Courses

10:30–NOON
Scientific Paper Sessions
RSNA Diagnosis Live™ Interactive and Mobile Device Integrated Audience Response: Tips, Tricks, and How to Get Started (Hands-on) (S401CD)

11:00–1:00
3-D Printing Theater Presentations (Learning Center)

11:00–2:00
Machine Learning Theater Presentations (Machine Learning Showcase, North Hall)

12:15–1:15
Poster Discussions (Learning Center)

1:30–2:00
Fast 5 Session (Arie Crown Theater)

2:00–3:00
Plenary Session (Arie Crown Theater)

The Next 20 Years: How Science and Technology Will Revolutionize Business, the Economy, Jobs and Our Way of Life
Michio Kaku, PhD

3:00–4:00
Hot Topic Sessions
3-D Imaging in Musculoskeletal: Acquisitions, Printing, and Applications (E450A)
New and Emerging Theranostic Agents for Prostate Cancer (E451A)
Dual Energy CT in the Emergency Department (E450B)
The Role of Proton and Heavy Ion Therapy in Solid Tumors (E351)
Controversies in Radiology (E352)
RSNA Diagnosis Live™ PedS, IR, Potpourri (Case-based Competition) (E451B)

4:30–6:00
Educational Courses

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Tip of the Day
In ultrasound, clusters of dead pixel elements can disrupt Doppler performance as well as B-mode image quality.

Technology Tip of the Day

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Members Share Most Exciting Technologies From the RSNA Technical Exhibits

The Daily Bulletin stopped doctors outside the exhibit halls with the question: “What is the most exciting technology that you have seen on the exhibit floor?” Doctors were enthusiastic to share their thoughts on the new advances and what they hold for the future of radiology.

Christopher Wood, MD, at Mayo Clinic in Rochester, MN, said, “The most exciting area in radiology right now is deep learning and how it will play an integral role in advancing computer-aided diagnosis.”

As a second-year resident and first-time attendee, everything about the exhibit floor is inspiring and makes me curious to learn more about the future of radiology,” said Noam Nissan, MD, PhD, at Chaim Sheba Medical Center, Tel Hashomer, Israel.

Why it’s Time for @Radiology to Like #Social Media

By Nick Klenske

Whether or not they think about it, many physicians — including radiologists — are involved in marketing in some form.

“Doctors are always publishing academic papers and presenting at conferences, both of which are a type of marketing,” said Alex Towbin, MD, a radiologist and medical imaging associate chief, Clinical Operations and Information, at Cincinnati Children’s Memorial Hospital. “Social media should be viewed as an extension of these traditional marketing methods.”

During a Wednesday session on growing your business with social media, Dr. Towbin and Saad Ranginwala, MD, also a radiologist at Cincinnati Children’s Hospital, shared how their department uses social media to drive engagement with patients, families and the professional community.

“Radiologists often struggle with communicating, especially with patients and the general medical community,” Dr. Towbin said. “Thanks to its massive user base, social media makes communicating easier.”

With over 80 percent of healthcare consumers perceiving a hospital with an active online presence as being more cutting edge, radiologists cannot afford to ignore this influential marketing tool.

Social media lets you control your image. If you don’t control it, rest assured somebody else will.

Saad Ranginwala, MD

“Before you even consider posting, you first need to have a conversation with your hospital’s legal and marketing teams,” Dr. Towbin said. “Every social media strategy must adhere to hospital policies and keep in mind such things as branding guidelines, patient consent and copyright law.”

Even with approval from legal and marketing, it is still too early to start posting, Dr. Towbin said.

“All successful social media campaigns begin with planning — and lots of it,” he said. “This includes deciding who your audiences are, what type of content you want to share, how often you will be posting and who is in charge of creating the content.”

Because each social media platform attracts a different audience, content should be tailored to the individual platform.

Facebook to communicate with patients and Twitter with the radiology community.

Of all the available platforms, Dr. Ranginwala noted that Instagram is particularly well-suited for radiology.

“We are a sector based on images and Instagram is all about sharing images,” he said. “It’s a great tool for teaching and, as a result, is by far our most popular channel.”

At Cincinnati Children’s, the radiology department posts a Case of the Day based on a particular theme, such as #MSKMonday and #NeuroWednesday.

Seeking the Big Payoff

Needless to say, all of this takes time. Dr. Ranginwala said his department uses an editorial team for planning and requires everyone to provide content for the blog. Running the Instagram account alone involves one hour of scheduling and one hour of content creation every week.

But if you put in the time and the effort, the payoff can be big. “Our department has seen a major impact from using social media,” Dr. Towbin said. “With over 30 million impressions since 2014, we have developed a reputation as a respected source for medical education — a reputation that has led to numerous new opportunities.”

While Not Often Talked About, Male Breast Cancer Poses Real Risk

By Nick Klenske

When most people think of breast cancer, they tend to think of women. But did you know that an estimated 2,470 men in the U.S. will be diagnosed with breast cancer this year? And that out of these men, 460 are predicted to die from the disease?

In fact, according to Dr. Nikki (Rita) Gidwaney, MD, of California Advanced Imaging Medical Associates (CAIMA), who presented at a Wednesday session on male breast cancer, men have about a one in 1,000 risk of developing the disease. While the odds are much higher for women — who have a one in eight chance of developing breast cancer — male breast cancer is a health issue that often goes ignored, she said.

According to Dr. Gidwaney, one of the key reasons people do not understand male breast cancer is because it is not talked about. “Whereas women are taught to routinely check their breasts for lumps and get annual mammograms, men are not,” she said. “This means men often fail to realize they have breast cancer until the lump is large and thus harder to treat.” As a result, the five-year survival rate for men is 74 percent, compared to 83 percent for women.

“Furthermore, as the majority of male breast lesions are benign, it is important that radiologists are able to recognize suspicious lesions that need biopsy and further treatment,” she said.

Prevention Key for Men and Women

Breast cancer in men occurs when cells divide more rapidly than others, going on to form a tumor. Some men inherit mutated genes that increase the risk of breast cancer. Other risk factors include:

- Advanced age
- Chest wall radiation
- Obesity
- Liver disease
- Exogenous estrogen
- BRCA gene mutation
- Liver disease
- Family history (20 percent of men with breast cancer have a positive family history)

As with breast cancer in women, prevention is key for men. Dr. Gidwaney stresses that physicians should encourage both their male and female patients to regularly check for bumps. Since men usually notice breast cancer later than women, they typically have palpable lumps that are enlarged and tender, she said. Men are also more likely to show secondary signs, like nipple discharge, nipple retraction and skin thickening.

Since breast cancer numbers may not be high enough among men to justify costly annual mammograms, all imaging is diagnostic.

“This is why it is so important for men to understand that breast cancer is a possibility and keep an eye out for suspicious bumps in their chest,” Dr. Gidwaney added.

Addressing the Stigma

An issue unique to male breast cancer is the stigma that it is a female disease.

To illustrate, Dr. Gidwaney pointed to the pink ribbons that we associate with breast cancer awareness.

Because of this stigma, the treatment journey for men can be lonely, and depression is a real concern.

“The psychological and social impact is probably more severe in men,” Dr. Gidwaney said. “In addition to the physical component of the disease, we also need to understand — and address — the emotional component too.”
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Deep Learning Shows Potential for Accurately Reading Mammograms

By Mike Bassett

The use of deep learning (DL) technology could help radiologists increase the quality of breast cancer screening programs, lower costs, and reduce the variability in the cancer detection process.

And the role of DL technology in imaging doesn’t stop there. In fact, it is likely that DL computers can be trained to read mammograms as well as radiologists and — in the future may even outperform them, said presenter Nico Karssemeijer, PhD, a professor of computer-aided diagnosis (CAD) at Radboud University Medical Center Nijmegen, the Netherlands, during a Hot Topic Session on Deep Learning for Mammography on Wednesday.

It is possible that radiologists — even when working with high performance equipment under optimal conditions — can fail to detect breast cancer. In this presentation, “Deep Learning Systems for Improving Breast Cancer Screening,” Dr. Karssemeijer, said that the development of CAD systems was supposed to help address the problem of undetected cancers in screening mammography.

“By CAD hasn’t delivered on what it was intended to do,” said Dr. Karssemeijer, also director of ScreenPoint Medical BV, a developer of DL and image analysis technology in Nijmegen.

Advances in DL technology, however, show that artificial neural networks can be trained to perform the same tasks as humans. And, according to Dr. Karssemeijer, reading screening mammograms is a task where the conditions are ideal for the application of DL, considering it is a repetitive task for which large amounts of data are available for training.

An example of the potential utility of DL in screening mammography was demonstrated in the session, “Detecting Breast Cancer in Mammography: How Close Are Computers to Radiologists?” also presented this week by Dr. Karssemeijer and colleagues.

In the study, researchers compared the performance of a DL computer detection system to that of six radiologists in detecting breast cancer using digital mammography.

The radiologists retrospectively reviewed 155 exams (75 malignant and 82 negative exams, of which 42 were biopsy-proven benign lesions, and 40 normal cases defined as BI-RADS 1 or 2). The DL computer system was applied to the same dataset.

The researchers found that the receiver operating characteristics area under the curve was 0.83 (CI: 0.76-0.90) compared to 0.79 (CI: 0.72-0.86) for the DL system, suggesting that there was no statistical difference in the average performance of the six radiologists compared to the DL system.

DL Aids Radiology Decisions

According to Dr. Karssemeijer, the key to improving the reading of screening mammograms is not necessarily the detection of suspicious areas on mammograms, but in making decisions on which ones radiologists should act on.

“When we develop these systems further we can get beyond the level of human performance and move to a situation where radiologists will always be involved, but more in the sense of checking computer output rather than doing first reads themselves. So that’s a good sign for the future of screening mammography.”

Marijuana Smoking may be More Harmful than Tobacco

By Lynn Antonopoulos

As of 2017, eight states and Washington D.C. have legalized recreational marijuana use, and 29 states have legalized its medicinal use. “With increased legalization, there is likely to be a greater number of related health problems, and radiologists must become familiar with the clinical effects of marijuana abuse,” said Benjamin Parnes, a fourth-year medical student at State University New York (SUNY) Downstate.

In his digital Education Exhibit, Parnes reviewed clinical symptoms found in chronic marijuana smokers and demonstrated common imaging manifestations related to pathophysiologic effects seen in patients who abuse marijuana. “Certain clinical symptoms like euphoria, conjunctival injection and increased appetite are expected, but chronic users may also have anxiety, paranoïd delusions and hallucinations,” Parnes said.

Deep inhalation and extended hold of marijuana smoke can have a significant cellular impact and lead to thermal injury and carcinogenic effects which may potentially be more harmful than tobacco smoking.

“The extended hold leads to an increase in the absorption of tetrahydrocannabinol (THC), and users are subject to a greater deposition of tar and carcinogens in the airway,” Parnes said.

Similar to tobacco, marijuana smoking injures the respiratory epithelium and kills ciliated epithelial cells. It can deliver nearly twice the amount of benzopyrene, the most common of the polyaromatic hydrocarbons (PAH) known to cause cancer, as well as nearly 75 percent more benzanthracene than tobacco smoking. Among the endobronchial biopsy findings related to marijuana use are goblet cell metaplasia, reserve cell hyperplasia and squamous cell metaplasia.

Imaging studies presented by Parnes demonstrated a wide range of clinical findings associated with chronic marijuana use including a synergistic emphysema that occurs when marijuana is used with tobacco, bronchitis and bronchiolitis, carcinogenic effects contributing to the development of lung cancer, invasive aspergillosis in immunocompromised patients, trauma and interstitial lung disease.

One study showed a mild displacement fracture of the left mandibular coronoid process on a 39 year-old man with a history of marijuana use. “We think of marijuana as creating a euphoria, but it can also lead to cannabis-induced psychosis and an increase in violent crimes. That’s where we see trauma injuries,” Parnes said.

Also on the rise is the use of synthetic marijuana which when abused, according to Parnes, is associated with pneumonia, airway collapse, airway disease and aspiration. The side effects associated with synthetic marijuana are similar to natural marijuana but may also include hypertension, myocardial ischemia, vomiting and aggression.

“The synthetic product is cheaper than natural cannabis, is not detected in standard drug tests, has questionable legal status and is often sold in gas stations and stores that carry drug-related paraphernalia,” he said.

Despite its risks, marijuana has proven effective in a variety of clinical uses including, but not limited to, serving as an appetite stimulant in patients with AIDS.

“Because there is an overlap with marijuana and cigarette smoking, we consider the findings of this study “non-specific.”” Parnes said. “However with increased legalization of the drug, over time we will be able to gather more marijuana-specific data.”
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Unconscious Bias may Impede Diversity in Radiology

By Richard Dargan

Developing an awareness of unconscious bias against women and underrepresented minorities and taking steps to mitigate its pernicious influence is vital to ensuring that radiology reach its full potential, according to presenters at a Wednesday session.

Radiology has been plagued with what session moderator Margaret Szabunio, MD, from the University of Kentucky in Lexington, KY, referred to as a “leaky pipeline,” or a disparity between the percentage of women in medical school and the proportion who go into radiology. Women made up only 25.8 percent of radiology residents in 2015, down from 27.4 percent in 2005 and a far cry from the almost 50 percent of female medical students overall. Diagnostic radiology also ranks low in diversity — 19th of 21 medical specialties, according to a 2014 Journal of American College of Radiology study.

Addressing this disparity means understanding and taking unconscious bias — a pervasive tendency, deeply rooted in unconscious feelings, to make assumptions about people based on race, gender and other characteristics, according to M. Elizabeth Oates, MD, chair of the Department of Radiology at the University of Kentucky College of Medicine in Lexington. Superficial information such as a person’s first name or their photograph on an application can provoke negative assumptions, often to the detriment of women and minorities. Dr. Oates shared results from a study in which changing the name from “John” to “Jane” on the exact same application for a laboratory manager position resulted in a lower rating and a lower salary offer.

“Unconscious bias exists in all of us,” she said. “We need to recognize and accept it and apply de-biasing strategies intentionally and systematically in the recruitment process.”

Strategies can be implemented every step of the way to attract a more diverse pool of radiology residents and fellows, said Madeline C. Lewis, MD, from the Medical University of South Carolina in Charleston.

The pictures and descriptions an institution chooses for its web site should suggest an inclusive atmosphere, Dr. Lewis advised. She also recommended that staff members create a shared vision of the ideal candidate, conduct the interviews in a structured way and avoid making negative inferences about family obligations or gaps in training. The selection committee should be composed of people from different ages, ranks and genders, she said. Artificial intelligence may have applications too, as it can be programmed to ignore demographic information about candidates and make screening decisions based on data points.

“Awareness and willingness to engage in reflection are the first steps and how change begins,” Dr. Lewis said. “One way to fix radiology’s leaky pipeline is to reach out to women and minorities early in their medical education, said Katarzyna J. Macura, MD, PhD, a professor in the Johns Hopkins Medicine Department of Radiology in Baltimore, MD. Dr. Macura helped develop the Pipeline Initiative for Enrichment of Radiology (PIER), a mentoring program designed to attract women and minorities to the profession. Five students were recently selected as the inaugural class of PIER scholars.

“We want to cast a wider net,” Dr. Macura said. “We don’t want to overlook any wonderful candidates because we have these biases.”

3-D Printing Models, Augmented Reality Images Help Surgeons Visualize Tumors

By Elizabeth Gardner

What if a surgeon could study a 3-D model of a tumor in situ before operating on a patient? What if an interventional radiology team could overlay an “augmented reality” image onto the patient’s body to pinpoint the location of a tumor while planning radiation treatment?

A presenter at a Wednesday poster session described just these types of visualization tools, derived from MRI and CT scans. Lincoln Wong, MD, led a research team from the radiology departments at the University of Nebraska Medical Center (UNMC) and the Children’s Hospital and Medical Center, in Omaha, in creating 3-D printed models of three types of tumors — a neuroblastoma, a phaeochromocytoma and a mediastinal synovial sarcoma — that surgeons have used to plan and guide surgeries, and to explain the procedures to their patients.

Models have also been used to plan radiotherapy. Wong said. “The translation is not straightforward — especially with abdominal images — and needs to be tweaked to get each organ and structure right.”

Radiologists and imaging technologists collaborate on the 3-D rendering of the images to ensure accuracy. “The radiologist is key to the success of 3-D printing,” Dr. Wong said. “You can do so much more with the radiologist guiding the process.”
A multinational approach to collect and consolidate data — including radiological data — related to various forms of drug-resistant tuberculosis (TB), has the potential to help improve TB diagnostics, drugs and treatment outcomes, new research shows.

The TB Portals program — described during a Wednesday poster discussion by Andrei E. Gabrielian, PhD, lead, TB Portals Program, Office of Cyber Infrastructure and Computational Biology, National Institute of Allergy and Infectious Diseases/National Institutes of Health — is an example of one of those approaches.

With participation from the U.S., China, South Africa, Georgia, Romania, Belarus, Moldova and Azerbaijan, the objective of the program is to collect and consolidate radiologic, genomic, clinical and socioeconomic information related to various forms of drug-resistant TB cases as a resource for both researchers and physicians.

“Many countries in Eastern Europe, as well as China, India and Bangladesh have witnessed a growing threat from drug-resistant tuberculosis, but the sharing of information is lacking,” Dr. Gabrielian said. “In many tuberculosis hospitals in small cities, the documentation is still either on paper, or Excel spreadsheets, so there are no centralized databases, no concept of cloud data that could be used by researchers in other countries.”

Researchers sought to create a patient-centric database that would allow doctors to connect the dots about each patient and establish recommendations and best practices.

“If we know everything about the patient, and we know that this x-ray corresponds to this strain of tuberculosis, and it corresponds to a particular history of the disease, we can then try to find correlations — and hopefully find causation — that are otherwise impossible to tie together,” Dr. Gabrielian said.

The database currently contains 1,299 patient cases and is open for public use. In addition to a query capability that allows users to search for and view specific tuberculosis cases, the TB DEPOT tool allows advanced search functions, visualization, and comparative statistical analysis of associated data.

Of the cases in the database, 675 patient cases include CT data. Dr. Gabrielian explained that with this data a researcher could, for example, create cohorts composed either of patients who have large lung cavities (greater than 25 mm) or those with small cavities (less than 10 mm) — under the hypothesis that large cavities can harbor drug resistant TB.

“We can compare these two cohorts and see how they differ in drugs that have been administered, the outcome of the treatment and whether we can see any trends regarding different kinds of drug-resistant tuberculosis,” he said, pointing out that depending on the number and size of cavities, TB bacteria can actually hide and make the disease more difficult to treat, even though the sputum of patients will not have detectable amounts of microbacterium TB.

“So we need to make sure — especially in cases of drug-resistant tuberculosis — that it doesn’t go undetected,” he said. “And that is the motivation behind this kind of analysis. It contrasts the cohorts with different types of cavities and looks at various parameters that might distinguish between them.”

Dr. Gabrielian said that one of his goals in presenting at RSNA was to try to expand his program’s support base of radiologists, since, while his team has been able to collect a number of x-ray and CT images, not all of them have been annotated.

“So we would like to be able to use radiologists from our member countries to annotate them,” he said. “To look at the images and tell whether there are cavities or anything else that might be instrumental in dissecting tuberculosis.”
Ultrasound vs. MRI for Imaging of the Female Pelvis

By Jennifer Alyn

When it comes to imaging the pelvis, radiologists agree that ultrasound (US) is the right tool for diagnosis. However, opinions diverge on when MRI should be used, and the topic was debated during a Wednesday Controversy Session.

“In a skilled hand and using all the techniques that are available to the sonologist, ultrasound can localize sources of pelvic pain and discomfort and performs equally, if not better than MRI,” said Beryl Benacerraf, MD, from Brigham and Women’s Hospital and Harvard Medical School in Boston. Deborah Levine, MD, from Beth Israel Deaconess Medical Center and Harvard Medical School in Boston, agreed that US is where radiologists should begin and finish with pelvic imaging, but added that in some instances more information is needed. “Pelvic MRI is a problem solving tool that should be used when an US is inconclusive about diagnosis or doesn’t provide enough information to confirm treatment direction,” Dr. Levine said.

For Dr. Benacerraf, technical advances, such as 3-D, color Doppler and real-time transvaginal dynamic US, make US an effective imaging tool for gynecologic patients. “These additional technologies add value, but only when the radiologist is in the room examining the patient simultaneously and uses the advances to tailor the imaging based on what the patient says,” Dr. Benacerraf said.

There are instances though, countered Dr. Levine, when US doesn’t provide a sufficiently complete picture of the nature of a mass or when there are complications during pregnancy.

“MRI can give additional information about the nature of a mass that may change the decision to perform surgery, such as when the mass is an exophytic fibroid,” Dr. Levine said. “When uterine artery embolization is planned, MRI can show the exact number, size and location of fibroids or guide decisions regarding a hysterectomy or laparoscopic approach.”

In pregnancy, Dr. Levine noted, MRI is helpful when there is a suspicion of fetal abnormality or prior to fetal surgery, when the surgeon wants to be sure that the abnormality being treated is the only one present.

In conclusion, Dr. Levine affirmed that is where radiologists should begin and finish with pelvic imaging, but added that in some instances more information is needed. “Pelvic MRI is a problem solving tool that should be used when an US is inconclusive about diagnosis or doesn’t provide enough information to confirm treatment direction,” Dr. Levine said.

According to Dr. Benacerraf, US can provide a diagnostic answer without the need for further testing. “If we continue as a profession to end so many ultrasound reports with ‘MRI is recommended,’” requesting physicians and payers may become disenchanted with ultrasound as a modality thus decreasing its value,” she said. “Consequently we need to provide additional information that confirms or alters the direction of treatment,” she said. “It can also assist with patient counseling, in situations where more detail is needed, or where reassurance is needed about the conservative management of benign masses.

“There is no one answer when imaging the female pelvis. ‘When surgical intervention is being considered, MRI can provide additional information that confirms or alters the direction of treatment,’ she said. “It can also assist with patient counseling, in situations where more detail is needed, or where reassurance is needed about the conservative management of benign masses.”

Dr. Kaku’s lecture replaces a previously scheduled lecture on cyber security by Robert Herjavec. Preceding Dr. Kaku’s talk will be a “Fast 5” session at 1:30 p.m., featuring five speakers delivering lively, five-minute presentations on transformational ideas in radiology.
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NFL Players Present with Ascending Aortic Dilation and Coronary Artery Calcium

By Jennifer Allyn

While much of the recent medical attention on National Football League (NFL) players has been on concussions and the risk of future neurologic disease, a new study presented on Wednesday shows that many former NFL players have enlarged aortas and could be at greater risk for aneurysms.

“There have been previous studies that have looked at the role of strength training versus endurance training in relation to the remodeling of the aorta,” said Christopher Maroules, MD, from the Naval Medical Center in Portsmouth, VA. “Our study looked at the potential for both of these types of training, which most professional athletes are proficient in, to affect the ascending aortic dimensions, particularly after the athletes have retired and no longer train as vigorously.”

Researchers compared 205 former NFL athletes over the age of 40 to 759 matched male subjects from the Dallas Heart Study with a body mass index greater than 20 kg/m². Mid ascending aortic dimensions were obtained from non-contrast, multidetector cardiac-gated CT scans performed as part of a screening protocol or as part of the Dallas Heart Study. Researchers also looked for an increased prevalence of coronary artery calcium (CAC) using the Agatston method.

Compared to the control group, former NFL athletes had significantly larger ascending aortic diameters (3.8 ± 0.5 vs. 3.4 ± 0.4 cm) with a significantly higher proportion (30 percent) of former NFL players with an aorta greater than 4.0 cm compared to the non-players (8.6 percent). Even after adjusting for age, body mass, race, cardiac risk factors and lifestyle factors, like smoking, the former NFL players were twice as likely to have larger ascending aortas.

CAC scores were similar in both groups as was the distribution across CAC score categories. According to Dr. Maroules, because there were no significant differences between the coronary calcium of the two groups, the aortic dilation is likely not associated with atherosclerosis cardiovascular disease.

The study also separated the former players into positions by linemen or non-linemen. “Former linemen, which includes positions like center, linebacker, and defensive and offensive tackle, had a two-fold higher risk of aortic enlargement than non-linemen,” Dr. Maroules said. “Even after multivariable adjustment, we were unable to find a reason why different positions would have affected the aorta differently.”

The results of the study do not imply a direct causal relationship between high-intensity training and aortic enlargement, according to Dr. Maroules. “However, there is likely a vascular remodeling process in some elite athletes that results in larger aortic size,” Dr. Maroules said. “Whether this remodeling is adaptive or maladaptive over the long-term remains uncertain. Future research could influence medical management, activity restriction and surgical indications for elite athletes.”

Thomas M. Grist, MD, FACR, is the chair-elect of the Research and Education (R&E) Foundation

Thomas M. Grist, MD, FACR, is the chair-elect of the Research and Education (R&E) Foundation Board of Trustees for 2017-2018.

Dr. Grist is chair of the Department of Radiology at the University of Wisconsin (UW) in Madison and the John H. Juhl Professor of Radiology, Medical Physics and Biomedical Engineering, at the UW School of Medicine and Public Health.

An active RSNA member since 1992, Dr. Grist has been on the R&E Foundation Board since 2015. Dr. Grist supports the Foundation as a Silver Centennial Pathfinder, Presidents Circle member and Platinum Visionary donor. He has been active on the R&E Fund Development, Corporate Giving, and Visionaries in Practice Subcommittees.

The R&E Foundation also appointed Michael J. Harsh as a member of the Board of Trustees. Mr. Harsh is co-founder and chief product officer at venture funded start-up Terapede Systems, Inc. He is former vice president and chief technology officer for GE Healthcare and a fellow of the American Institute for Medical and Biological Engineering.

The Board of Trustees reappointed Richard D. White, MD, as secretary, Brian S. Kuszyk, MD, as treasurer and Carolyn C. Meltzer, MD, as executive officer.

To learn more about the Foundation visit the R&E Foundation Donor Suite in the Connections Center at RSNA 2017 or RSNA.org/Foundation.

Fast 5 Session Makes RSNA Debut Today

An engaging, fast-paced opportunity to share new ideas, the RSNA Fast 5 Session makes its debut today at 1:30 p.m. in the Arie Crown Theater.

The session will feature five speakers who will each make a five-minute presentation on ways to invent, explore and transform radiology.

Sessions are:

• “3 Categories of Referring Clinician Preferences Based on Survey Data,” Richard E. Heller, III, MD
• “Radiology Engagement Project (REP): A Novel Online Tool for Public/Patient Engagement,” Syed E. Jamali, MBBS, BSc
• “Radiology-TEACHES: (Technology Enhanced Appropriateness Criteria Home for Education Simulation),” Marc H. Willis, DO, MMM
• “Artificial Intelligence in Radiology: Lessons from the Financial Sector,” Ajay Kohli, MD
• “Value-Added Matrix: Defining, Categorizing, Quantifying, and Presenting Value-Added Radiologist Actions in 5 minutes,” Samir B. Patel, MD

Follow the conversation on social media at #RSNAFast5.
Standardized Protocols Aid in Dose Reduction

By Lynn Antonopoulos

Radiologists can achieve a significant reduction in the dose variance for head, chest and abdominal/pelvic CT through standardized protocols and the implementation of advanced software designed to better manage dosing.

“Our chair was not only a supporter…but also a champion. This support lent credibility and authority to our efforts resulting in success in reducing variation at our institution.”

Ryan K. Lee, MD, MBA

The team established the Radiation Dose Optimization Committee (RDOC), a group of radiologists, radiology residents, a radiation safety officer, medical physicist and technologists. The group standardized dose protocols at each imaging facility across their network and implemented custom scanning software designed to reduce dose variance between patients.

The custom software implemented included modifications in the amount of tube current and permitted slightly more noise while providing better dose management. This avoided the exponential increase in radiation that can occur, particularly in larger patients, with conventional methods of dose modulation. To evaluate their approach, the researchers measured the variance of administered dose to head, chest and abdominal/pelvic CT over two periods: pre-intervention (Jan 1, 2013 to Jul 31, 2014) and post intervention (Jan 1, 2016 to Dec 31, 2016). They performed a statistical analysis for differences in variability of radiation dose between the two periods using Bartlett’s test. Results showed that post-intervention, standard deviation was significantly decreased for all studies.

Dr. Lee said the main challenge to evaluating the efficacy of dose management measures was determining the effect of specific interventions. The team performed interventions contemporaneously rather than applying them in stages.

“We did not necessarily have control over when interventions could be implemented. For example, implementation of specific software at sites occurred as the software became available through the manufacturer,” he said adding, “The effort to standardize protocols required differing amounts of vetting resulting in differing times of implementation.”

The researchers would like to take the process further and attempt to identify factors in variability that may be specific in different settings such as inpatient, outpatient or emergency departments. Dr. Lee said that support from senior administration when implementing these changes was very important. “Our chair was not only a supporter…but also a champion. This support lent credibility and authority to our efforts resulting in success in reducing variation at our institution.”
Inflammation Markers Aid in Predicting the Need for CT after Ultrasound in Acute Abdominal Pain

By Elizabeth Gardner

Patients who go to the emergency department (ED) with acute abdominal pain need a diagnosis as soon as possible, but ultrasound (US) — the quickest and least invasive imaging option — often doesn’t yield enough information. The patient then is generally given a CT examination in addition to US. Seeking a possible solution, researchers from Klinikum Augsburg Hospitals in Germany sought to determine whether the ER could triage patients more quickly and efficiently using lab results to identify which patients with abdominal pain would need a CT scan.

On Wednesday, presenter Katharina Rippel, MD, shared findings suggesting that lab tests for systemic inflammation, combined with a medical history, can identify which patients will need a CT scan, allowing the ED to save time by skipping the US exam and proceeding directly to a CT scan.

Test results for inflammation markers are generally available within half an hour of giving the sample to the lab, Dr. Rippel said. So if the ED drew blood before doing a history and physical exam, there would be little to no delay in making a decision about which imaging exam is most appropriate.

Researchers analyzed electronic health records for 484 consecutive patients who presented to the ED over a two-month period with acute abdominal pain and were first referred for an abdominal US examination.

The study analyzed results for lab tests to determine systemic inflammation, including white blood cell count (WBCC) and C-reactive protein (CRP), as well as prior medical history and CT scans of the abdomen that were performed within 36 hours of the US exam. Subgroup analyses were performed for patients without documented hospital admission during a 12-month period preceding presentation to the ED. Out of the initial group, 38 patients were excluded because they had no lab test results. Of the remainder, 15 percent underwent additional abdominal CT within 36 hours.

Predicting Need for CT Could Save Time in ED

Results showed that patients who underwent additional CT were significantly more likely to have had lab results indicating inflammation. The lab values were especially likely to be correlated with a CT scan if the patient had not been hospitalized in the previous 12 months and had no history of malignancy.

In one sample case, a patient had a normal US but CRP and WBCC results indicated inflammation. A CT scan revealed acute appendicitis with perforation.

“Usually a CT scan alone is enough to detect the relevant illnesses, but due to the potential side effects, we try to diagnose primarily with ultrasound,” Dr. Rippel said. “We tried to find the parameters that would predict the need for CT in order to save time in the emergency department.”

Dr. Rippel said the findings have led the emergency and internal medicine departments to discuss a possible change in protocol, if these results are confirmed by additional studies. She hopes to do further research that will identify other subgroups where inflammation markers have high predictive value, using other lab results such as bilirubin, or physical exam findings such as right upper quadrant pain that are easy to identify in medical records.

Opportunities Abound for Radiation Oncology in the Era of Personalized Medicine

CONTINUED FROM COVER

Radiation damage and serve as what Dr. Haas-Kogan called “functional dosimeters of radiation.”

As she closed her address, Dr. Haas-Kogan discussed how the philosophy of personalized medicine has had particular resonance in her life. In 1997, she was under consideration for an RSNA Research Scholar award, but her plans to travel to Chicago for the interview were interrupted by the birth of her third child, a son, who was in the audience Wednesday. Undaunted, Dr. Haas-Kogan made copies of her slides and shipped them overnight to Chicago. She then completed her presentation over the phone and won the grant, which she credits for jumpstarting her career and changing her life.

“This is the most important kind of personalized care that we can engage in as radiologists, radiation oncologists and healthcare professionals: the personal touch devoted to education and mentorship,” she said. “I owe much of what I’ve accomplished to all of you and to RSNA, and I thank you from the bottom of my heart.”

Immunotherapy provides fuel to an existing fire, but how do we generate the spark, the initial immune response against the tumor? That is where radiation comes into play.

Daphne A. Haas-Kogan, MD

RSNA SEeks Editors for New Online Journals

RSNA is seeking applications from candidates interested in serving as the editor of one of three new subspecialty journals RSNA will begin publishing in 2019. The journals will be published solely online and will cover cancer imaging, cardiothoracic imaging and machine learning (ML)/artificial intelligence (AI).

The editors will work closely with the RSNA Board of Directors and other RSNA journal editors to develop and execute the strategic vision for each new publication. The editors will also lead the editorial team, manage the peer review process, and actively solicit submissions of scientific manuscripts to the assigned journal, both from external sources and other RSNA journals. The editors will be expected to commit 20 percent of their time to the position beginning in Spring 2018. A complete description of responsibilities for each of the editor positions can be found at RSNA.org/Journals.

Mary C. Mahoney, MD, RSNA board liaison for publications and communications, will chair the search committee. Interested individuals are invited to send their curriculum vitae and a letter of interest/vision by close of business on Friday, December 29, 2017, to:

Mary Mahoney, MD
RSNA
820 Jorie Blvd, Oak Brook, IL 60523
Email to editorssearch@rsna.org

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