Brown Fat May Affect Cancer Progression

By Michael Bassett

Brown adipose tissue (BAT) activity is greater in patients with active malignancy than in comparable BAT positive patients without active malignancy, according to a study presented on Monday. This suggests that BAT — also referred to as “brown fat” — plays a role in cancer progression, said Miriam Bredella, MD, professor of radiology, Harvard Medical School.

Adipose tissue is known to influence the development and progression of different cancers. In her presentation Dr. Bredella explained that white adipose tissue stores energy and becomes “dysfunctional” in obesity, increasing the risk of developing metabolic disease and cancer. BAT is metabolically active and is characterized by high mitochondrial content and high vascularity.

“Active brown adipose tissue refers to BAT that is visible on FDG-PET because it is metabolically active and takes up glucose,” Dr. Bredella said. “Some studies suggest that BAT can also be ‘non-active’ or ‘cold’ on FDG-PET and does not take up glucose,” Dr. Bredella said. “And it’s not just brown fat that’s important, it’s also the type of brown fat that’s important.”

The patients under went 18F-FDG PET/CT for staging or surveillance of malignant neoplasms and were BAT-positive on PET/CT. The researchers assessed BAT volume by PET/CT, and abdominal and muscle cross sectional areas (CSA) by CT, and groups with and without active malignant disease on PET/CT were compared.

The groups were similar in age and BMI, and abdominal and muscle CSA. Patients with active malignant disease on PET/CT had higher BAT volume compared to patients without active malignancy (24±6 vs 12±2 cm3, p=0.009). In patients without active malignancy, BAT volume was associated with BMI and abdominal fat CSA (r= 0.56 to 0.58, p<0.0001) while there were no such associations in patients with active malignancy (p<0.2). No associations between BAT volume and age or muscle CSA were found (p=0.1).

What are the mechanisms through which brown fat plays a role in the development or progression of cancer? “Brown fat is very vascular,” Dr. Bredella said. “And studies have shown increased expression of the protein CD31 (a marker of angiogenesis in brown adipose tissue), which may lead to cancer development by favoring tumor growth through increased vascularization.”

Dr. Bredella also pointed out that studies have been performed in animal models where different cancer types were implanted into brown fat, leading to accelerated tumor growth, increased neovascularization, increased blood perfusion and decreased hypoxia.

“Our preliminary investigation suggests a possible role of BAT in cancer activity and associated metabolic disturbances, but prospective longitudinal studies are necessary to assess the effects of BAT on cancer activity and progression,” Dr. Bredella said. “In the future, modulation of BAT may play a role in cancer therapy.”

Dr. Bredella received a 2018 Society of Skeletal Radiology Paper Award for this study.
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LI-RADS Algorithm Shows Promise in Liver Cancer Treatment

**By Richard Dargan**

A new Liver Imaging Reporting and Data System (LI-RADS) algorithm that uses imaging to assess response to liver cancer treatment is effective at determining which tumors are viable and which have been eradicated, according to research presented Monday.

First published in 2011, LI-RADS created a classification system for CT and MRI findings in patients with suspected hepatocellular carcinoma (HCC), the most common type of liver cancer. LI-RADS categorizes tumors from definitely benign, or LR1, to LR5 or definitely HCC.

An update to LI-RADS in 2017 added a treatment response algorithm with three categories for treated liver tumors: viable, meaning that at least some of the tumor is still active; non-viable, which indicates the tumor is entirely destroyed; and equivocal, meaning that a definitive conclusion is not possible based on current information.

There has been little published data on the performance of this new algorithm for predicting the degree of necrosis induced in individual lesions by loco-regional treatments that focus on shrinking or eliminating the tumors through a variety of means, including radiation and chemotherapy, said lead author, Erin Shropshire, MD, a fourth-year radiology resident at the Duke University School of Medicine in Durham, N.C.

“With the shortage of transplant livers, loco-regional treatments have become important as a way to help reduce pain and symptoms in patients and act as bridges to a transplant,” she said.

For the study, Dr. Shropshire and colleagues evaluated the treatment response algorithm in 45 patients who had undergone transarterial embolization, also known as bland embolization, for potential HCC. In transarterial embolization, small particles are injected into a liver artery to block the tumor’s blood supply. If the treatment is effective, the oxygen-starved tumor will shrink and die.

Three radiologists independently assessed all tumors before embolization using LI-RADS criteria. After treatment, the radiologists re-evaluated the tumors with the 2017 treatment response algorithm. The patients subsequently underwent liver transplantation, allowing the researchers to directly examine their livers and correlate the status of the tumors with the LI-RADS treatment response algorithm.

The treatment algorithm performed strongly in predicting viable tumor. Of the 26 tumors identified as viable by the algorithm, 24 were confirmed on pathology. The algorithm delivered a finding of equivocal in 17 lesions; subsequent examination revealed 12 of those 17 lesions to be incompletely necrotic, suggesting that an equivocal determination is likely to represent a viable tumor.

Treatment Response Algorithm Effective

Dr. Shropshire said the overall results for the treatment response algorithm were similar to those of published data on LI-RADS, meaning that the algorithm appears to be working as well as existing methods. The algorithm’s effectiveness at identifying incomplete tumor necrosis could be useful in selecting patients for additional treatment.

“The algorithm was pretty effective at saying, ‘Yes, there is viable disease here,’ or ‘No, this lesion is not non-viable,’” Dr. Shropshire said. “But we still have room for improvement with lesions that are equivocal.”

Future research will examine the treatment response algorithm in other types of loco-regional treatments.

“Since we only used bland embolization in the study, there are still lots of unanswered questions,” Dr. Shropshire said. “We would like to look at other kinds of embolization, like radioactive embolization and chemoembolization, and we would like to tweak the accuracy of the algorithm to improve its positive predictive value.”

Chest MRI Effective in Screening Children for Lung Disease

**By Michael Bassett**

Pediatric chest MRI provides high image quality and can be an effective technique for screening large groups of children for lung and airway diseases, such as asthma, according to research presented Monday.

According to presenter Alice Pittaro, MD, Erasmus Medical Center, Rotterdam, Netherlands, pediatric chest MRI is a relatively new technique that is slowly replacing CT in pediatric thoracic imaging.

“But it remains challenging in a clinical setting,” she said. “Only large centers have the ability to see who will develop asthma and who will not, because they are potential asthmatic children, because they are symptom free,” Dr. Pittaro said. “However, we will follow this cohort until 18 years of age, so we will have the ability to see who will develop asthma and who will not, and to compare the amount of air trapping seen at this time point. In this way, we will determine the real prevalence of air trapping in children with asthma.”

With the shortage of transplant livers, loco-regional treatments have become important as a way to help reduce pain and symptoms in patients and act as bridges to a transplant.

**Erin Shropshire, MD**

**Pittaro**

**Technique May Help Predict Asthma**

This was a unique opportunity to screen a large group of healthy children for possible determinants of lung and airways diseases — asthma, in particular,” Dr. Pittaro said. “The clinical importance of the study is that chest incidental findings are quite common in the pediatric population and need to be correlated to the clinical conditions of the children.”

Specifically, she pointed out that radiologists should be aware that more than one-third of asymptomatic children may have a clinically non-relevant incidental finding. Furthermore, she said, small areas of trapped-air or limited consolidations are quite common in healthy children and likely to have no clinical relevance.

However, while relevant thoracic incidental findings were rare in the study population, the researchers did find that more than half of the clinically relevant incidental findings were severe trapped-air.

“At this point we cannot say if these children are potential asthmatic children, because they are symptom free,” Dr. Pittaro said. “However, we will follow this cohort until 18 years of age, so we will have the ability to see who will develop asthma and who will not, and to compare the amount of air trapping seen at this time point. In this way, we will determine the real prevalence of air trapping in children with asthma.”
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William J. Casarella, MD

A dedicated interventional radiologist, leader and educator, William J. Casarella, MD, is a pioneer in interventional radiology (IR) who helped to develop the life-saving angioplasty and diagnostic angiography techniques that are now used daily in cardiovascular, vascular surgery and neurosurgery.

Dr. Casarella, now retired, served as a radiology professor and chair of the Department of Radiology at Emory University, Atlanta, from 1981 to 2004, and as executive associate dean for clinical affairs from 1999-2013.

His path to radiology began after Dr. Casarella graduated cum laude from Yale University in 1959 and earned his medical degree at Harvard Medical School in 1963. After finishing a rotating internship at the University of Pennsylvania, Dr. Casarella entered the U.S. Army and became a flight surgeon in Korea and the U.S. before completing his residency at Boston City Hospital.

Following his radiology residency at Columbia-Presbyterian Medical Center, New York, Dr. Casarella held a number of radiology positions at Columbia before becoming chief of the cardiology radiology section in 1970 — a position he held for 11 years. During this time, which was before the introduction of CT and MRI, Dr. Casarella used vascular radiology techniques to explore and treat clinical problems including GI bleeding, portal hypertension and malignant tumors.

After he was recruited by Emory University in 1981, Dr. Casarella began building a legacy of achievements that included recruiting top scientists and clinicians to the radiology department and building one of the country’s premier radiology residency training programs.

In 1973, Dr. Casarella worked with colleagues at the Society of Cardiovascular Radiology which evolved into the Society of Interventional Radiology (SIR). Dr. Casarella has served as president of the American Society of Radiology, the American Roentgen Ray Society (ARRS) and the Society of Cardiovascular & Interventional Radiology.

Along with publishing more than 100 research articles and numerous book chapters, Dr. Casarella has served as a manuscript reviewer for journals including Radiology and RadioGraphics.

A longtime RSNA member, Dr. Casarella presented the RSNA Annual Oration in Diagnostic Radiology in 1987. Among his numerous honors, Dr. Casarella has received gold medals from SIR, ARRS and the American College of Radiology.

Sarah S. Donaldson, MD

A world-renowned expert in pediatric radiation oncology, Sarah S. Donaldson, MD, is an influential educator, role model and a leader in pioneering relationships between radiation oncologists and radiologists. Her work with every aspect of childhood cancer has been the hallmark of her long and distinguished career.

Dr. Donaldson is the Catharine and Howard Avery Professor in the Department of Radiation Oncology at Stanford University and directs the supervision and mentoring in the Department of Radiation Oncology at Stanford University School of Medicine.

After graduating from Harvard Medical School in 1968, she completed a radiation oncology residency at Stanford University, joined the faculty in 1973 and has remained at Stanford for her entire career.

Dr. Donaldson has contributed greatly to the success of Stanford’s Department of Radiation Oncology, serving as associate chair and deputy clinical chief from 1997-2011. She was instrumental in building the Pediatric Hematology/Oncology Program and served as the inaugural chief of pediatric radiation oncology at the Lucile Salter Packard Children’s Hospital.

Her research has focused on pediatric radiation oncology and the effects of cancer therapy on long-term survivors. She served as Stanford’s residency program director in the Department of Radiation Oncology from 2001 to 2009 and is currently Stanford’s mentoring director. In 2017, Stanford established the Sarah S. Donaldson Inaugural Mentorship Award in the Department of Radiation Oncology.

At RSNA, Dr. Donaldson has served on the Board of Trustees of the Research and Education Foundation and the Public Information Advisors Network. She was elected the RSNA second vice president in 2003. In 2005, she was elected to the RSNA Board of Directors and served as the liaison for science from 2005-06, for publications and communications from 2007 to 2010, then served as chairman and president-elect before serving as president in 2013.

She was the first female president of the American Board of Radiology as well as the American Society for Radiation Oncology (ASTRO).

Dr. Donaldson has authored or co-authored hundreds of peer-reviewed scientific articles, book chapters and review articles and has served on the editorial boards of numerous publications.

Among her numerous honors, Dr. Levine has received gold medals from the del Regato Foundation, the American Radiology Society, the American College of Radiology and ASTRO.

Deborah Levine, MD

A highly respected diagnostic radiologist, researcher and educator, Deborah Levine, MD, is widely recognized for revolutionizing fetal MRI and for her groundbreaking research in high-risk obstetrical and gynecological ultrasound (US). Equally dedicated to academic publishing, Dr. Levine has served for a decade as the Senior Deputy Editor of Radiology, helping to guide the RSNA journal into the digital age.

Dr. Levine has served as the director of obstetric & gynecologic ultrasound (US) and medical education at Beth Israel Deaconess Medical Center (BIDMC), Boston, since 2011, and as a professor of radiology at Harvard Medical School, Boston, since 2008. Dr. Levine, who earned her medical degree from University of California, San Francisco, focuses her clinical work on outpatient US and her research on obstetric and gynecologic imaging.

During her residency at University of California San Diego, Dr. Levine began researching the use of US to assess the post-menopausal pelvis and adnexal cysts — topics she investigated throughout her career. In 2010, she published a highly-regarded Radiology report setting guidelines to decrease follow-up of physiologic adnexal cysts. Her early research work with Schuchter produced a $1.5M RSNA Research Seed Grant to assess chromium separation after amniocentesis.

As a radiology instructor at Harvard Medical School, Dr. Levine began her pioneering work using MRI as an adjunct to US in obstetrics. At Harvard, her laboratory published use of the ultrasound sequence (HASTE) for superior visualization of the fetus.

As vice chair of academic affairs at BID-MC, Dr. Levine oversees the programs that train medical students, radiology residents and fellows, and supervises a mentoring program for junior faculty in the Department of Radiology.

Her service to Radiology began in 2004 when she joined the journal’s editorial board, culminating in her current role as senior deputy editor, which she assumed in 2008. Dr. Levine, who also served as editor of the RSNA Daily Bulletin from 2007 to 2010, is the author of more than 200 manuscripts, chapters and reviews as well as five books.

Among her numerous leadership positions, Dr. Levine served as President of the Society of Radiologists in Ultrasound in 2016. Dr. Levine received the American Board of Radiology’s Lifetime Service Award in 2015.

Emotional Intelligence Enriches Learning Environment

By Lynn Antonopoulos

Educators must look beyond mastery of a certain domain of radiologic knowledge and develop a set of social and emotional intelligence skills. They must better understand their own emotional states and recognize how their interaction with others affects their students.

“Social and emotional intelligence is a skill set that anyone can practice and develop,” said Robert Perafile, PhD, a part-time professor of radiology at Geisel School of Medicine, Dartmouth, NH. “The first step is to be aware of these skills, and then we can make a conscious effort to improve them in ourselves.”

In a session that focused on his early experiences as an educator, Dr. Perafile discussed the surprising anxiety that crept into his work and interventional radiology speaking experiences as he grappled with how to balance his clinical productivity and patient care with the responsibility of resident education and presenting a consistent learning environment.

For Dr. Perafile, the solution came in the form of training in social and emotional intelligence.

“The majority of radiology education is experiential and collaborative work between the attending radiologist and the resident MDs in the IR suite,” he said. “This is where social and emotional intelligence can have a big impact.”

Social and emotional intelligence refers to a set of skills, traits or competencies that relate to one’s own emotions and social interactions with others. It can be better understood when divided into four domains: self-awareness, self-management, social awareness and relationship management.

“Self-awareness and self-management focus on ourselves and relate to our personal emotional management. We pause and reflect about our mental state and determine whether it may be negatively affecting our behavior. If it is, that’s a good time to take a timeout to reset and come back with an improved state of mind,” Dr. Perafile said.

Social awareness and relationship management refer to our interactions with others. “In social awareness, we determine whether we are attuned to the emotions of others and if we are able to exhibit empathy. Relationship management relates to how we function with teamwork or mentorship, coaching or conflict,” he said.

In his learning environment, these skills become important because opportunities for learning can be lost if a resident feels overwhelmed, unappreciated or anxious. Educators who are able to detect these roadblocks can be objective and try a different approach.

A more nuanced example of social intelligence is detecting impression management. “People manage behaviors to construct a personality which they value or want others to see,” Dr. Perafile said adding, “By recognizing this tendency in our residents, we can target better ways of educating.”

In one hypothetical example of impression management, he shared a story of a junior resident who did not want to be perceived as incompetent after missing a large uterine mass on a CT study. When asked, the junior resident deflected by saying he saw it but forgot to mention it or didn’t think of mentioning it.

“In this case, there is an opportunity to walk him back, to recognize and correct the mistake. While doing so, you also reveal the true nature of the mistake and have a real chance for learning,” he said.

Go to RSNA.org/Bulletin to watch an interview with Dr. Perafile.
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RSNA 2018 CELEBRATES EARLY-CAREER AND ESTABLISHED RADIOLOGISTS

Exciting activities for radiology trainees and inspirational ceremonies for luminaries in the field are all part of RSNA 2018.
What are You Most Excited to See at RSNA 2018?

The Daily Bulletin stopped by the Residents Lounge on Monday to ask doctors the question: "What is of most interest to you at RSNA 2018?" Participants were eager to share what draws their attention at the meeting.

“I am looking forward to the neuroradiology lectures and updates,” said Faraan Khan, MRCP, FRCR, fifth-year resident in neuroradiology at Atkins Morley Hospital, London.

“Meeting up with great colleagues,” is one of the best parts about the RSNA annual meeting according to Nazmus Sakib, MD, a third-year resident from Beth Israel, Newark, NJ.

Neuroradiology fellow Noha A. Aboueldahab, MD, from the University of Alabama at Birmingham, is most interested in learning, “the latest research and discoveries in neuroradiology.”

“The alumni events, technical exhibits and getting to know other trainees,” are some of the perks of the RSNA annual meeting said William Winter, MD, third-year resident at Vanderbilt, Nashville, TN.

Brittany Lewis, MD, a third-year resident in emergency radiology at Detroit Medical College and Wayne State University, Detroit, looks forward to the, “research presentations and how they can be implemented back at my institution.”

“I am looking forward to the diversity of the topics and the challenge of the Case of the Day.”

Mona Abo El-Ela, MSC, a fourth-year radiology resident from Dermadash Hospital, Cairo, is a first-time attendee and is enjoying, “the diversity of the topics and the challenge of the Case of the Day.”

Amy Hurley Dugdale, FRCR, a third-year resident from Queen Alexandra Hospital, Portsmouth, UK, is looking forward to, “taking home the latest information and research on breast imaging.”

Wendy Tu, MD, a third-year resident at Ottawa Hospital, Canada, is interested in, “experiencing the diversity of the scientific sessions and absorbing all the exciting research.”

“Meeting up with great colleagues,” is one of the best parts about the RSNA annual meeting according to Nazmus Sakib, MD, a third-year resident from Beth Israel, Newark, NJ.
“Graspable, 3D printed models provide radiologists with an accurate level of depth perception that is difficult to achieve when viewing 2D-rended images on a flat screen,” said presenter Nicole Wake, PhD, of New York University (NYU) School of Medicine, during a Monday session. “3D printing of anatomical data allows radiologists, surgeons, and other physicians to physically hold patient-specific models and use visuo-haptic inputs to better understand both complex anatomy and the condition being treated.”

To produce anatomically accurate 3D printed models, radiologists must separate regions of interest (ROIs) from DICOM (digital imaging and communications in medicine) images, which can be acquired from any imaging technique offering volumetric imaging capability (i.e., MRI, CT).

The segmented ROIs are then converted into a 3D format that can be recognized by the 3D printing software. According to Dr. Wake, 3D printed models offer several advantages over other types of models, such as traditional imaging, augmented reality and 3D computer models. Referencing a large cohort study in the Journal of Urology, she noted that prostate cancer volume estimates made using MRI tend to substantially underestimate pathological volumes. “3D printed prostate molds created from a patient’s pre-operative MRI can be used to correlate MRI and pathology,” said Dr. Wake.

Based on an ongoing prospective study underway at NYU, Dr. Wake shared how 3D printed prostate cancer models can be used for both pre-surgical planning and to help patients better understand their anatomy and disease. “While they can’t interpret images, patients may be better able to understand the anatomy, disease and surgical plan by handling 3D models and discussing the models with their doctors,” she said.

Enhanced Insight Into Underlying Anatomy
3D printed models can also influence surgical decisions regarding nerve-sparing, continence, and potency. “These models improve a surgeon’s confidence in the surgical procedure,” Dr. Wake said. “Most importantly, 3D printed models can decrease operating times and improve outcomes for those patients undergoing robotic-assisted radical prostatectomy.”

By providing both spatial comprehension and tactile feedback, 3D printed prostate cancer models provide enhanced insight into the underlying anatomy. “With a better understanding of lesion size, shape, and position within the prostate provided by 3D printing, surgeons are better able to prepare and execute these minimally invasive procedures,” concluded Dr. Wake. “Patients can also better understand their disease and surgical procedure, allowing them to feel more comfortable with the surgical plan – ultimately leading to improved patient satisfaction.”

### Margulis Award Presented Today
The RSNA Alexander R. Margulis Award for Scientific Excellence recognizes the best original scientific article published in Radiology for a given year. The Margulis Award Nominating Committee and the Margulis Award Selection Committee review articles in #GivingTuesday, a global day dedicated to giving.

Last year, organizations in more than 150 countries came together to celebrate #GivingTuesday — a movement to celebrate and provide incentives to give. Since its founding in 2012, #GivingTuesday has inspired giving around the world, resulting in greater donations, volunteer hours and activities that bring about real change in communities.

For three consecutive years the RSNA Research & Education (R&E) Foundation has funded $4 million in grants to researchers and educators in the radiology community with the help of donations from individuals, industry partners and private practice groups. Celebrate #GivingTuesday and seed the future of radiology by making a donation to the Foundation today at RSNA.org/Donate or by visiting the R&E Foundation booth in the Connections Center.
Lifestyle, Medication Affect Bone Health of HIV-Infected Adults

By Jennifer Allyn

In adults with long-term HIV infection, low bone mineral density and increased fracture risk have emerged as significant comorbidities.

As therapies improve, so does life expectancy and a new study presented on Monday assessed the influence of exercise, nutrition and medication on bone microarchitecture to ultimately improve the quality of life for these patients.

“In adults with long-term HIV infection, bone mineral density has been shown to decrease by two to six percent within the first two years of antiretroviral therapy, regardless of the choice of therapy,” said Sarah Foreman, MD, postdoctoral research scholar at University of California, San Francisco (UCSF). “To help decrease the rate of fracture and increase fracture healing, it’s essential to address this multifactorial challenge.”

Researchers studied 29 HIV-infected subjects — three women and 26 men — who had been diagnosed with HIV more than 20 years prior. To assess physical activity levels over the past month, subjects answered questions from the Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire. To determine their changes in food intake and weight over the previous three months, subjects took the Mini Nutritional Assessment (MNA). They also provided medication assessments.

Participants underwent radius and tibia high-resolution peripheral quantitative CT (HR-pQCT) and laboratory evaluation. Multivariable linear regression models were used to evaluate the effects of exercise, nutritional status, tenofovir disoproxil fumarate (TDF) and protease inhibitor (PI) use on bone microarchitecture, adjusting for all demographic risk factors.

HR-pQCT results showed that cortical bone was detrimentally affected by malnutrition, while trabecular bone was detrimentally affected by previous use of TDF in combination with a PI.

“There is not much known about the determinants of bone microarchitecture in people living with HIV, so the findings were novel to our team,” Dr. Foreman said. “It was interesting that the bone microarchitecture seemed to be correlated to not only medication protocols but also to nutrition and exercise regimens.”

Exercise could help diminish decreases in trabecular bone structure while nutritional support is specifically relevant for maintaining cortical bone structure.

“Our team noticed that light and moderate, but not vigorous, physical activity also favorably influenced bone composition, which can help patients who may not be interested in maintaining high levels of physical activity,” Dr. Foreman said.

The goal of the study is to assist physicians in balancing medications with physical activity and nutritional guidance to prevent bone loss in adults with HIV, particularly since the study demonstrated the use of TDF with PIs can compromise bone health.

In addition, researchers also noted that dual energy X-ray absorptiometry may no longer be sensitive enough to assess osseous changes in long-term HIV-infected individuals and that HR-pQCT may be better suited to evaluate these changes.

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Radiology Adds Value to Anatomy Courses in Medical School

By Melissa Silverberg

Radiologists are anatomists of the future. That is the premise of researcher Kathryn Darras, MD, who is working to assess the effectiveness of integrating 3D imaging into the anatomy curriculum of medical students.

In research presented Monday, Dr. Darras, a radiologist at the University of British Columbia who is pursuing a PhD with the School of Health Professions Education at Maastricht University in the Netherlands, examined the educational value of using new 3D imaging technology, such as anatomy visualization tables (AVTs).

The purpose of our study was to see how we can use novel technology to bring radiology to medical students in a way that is easy to understand, but still connects teaching medical undergraduates anatomy to the clinical world,” Dr. Darras said.

The research project was supported by a RSNA Research and Education (R&E) Foundation grant. Dr. Darras received the RSNA Trainee Research Prize for her study.

We saw that virtual dissection adds to traditional anatomy teaching and we learned more about what kind of cases we should be sharing with students to get them excited about radiology.

Kathryn Darras, MD

Virtual Dissection Valuable to Students

All 292 first-year medical students at the University of British Columbia, were included in the study. Basic Virtual Dissection Curriculum, which focused on normal anatomy, was offered to all students concurrently with their cadaveric laboratories.

Additionally, an advanced Virtual Dissection Curriculum that focused on anatomy teaching and we learned more about what kind of cases we should be sharing with students to get them excited about radiology.

Typical anatomy education has focused on cadaveric dissection with some integration of ultrasound and 2D images. However, Dr. Darras said that with recent advances in technology, radiologists and medical educators should take advantage of new ways to explore difficult cases with students and expose them to the field.

For example, AVTs can be used to teach anatomy through virtual, or digital, dissection. Real patient CT scans – either normal or abnormal – are loaded onto the AVTs, which function like large touch-screen PACS workstations and allow learners to work together in small groups to manipulate the data and move through the dissection.

Virtual Dissection Valuable to Students

Among the students in the advanced AVT course, 93.1 percent indicated that virtual dissection was an effective use of their time and 78.7 percent agreed that the virtual dissection portion of class enhanced their understanding of the clinical applications of anatomy.

Students found the cases interesting and engaging and were inspired to learn more medicine,” Dr. Darras said. “There’s something about learning in 3D that makes the content more accessible to students. It has given us insight into how we can teach radiology effectively to this population of students.”

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CT Radiomics Shows Promise Predicting Survival in Early Lung Cancer

By Richard Dargan

A CT radiomics model is more effective in predicting disease-free survival in patients with early-stage lung cancer than traditional clinical staging, according to research presented Monday.

Lung cancer is traditionally staged through the Tumor-Nodes-Metastasis (TNM) method, in which three variables are used to assign a stage to the cancer, ranging in increasing order of severity from 0 to IV. But this approach has limitations.

“The TNM method predicts the prognosis according to the size and extent of tumor invasion, lymph node metastasis and distant metastasis,” said study co-author Xueguo Liu, MD, PhD, from Sun Yat-sen University in Zhuhai, China. “Even the same-staged solid lung cancers with the same treatments show different curative effects and metastatic behavior. TNM stage is not able to fully reflect the intratumor heterogeneity, which may result in therapeutic failures.”

Heterogeneity is one of the many features of a tumor that can be assessed through radiomics or the conversion of images into data that can be mined and analyzed with the help of computers.

Dr. Liu and colleagues recently developed a CT radiomics model in collaboration with research scientists from GE Healthcare China led by Xin Li, PhD, for patients with stage I lung cancer. They used CT scans to train and test the algorithm, maximizing the effectiveness of the training set through the use of a random forest model, a powerful machine learning algorithm that helped select radiomics features significantly related to prognosis.

They then retrospectively evaluated the performance of the radiomics model in predicting disease-free survival and compared it with traditional clinical staging through the TNM method in 109 cases of stage I solid lung cancer.

Radiomics can be used to identify potential biomarkers to predict prognosis of early stage solid lung adenocarcinoma patients after surgery.

Xueguo Liu, MD, PhD

Radiomics Can Guide Treatment Decisions

The researchers followed the patients for up to six years and found that 10 of the 385 radiomics features were significantly associated with disease-free survival. The model was able to distinguish between patients at high and low risk of cancer recurrence, which is important in determining the appropriate course of treatment.

“This radiomics model can predict disease-free survival of stage I solid lung adenocarcinoma better than traditional clinical staging,” said Dr. Liu. “Radiomics can be used to identify potential biomarkers to predict prognosis of early stage solid lung adenocarcinoma patients after surgery.”

More research is needed, but Dr. Liu and colleagues believe the model can play a role in guiding treatment decisions for patients at a high risk of disease progression.

“I think this radiomics model has good prospects,” Dr. Liu said. “It can optimize the existing pathological staging methods, improving the accuracy of predicting prognosis, and predict tumor heterogeneity, assisting in the stratification of treatment plans.”

Study Reveals Higher Mammography Rates in Coastal Cities

By Mary Henderson

The number of women getting screening mammograms has increased significantly over the past 30 years, said Eric Kim, MD, diagnostic radiology resident at NYU Langone Health.

According to data from the National Center for Health Statistics, the utilization of screening mammography has increased from 28.7 percent of women 40 years and older in 1987 to 65.3 percent in 2015. However, millions of women in both rural and urban areas are still not receiving mammographic screening. Breast cancer remains the second leading cause of cancer-related deaths among women in the U.S.

“We can still do better,” Dr. Kim said during a Monday presentation. He said screening mammography rates for women 40 years and older in 2004 varied from 71.1 percent in rural areas to 75.4 percent in metropolitan areas. While researchers have identified a lack of access to care providers and other physical barriers as factors affecting the lower rate of mammographic screening in rural areas, less is known about urban areas.

“Studies thus far have focused on rural disparities in screening utilization,” he said. “City-level screening mammography disparities have been less evaluated, although more than 30 million adult women live in the 500 largest U.S. cities.”

To evaluate disparities in screening mammography utilization at the city level, Dr. Kim and his colleagues conducted a descriptive study using public data from the 500 Cities Project, which reports city-level data on 27 chronic disease measures in more than 2,000 communities in the U.S.

According to the researchers’ analysis, the mean utilization rate for city screening mammography was 77.7 percent, with the highest utilization (82.7 percent) in the New England cities and the lowest (73.6 percent) in cities in the mountain states, a north-south corridor stretching from Montana, Idaho and Wyoming to Arizona and New Mexico.

“We found higher screening mammography utilization on the coasts in areas with higher levels of household income and insurance,” Dr. Kim said.

The study demonstrated a positive correlation between screening mammography utilization and use of preventive health screenings and with household income. Utilization was negatively correlated with obesity, poverty and a lack of insurance.

According to the researchers’ analysis, significant independent predictors of screening mammography utilization included Pap test compliance, being of Asian descent, having private insurance and geographic region of residency.

“Although the literature focuses on rural screening disparities, uptake varies at the city level throughout the country,” Dr. Kim said. “Identifying predictors of uptake may aid in targeting areas and populations for screening education and intervention.”

Next research steps for Dr. Kim include connecting city-level screening utilization with the incidence of breast cancer mortality.
Assessing the Clinical Impact of Second Opinion Radiology Consultation for Breast Cancer Patients

By Nick Klenkho

While many patients diagnosed with breast cancer seek an additional review and reinterpretation of their breast imaging studies from a specialized cancer center, second-opinion radiology review can be time-consuming, labor-intensive—and expensive. However, if a second opinion finding progresses from benign to malignant, it is generally accepted that the increased cost for further evaluation and management is both beneficial and warranted. As a result, most studies on the clinical impact of second-opinion radiology consultation for patients with breast cancer continue to support the use of second opinions in clinical management. That said, there is the lack of a gold standard assessing whether the first or second opinion is correct. During a Monday session, Debra Whorms, MD, a resident physician at Cambridge Health Alliance, Mass., shared results of her research examining the impact this can have on patient care.

Dr. Whorms’ research differs from prior studies in that her team assessed discrepancy using the American College for Radiology RADPEER™ scoring system. Discrepancy scores were assigned blindly by two breast imaging radiologists in consensus, with cases showing a moderate to major discrepancy being reviewed by medical and surgical oncologists for management changes.

“We think this approach offers a more accurate and comprehensive assessment of true discrepancy between radiology reads,” she said.

Based on this research, Dr. Whorms noted that not infrequently—16 percent of the time—there is a significant discrepancy between radiologists. Furthermore, this discrepancy resulted in a change in the surgical management plan for 7 percent of patients and the identification of malignancy in 4 percent.

“These findings highlight the variation or discrepancy between radiologists and the impact this can have on patient care,” Dr. Whorms said. “In general, our study supports a multi-disciplinary breast oncology program, with embedded formal breast imaging subspecialty second opinion consultation, for all patients referred with newly diagnosed breast cancer.” Nevertheless, Dr. Whorms noted several potential drawbacks, including a higher-than-usual rate of false positive reads as consulting radiologists have a heightened level of scrutiny given a cancer diagnoses. There is also a potential delay in treatment due to the need for additional diagnostic evaluation, which could increase costs. Further research is needed to help determine the implications of the service on time-to-treatment, long-term patient outcomes and health care costs.

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Dr. Whorms

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