MSAS32

Using Big Data to Improve Practice (Sponsored by the Associated Sciences Consortium)

AI

AMA PRA Category 1 Credit ™: 1.00

Participants
Rennie Mohabir, MBA,RT, Valley Stream, NY (*Moderator*) Nothing to Disclose

Sub-Events

MSAS32A Operational Dashboards in Radiology: Opportunities and Challenges

Participants
Joseph P. Erinjeri, MD,PhD, New York, NY (*Presenter*) Advisory Board, AstraZeneca PLC

MSAS32B Resource Optimization for Constrained Radiology Operations

Participants
Nick Kastango, New York, NY (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

MSAS33

Emerging Technology in Breast Imaging (Sponsored by the Associated Sciences Consortium)

BR MI

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Sabala Mandava, MD, Detroit, MI (*Moderator*) Nothing to Disclose
Patricia A. Miller, MD, Bingham Farms, MI (*Moderator*) Nothing to Disclose
Nancy McDonald, MS, Chicago, IL (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

patriciami@rad.hfh.edu

Sub-Events

MSAS33A F-18 Labeled Estrogen PET/CT: Maximizing Its Clinical Potential

Participants
Robert S. Bridwell, MD, MBA, Charles Town, WV (*Presenter*) Consultant

MSAS33B Molecular Breast Imaging: What Can It Do for Your Practice?

Participants
Carrie B. Hruska, PhD, Rochester, MN (*Presenter*) Institutional license agreement, CMR Naviscan Corporation

For information about this presentation, contact:

hruska.carrie@mayo.edu

LEARNING OBJECTIVES

1) Examine the current evidence of MBI's performance for diagnostic and screening indications. 2) Recognize the advantages and limitations of MBI relative to other breast imaging modalities. 3) Discuss future developments for MBI technology.

MSAS33C Molecular Breast Imaging: How We Do It

Participants
Lacey Ellingson, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Ellingson.lacey@mayo.edu

LEARNING OBJECTIVES

1) Describe a clinical protocol for obtaining high-quality, low-radiation dose MBI examinations. 2) Recognize potential problems and solutions for radiotracer injection, breast positioning, and image processing techquies. 3) Discuss the MBI patient's experience.

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

MSAS34

Understanding Radiology Group Consolidation: Strategic, Practical, and Legal Considerations (Sponsored by the Associated Sciences Consortium)

LM

AMA PRA Category 1 Credit ™: 1.00

Participants
Jennifer Kroken, MBA, Lewisville, TX (*Moderator*) Nothing to Disclose
Catherine Gunn, MBA,RT, Halifax, NS (*Moderator*) Nothing to Disclose
Wayne K. Baldwin, JD, Camarillo, CA (*Presenter*) CEO, Pueblo Radiology AssociatesCEO, California Managed Imaging Medical
William K. Davis JR, JD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

wbaldwin@puebloradiology.com

LEARNING OBJECTIVES

1) Understand the drivers in these deals, and the models that private equity and the strategic consolidators are using. 2) Think about and plan for things that groups should be doing now, even if they are not pursuing these deals. 3) Recognize things to consider before engaging in consolidation discussions both internally and with potential consolidators as part of the due diligence. 4) Issue spot the most significant group dynamics and legal and process hurdles before starting, and then during, a transaction. 5) Identify and understand the internal factors a group should think about when considering their future as an independent group or as part of a consolidation.

Printed on: 05/05/21

MSCA21

Case-based Review of the Abdomen: Part I

Tuesday, Dec. 1 3:30PM - 4:30PM Room: Channel 1

GI GU PD

AMA PRA Category 1 Credit ™: .75

Participants
Jorge A. Soto, MD, Boston, MA (*Moderator*) Royalties, Reed Elsevier

Sub-Events

MSCA21A Pediatric Abdomen Imaging

Participants
J. Damien Grattan-Smith, MBBS, Atlanta, GA (*Presenter*) Nothing to Disclose

MSCA21B Pancreatic Imaging

Participants
Jay P. Heiken, MD, Rochester, MN (*Presenter*) Patent agreement, Guerbet SA

MSCA21C Gastrointestinal Imaging

Participants
Frank H. Miller, MD, Chicago, IL (*Presenter*) Nothing to Disclose

MSCA21D Genitourinary Imaging

Participants
Khaled M. Elsayes, MD, Houston, TX (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

MSCA22

Case-based Review of the Abdomen: Part II

Saturday, Dec. 5 11:00AM - 12:00PM Room: Channel 1

ER GI OB

AMA PRA Category 1 Credit ™: .75

Participants
Jorge A. Soto, MD, Boston, MA (*Moderator*) Royalties, Reed Elsevier

Sub-Events

MSCA22A Women's Imaging

Participants
Marcia C. Javitt, MD, Haifa, Israel (*Presenter*) Spouse, Employee, NeuroRx

MSCA22B Pitfalls in Post-op Abdomen and Pelvis

Participants
Vincent M. Mellnick, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

MSCA22C Abdominopelvic Trauma Imaging

Participants
Jennifer W. Uyeda, MD, Somerville, MA (*Presenter*) Consultant, Allena Pharmaceuticals, Inc

For information about this presentation, contact:

juyeda@bwh.harvard.edu

MSCA22D Abdominopelvic Emergency Imaging

Participants
Christina A. LeBedis, MD, Newton, MA (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

MSCB51

Case-based Review of the Breast: Part I

Sunday, Nov. 29 5:00PM - 6:00PM Room: Channel 1

BR

AMA PRA Category 1 Credit ™: .75

Participants
Jiyon Lee, MD, Scarsdale, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

Jiyon.Lee@nyumc.org

LEARNING OBJECTIVES

1) Identify appropriate application of multi-modality breast imaging for routine screening, supplemental screening, and diagnostic indications. 2) Select appropriate methods for image-guided percutaneous biopsy and perform post-biopsy radiologic pathologic correlation for next management recommendation. 3) Review appropriateness criteria and performance benchmarks, and guidelines for ongoing breast imaging audits as they apply and are adapted around the world. 4) Appreciate the range of reassuringly common and sometimes not-so common among the international faculty's portrayal of their piece of the globe. 5) See how breast imaging tools and procedures are applied in a range of clinical experience; their clinical vignettes tell real stories to teach core radiology, while also celebrating achievements and conveying challenges.

ABSTRACT

Title: Managing expectations in breast imaging around the world. "Best" versus sufficient?Abstract:Our case-based review course will walk and skip through the fundamentals of breast imaging.We will present how we use mammography, ultrasound, MRI, and other modalities in daily screening and diagnostic scenarios, along with reminders of the overarching principles of BI-RADS lexicon for effective communication, and ACR appropriateness criteria and performance metrics as applicable or adapted around the world.Our international faculty (sessions 1 and 2) will also add depth, breadth, and the fun added dimensions of which and how breast imaging modalities and procedures are utilized around the world. Varying breast cancer statistics, possible innate ethnic variations, and differing cultural expectations and socioeconomic context can and do impact how we carry out our discretionary work.Such interesting details will inform the narrative of the speakers' clinical case scenarios, while the core diagnostic radiology skills aim to be constant, and teachable. The range of complexity of the clinical vignettes help demonstrate breast imaging now and evolving.Please join us for smart and enlightening fun!

Sub-Events

MSCB51A A Breast Imaging Waltz in Vienna

Participants
Paola Clauser, MD, Vienna, Austria (*Presenter*) Speaker, Siemens AG

For information about this presentation, contact:

paola.clauser@meduniwien.ac.at

LEARNING OBJECTIVES

1) Present the various imaging modalities currently available for breast cancer screening in Austria and consider their pros and cons, through the discussion of clinical cases. 2) Discuss various scenarios of women presenting with symptoms in the breast, and the best approach to the case. Discuss more common diagnosis and rare differential diagnosis that should be kept in mind. 3) Present the peculiarities of breast cancer diagnostics in Austria, and its similarities and differences with the rest of Europe. 4) Review appropriateness criteria and guidelines for breast imaging in the diagnosis and follow up of breast cancer in Europe.

ABSTRACT

Austria has a national breast cancer screening only since few years. Consequently, breast cancer awarness has rapidly increased since then. This awarness is, though, still very much heterogenous in the population. The capital city, Vienna, is multicultural, with many people coming from middle-east countries; as a consequence, breast radiologists are faced with a wide variety of clinical scenarios and pathologies, some of them not that common in other european Countries. Austria follows European guidelines and regulations, but there is a wider access to all breast imaging modalities. It is rather easy to get access to all the imaging modalities available, and examinations such as tomosynthesis and breast MRI are commonly used, even beyond current recommendations.

MSCB51B True 'Tales' of Breast Imaging in Malaysia

Participants
Evelyn Lai-Ming Ho, MBBS, MMed, Kuala Lumpur, Malaysia (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

evelyn.ho.laiming@ramsaysimedarbyhealth.com

LEARNING OBJECTIVES

1) Provide a brief epidemiology of breast cancer in Malaysia. 2) Learn how geographical, sociocultural factors and financial/resource

1) Provide a brief epidemiology of breast cancer in Malaysia. 2) Learn how geographical, sociocultural factors and financial/resource constraints including personal beliefs/preferences impact diagnosis and management. 3)The interactive case based review will take into consideration objective no. 2 and where applicable - when ideal has to be modified because of availability, accessibility, affordability and acceptability.

ABSTRACT

Title: True 'Tales' of Breast Imaging in Malaysia Malaysia is a multicultural, multiethnic, small, middle-income country in South East Asia. Breast cancer is the overall top cancer in Malaysia. Whilst early detection and optimal treatment for breast cancer and other breast conditions exist, the distribution of such services are in major cities especially on the west coast of Peninsula Malaysia, many centered around the capital of Kuala Lumpur. We have clinical practice guidelines for breast cancer management. There is no organized population based screening mammogram program but over the years, opportunistic screening has increased due to rising levels of awareness. Barriers to even diagnostic mammograms include perception of pain; radiation risks and that compression can spread cancer. Ultrasound is the most widely accepted imaging modality and therefore follow up compliance is relatively good, sometimes preferred over immediate biopsy of even BI-RADS 4 lesions. Women may refuse a mammogram, even when clinically indicated! Paradoxically, despite availability of MRI services in many major hospitals, specifically MRI breast is not widely available. MRI is also expensive and requires Gadolinium contrast media. Factors for late presentation include fatalism, ignorance, fear of cancer and belief in traditional therapies. Proliferative benign breast conditions are common. Our patients range from pre-pubertal to the elderly and males. In addition, women fall prey to unlicenced injection breast augmentation. All these add to colorful but challenging situations, YET provide opportunities to connect with and counsel patients. Dealing with personal beliefs and preferences despite standard of care recommendations is better than refusing them care at all and leaving them to their own devices. The spectrum of tales (clinical scenarios) will strive to illustrate the above. A handout is included for more in-depth information of the Malaysian scene.

MSCB51C Multimodal Approach to Breast Imaging: How It Works in Russia

Participants
Katerina A. Busko, St Petersburg, Russian Federation (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dr.katerinabusko@gmail.com

LEARNING OBJECTIVES

1) To get acquainted with the features of the healthcare system and training of doctors in Russia. 2) Learn how women with breast pathology are examined in our country. 3) Find out what are the differences between breast imaging in here and in the other countries. 4) See the clinical cases, with different diagnostic methods which are used in Russia.

ABSTRACT

Multimodality approach to Breast imaging. How it works in Russia. Katerina Busko Associate professor of Radiology N.N. Petrov National Medical Research Center of oncology Saint-Petersburg, Russia The Russian federation is the largest country in the world, occupying 1/8 of the land area. Population of 146 million (2019) (78 million female, 68 million male). The World Bank has classified it as a middle-income country. Overall life expectancy at birth is 72,60 years in 2019 (female 77,55; male 67,66 лет). There are more than 160 people living on the Russian Federation territory, in which the biggest one is Russian (111 millions of people or 77% of country's population). Tatar (5,5mln of people), Ukrainian (about 2mln of people), Bashkir, Chuvashi, Chechen and Armenian which numbered more than 1 mln of people. Homogenous nature of the population with predominance of Russian nationality is typical only for Central, Central-Chernosem and North-Western regions, whereas all other regions especially Northern Caucasus have mixed national composition of population. Russia is unique country according to the religion structure population: there are representatives of three world's religions - Christian, Islam and Buddhism. The biggest cities are Moscow (capital) - 8 millions of people and Saint Petersburg - 5 millions of people. Being the most important center of economics, transportation, culture and science Saint Petersburg is still the heart of Russian history. The North capital, the city of three revolutions, Cultural capital, Northern Palmira, the city am Neva river, Northern Venice, the city of white nights - this is hardly a complete list of unofficial names of Saint Petersburg. The public health care system (funded by general taxes) provides near universal healthcare coverage. Russia spent 7 % of GDP on Healthcare in 2019. There are some differences in training radiation diagnostic doctors between Russia and Europe and North America. After school (11 grades) graduation the future doctor should enter and graduate medical university (6 years). To get the sub-specialty it's necessary to go through residency (2 years). The main difference is in opportunity to make the choice between specialty of radiologist and the sonographer. Not all of the doctors have two specialty (Radiologist and Sonographer). Therefore, the realization of multimodal method of breast imaging is only possible in the lead national institutions, as a rule these are the scientific-research centers of Moscow and Saint Petersburg. And this poses the main problem. Generally, in Russia the patient is examined by three doctors: radiologist doctors which describes only mammogram, radiologist who describes only MRI and the doctor who perform ultrasound investigation. Too narrow specialization doesn't allow the doctors to see the full image of breast cancer diagnostics what sometimes could be the reasons of false positive and either false negative diagnoses. Widely used BI-RADS system became compulsory in Russia about 5 years ago. Due to this, fact the doctors of different specialties (radiologists, sonographers and oncologists) started to speak the same language. Stereotactic biopsy is performed by the radiologist in specialized oncological institutions. In the great majority of cases the core biopsy is performed by the oncologist under the ultrasound control or by the surgeon together co-working with sonographer. Furthermore, we don't have a clear separation of visualization a certain organ, it means that the diagnosis doctor works while general appointment, e.g. he could examine organs of pulmonary system, gastrointestinal tract and breast. There were about 35667 of doctors who worked in X-ray diagnosis department in 2016 representing 5% of total number of medical staff (16611of radiologists and 15083 sonographers specialists are among them) All the government health institutions in Russia are equipped with mammographs and US scanners. However, there is a place for a lack of profile specialists who do diagnostics only for breast. As a rule, MR tomography can be found only in big cities and not all of them are equipped with breast coil. According to statistics of 2016, in government health care institutions they found: 5014 US departments; 1520 mammographic screening cabinets, 465 MRI departments. Considering the fact that private clinics' go through active development in Russia now, so the amount of diagnostic machines has doubled [1]. In 2016 6,3 mln of mammograms were performed. Analyzing the MR researching structure we can find out that only 1% is accounted for breast imaging (about 8000) [1]. Leading localizations in the general structure of cancer morbidity are presented in: skin(12,6% with melanoma - 14,4%), breast (11,4%), trachea, bronchus and lungs (9,9%), colon (6,9%), prostate (6,8%), stomach (5,9%), rectum (5,0%) lymphatic and hematopoietic tissues (4,8%), corporis uteri (4,3%), kidney (3,9%), pancreas (3,1%), cervix uteri (2,8%), bladder (2,8%), ovary (2,3%). Breast cancer is presented as the main cancer-related pathology among female population of Russia, accounted about 21.1% among all female malignant tumors. The average age of patients with breast cancer diagnosed for the first time with malignant tumors in Russia in 2017 was 61,4 years old. Malignant tumors of breast have its peak of relative importance in a group age of 30-59 years old (16.1%) [2]. Prevalence rates of women breast cancer are increasing: from 42,7 per 100 hundred of people

in 2007 to 51,9 per 100 hundred people in 2017, the morbidity growth in a decade amounted to 22,68%. In 2007-2017 period there was also marked the mortality rate decrease caused by breast cancer to 17,73% - from 17,17 to 14,24 per 100 hundred of people. The proportion of sick people with tumor process I-II stage according to the number of sick people for the first time diagnosed with malignant tumor in 2017 amounted to 69,9%. There was also marked the decrease of number of mortality, among patients throughout the year form the diagnose fact of WBC: from 10,1% in 2007 to 6,0% in 2017. Percentage of women registered for 5 or more years in 2017 amounted to 60,4% [3,4]. In general, the morbidity valuation of breast cancer indicates that Russia applies to the countries of so called 'medium risk' zone - with lower rates than in European countries, North and South America; but higher than in Asian and African countries. In comparing the number of morbidity and mortality caused by breast cancer identified in our country to the similar rates in the certain regions in the world, the negative situation takes place [5,6]. According to the weak rates of morbidity the mortality rates are almost equal with ones in North and West Europe, North America and significantly higher than the world averages. Yearly about 23000 (22150 - 2018 year) of women are dying because of WBC in Russia. The raw rate per 100 000 of women accounts 27,9 0/0000, standard - 14,02 0/0000. Full number of morbidity of men caused by BC accounts 183 (0,26 0/000 - raw rates, 0,17 0/0000) in Russia [7,8]. Russia applies to countries without government screening support programs. Today's situation allows women (40-75 y.o.) to get the preventive mammography of both breasts in two projections with double check radiologist's reading biannually. The examination is free for women, which they can get after applying to the governmental health care establishment and produce the passport and compulsory health insurance [9]. Also, all women can visit private clinic and get MG, US and MRI examinations for a fee. The examination price is not so high and its available almost to all social groups. National Medical Research Center of oncology named after N. Petrov is one of the biggest federal scientific-treatment centers in Russia. It is based in Pesochniy village nearby St-Petersburg. Center was founded in 1927 by the founder of Russian oncology Nikolay Petrov. Today National Medical Research Center of oncology provides specialized and high-tech health care at a level of the world standards. In the Radiology department of Petrov's oncology center there are modern methods of breast imaging are used at present moment: Digital mammography, CESM, Ultrasound with elastography and contrast enhancement, MRI, ultrasound guided core biopsy, vacuum assisted biopsy. Women diagnosed with breast cancer get the positron emission mammography or scintimammography to measure the incidence and for marking the sentinel lymph node for women with (c)T1-2N0M0 stage. Pre-operative wire localization is performed for patient with nonpalpable breast lesions. Before the neoadjuvant chemotherapy the clips are installing under the US control what makes the searching for tumors bed after NAC easier. Our center is one of the first in Russia which started to use multimodality approach to breast imaging. Breast radiologist checks the mammography, MRI images and in case of identifying the pathology performs the ultrasound diagnostics with elastography, and if it's necessary ultrasound guided core biopsy can be performed by the same doctor. Also, the «Multidisciplinary Breast Cancer tumor boards» has its active developing in which masters of different specialties such as oncology, radiology and pathomorphology take part. List of reference:

1. Turin I. E. Radiation diagnostics in Russian Federation// Oncology journal; radiation diagnostics, radiation therapy.- 2019- T. 1. - №. 4. - C. 43-51. 2. DeVita Jr., Rosenberg S.A., Lawrence T.S. Cancer: Principles & Practice of Oncology. Tenth Edition // LWW. P. 2280. 3. Kaprin A.D., Starinsky V.V. Petrova G.V. Malignant tumors in Russia in 2017(morbidity and mortality). Moscow: MSRIO in the name of P.A. Gercen - FGBD NMRC branch of Ministry of health.2018 250 rub 4. Kaprin A.D., Starinsky V.V. Petrova G.V. Epy The condition of oncological support of people in Russia in 2017. Moscow. MSRIO in the name of P.A. Gercen - FGBD NMRC branch of Ministry of health.2018 236 rub. 5. Merbishvilli V.M. Medium-term variant projection of morbidity caused by malignant tumors in Russia// Siberian oncological journal. - 2019. - T. 18. - №. 4. 6. Ferlay J., Soerjomataram I., Ervik M., Dikshit R., Eser S., Mathers C., Rebelo M., Parkin DM, Forman D, Bray, F. GLOBOCAN 2012 v1.0, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11 [Internet]. Lyon, France: International Agency for Research on Cancer; 2013. http://globocan.iarc.fr. 7. Semiglazov V.F Recommendations for doctors for management of patients diagnosed with breast cancer// Magazine supplement 'Medical advice' - 2017. - T. 14. - C. 67. 8. Semiglazov V.F. and others. Epidemiology and screening of breast cancer// Questions in oncology. - 2017. - T. 63. - №. 3. - C. 375-384. 9. Kochergina N.V., Bludov A.B., Shchipakhina Y.A., Ivankina O.V., Karpova M.S., Kiselev I.L., Dolgushin B.I. NEW DIRECTIONS FOR IMPROVEMENT OF BREAST CANCER SCREENING. Journal of radiology and nuclear medicine. 2016;97(6):333-339. (In Russ.) https://doi.org/10.20862/0042-4676-2016-97-6-333-339

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MSCB52

Case-based Review of the Breast: Part II

Monday, Nov. 30 3:30PM - 4:30PM Room: Channel 1

BR

AMA PRA Category 1 Credit ™: .75

Participants
Jiyon Lee, MD, Scarsdale, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

Jiyon.Lee@nyumc.oorg

LEARNING OBJECTIVES

1) Identify appropriate application of multi-modality breast imaging for routine screening, supplemental screening, and diagnostic indications. 2) Select appropriate methods for image-guided percutaneous biopsy and perform post-biopsy radiologic pathologic correlation for next management recommendation. 3) Review appropriateness criteria and performance benchmarks, and guidelines for ongoing breast imaging audits as they apply and are adapted around the world. 4) Appreciate the range of reassuringly common and sometimes not-so common among the international faculty's portrayal of their piece of the globe. 5) See how breast imaging tools and procedures are applied in a range of clinical experience; their clinical vignettes tell real stories to teach core radiology, while also celebrating achievements and conveying challenges.

ABSTRACT

Title: Managing expectations in breast imaging around the world. "Best" versus sufficient?Abstract:Our case-based review course will walk and skip through the fundamentals of breast imaging.We will present how we use mammography, ultrasound, MRI, and other modalities in daily screening and diagnostic scenarios, along with reminders of the overarching principles of BI-RADS lexicon for effective communication, and ACR appropriateness criteria and performance metrics as applicable or adapted around the world.Our international faculty (sessions 1 and 2) will also add depth, breadth, and the fun added dimensions of which and how breast imaging modalities and procedures are utilized around the world. Varying breast cancer statistics, possible innate ethnic variations, and differing cultural expectations and socioeconomic context can and do impact how we carry out our discretionary work.Such interesting details will inform the narrative of the speakers' clinical case scenarios, while the core diagnostic radiology skills aim to be constant, and teachable. The range of complexity of the clinical vignettes help demonstrate breast imaging now and evolving.Please join us for smart and enlightening fun!

Sub-Events

MSCB52A Breast Imaging in Finland, the Land of a Thousand Lakes

Participants
Pieta Ipatti, MD, Oulu, Finland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn the spectrum of breast imaging in Finland. 2) Learn how breast cancer routine screening, supplemental screening and diagnostic breast imaging is performed in this Scandinavian country and appreciate its pros and cons. 3) Learn how different imaging modalities can be utilized in various clinical scenarios. 4) Select appropriate method for percutaneous imaging guided biopsy and perform post-biopsy radiologic pathologic correlation for management recommendation.

MSCB52B Breast Care in Egypt: From Pharaohs to Modern Breast Imaging

Participants
Rasha M. Kamal, MD, Cairo, Egypt (*Presenter*) Nothing to Disclose

MSCB52C Breast Imaging in Qatar Amidst Futuristic Skyscrapers in the Desert

Participants
Noor A. Al Khori, MD, Doha, Qatar (*Presenter*) Nothing to Disclose

MSCC31

Case-based Review of Nuclear Medicine: PET/CT Workshop-Head and Neck (In Conjunction with SNMMI)

CT HN NR NM

AMA PRA Category 1 Credit ™: 1.00

Participants
Katherine A. Zukotynski, MD, PhD, Hamilton, ON (*Moderator*) Nothing to Disclose

Sub-Events

MSCC31A Brain FDG and Amyloid PET/DAT Scans

Participants
Phillip H. Kuo, MD,PhD, Tucson, AZ (*Presenter*) Consultant, Novartis AGMedical Director, Konica Minolta, IncConsultant, Konica Minolta, IncConsultant, Bayer AGConsultant, Eisai Co, LtdSpeaker, Eisai Co, LtdConsultant, General Electric CompanySpeaker, General Electric CompanyGrant, General Electric CompanyGrant, Blue Earth Diagnostics Ltd

LEARNING OBJECTIVES

1) Apply a systematic approach to interpretation of PET imaging in dementia. 2) Explain the optimal performance and interpretation of dopamine transporter imaging. 3) Describe the complementary roles of amyloid, FDG and dopamine transporter imaging in the assessment of neurodegenerative diseases.

MSCC31B Neck

Participants
Rathan M. Subramaniam, MD,PhD, Dunedin, New Zealand (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review best clinical practices in Head and Neck PET/CT and case review.

MSCC32

Case-based Review of Nuclear Medicine: PET/CT Workshop-Chest (In Conjunction with SNMMI)

CH CT NM

AMA PRA Category 1 Credit ™: .50

Participants
Samuel E. Almodovar-Reteguis, MD, Orlando, FL (*Moderator*) Nothing to Disclose

Sub-Events

MSCC32A Lung Diseases

Participants
David M. Naeger, MD, Denver, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List the various guidelines used to determine follow up recommendations for pulmonary nodules. 2) Analyze clinical scenarios as to which nodule follow up guideline is most appropriate. 3) Describe how FDG PET can be used to guide pulmonary nodule management.

ABSTRACT

This review course lecture will guide radiologists in the imaging management of pulmonary nodules. We will review the various guidelines used to determine pulmonary nodule follow up and the clinical scenarios for when each is appropriate. Finally, we will review how FDG PET can be used to guide pulmonary nodule management

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MSCC33

Case-based Review of Nuclear Medicine: PET/CT Workshop-Abdomen/Pelvis & Pediatrics (In Conjunction with SNMMI)

Thursday, Dec. 3 8:30AM - 9:30AM Room: Channel 1

CT GI GU NM PD

AMA PRA Category 1 Credit ™: 1.00

Participants
Medhat M. Osman, MD, Saint Louis, MO (*Moderator*) Nothing to Disclose

Sub-Events

MSCC33A Adult Abdomen/Pelvis

Participants
Don C. Yoo, MD, Lexington, MA (*Presenter*) Consultant, inviCRO, LLC
Terence Z. Wong, MD, PhD, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

terence.wong@duke.edu

LEARNING OBJECTIVES

PET/CT imaging in the abdomen and pelvis can be challenging. We will review imaging techniques and present instructive cases which will help improve interpretation of PET/CT scans.

ABSTRACT

For oncologic studies, F18-FDG is an outstanding tracer with wide applications. However, there are many pitfalls which can make interpretation challenging. The purpose of this educational activity is to familiarize the audience with the normal biodistribution of FDG in the body and learn various pitfalls in the abdomen and pelvis that can occur when interpreting oncologic PET/CT scans.

MSCC33B Pediatrics

Participants
Helen R. Nadel, MD, Palo Alto, CA (*Presenter*) Consultant, ICON plc

LEARNING OBJECTIVES

1) Be able to identify indications for pediatric PET /CT or PET/MRI imaging. 2) Be familiar with protocols used for pediatric PET/MRI.

MSCC34

Case-based Review of Nuclear Medicine: PET/CT Workshop-Advances in PET (In Conjunction with SNMMI)

Friday, Dec. 4 3:30PM - 4:30PM Room: Channel 1

BQ CT NM

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Chadwick L. Wright, MD,PhD, Columbus, OH (*Moderator*) Nothing to Disclose

Sub-Events

MSCC34A Response Assessment

Participants
David A. Mankoff, MD, PhD, Philadelphia, PA (*Presenter*) Speaker, Koninklijke Philips NVAdvisory Board, RefleXion Medical IncConsultant, Blue Earth Diagnostics LtdResearch Funded, Siemens AGAdvisory Board, ImaginAb, IncSpouse, Owner, Trevarx

For information about this presentation, contact:

david.mankoff@uphs.upenn.edu

LEARNING OBJECTIVES

1) Discuss the application of PET as a cancer biomarker. 2) Provide an exmaple of an early repsonse biomarker. 3) Define integral versus integrated biomarkers.

ABSTRACT

This section will review the application of molecular imaging as a cancer biomakrer, with an emphasis on assessing repsonse. Examples of different types of markers and the distinction between integral and integrated biomakrers will be discussed. Examples from recent clinical trials and current clinical practice will be included.

MSCC34B Fluciclovine/PSMA PET Cases

Participants
Andrei Iagaru, MD, Stanford, CA (*Presenter*) Research Grant, General Electric CompanyResearch Grant, Progenics Pharmaceuticals, IncResearch Grant, Advanced Accelerator Applications SA

LEARNING OBJECTIVES

1) Understand the rational and complexity of imaging prostate cancer. 2) Describe different categories of imaging findings on prostate cancer. 3) Discuss the difference between Axumin and PSMA cases.

ABSTRACT

Although significant advances in primary definitive treatment of prostate cancer (PC) has improved the prognosis, recurrence of PC is still common, occurring in 20% to 40% of treated patients. 18F-Fluciclovine (18F-FACBC, anti-1-amino-3-18F-fluorocyclobutane-1-carboxylic acid, Axumin®) was approved by the US Food and Drug Administration (FDA) in 2016 and by the European Medicines Agency (EMA) in 2017 for use in BCR PC. Prospective trials reported that 18F-Fluciclovine avid lesions were detected in 57% of patients with BCR PC and 59% of them had a change in management after the scan. A recent update to the NCCN Guidelines® recommends that 18F-Fluciclovine PET be considered in the workup of patients with BCR PC. A growing number of studies in recent years have reported the superiority of PSMA-based PET to 18F-Fluciclovine PET. The advantage of PSMA-based PET stands out in the detection of lymph node metastases in patients with low PSA levels. 18F-Fluciclovine PET is non-inferior to PSMA PET in detecting distant metastases of patients with high PSA levels.Here we will review cases, including some who had both Axumin and PSMA PET.

MSCC34C Somatostatin Receptor PET Cases

Participants
Corina Millo, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

millocm@nih.gov

LEARNING OBJECTIVES

1) Evaluate applications of molecular imaging as a cancer biomarker. 2) Review clinical cases for which molecular imaging response approaches are applicable. 3) Discuss investigational agents being investigated for response assessment and early results.

ABSTRACT

This talk will review molecular imaigng approaches for cancer, considering molecular imaging as a cancer biomarker to guide

treatment decisions and evaluate therpaeutic repsonse. Examples form recent or ongoing multi-center trials will be presented as exmaples of possible future clinical role for molecular imaigng cancer biomarkers.

Printed on: 05/05/21

MSCM51

Case-based Review of Magnetic Resonance: Part I

Saturday, Dec. 5 3:30PM - 4:30PM Room: Channel 1

CH HN MR NR PD

AMA PRA Category 1 Credit ™: 1.00

Participants
Alexander R. Guimaraes, MD, PhD, Portland, OR (*Moderator*) Speakers Bureau, Siemens AGConsultant, Takeda Pharmaceutical Company LimitedConsultant, Merck & Co, IncConsultant, Agfa-Gevaert GroupConsultant, PAREXEL International Corporation

Sub-Events

MSCM51A MRI of the Pediatric Brain

Participants
William T. O'Brien Sr, DO, Cincinnati, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize patterns of neonatal hypoxic-ischemic injury (HII).2) Identify characteristic imaging findings of some of the more common metabolic brain disorders.3) Describe imaging features associated with neoplastic causes of epilepsy in children.

MSCM51B MRI of the Adult Brain

Participants
Pina C. Sanelli, MD,MPH, Manhasset, NY (*Presenter*) Research funding

MSCM51C MRI of the Spine

Participants
Pia C. Maly Sundgren, MD, PhD, Lund, Sweden (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Slottsgatan32

LEARNING OBJECTIVES

1) Know the MR imaging characteristics of common and uncommon spine lesions. 2) Have knowledge about common differential diagnosis based on imging findings and clinical information. 3) Know potential additional imaging that might help to improve final diagnsosis.

MSCM51D MRI of the Chest

Participants
Sanjeev Bhalla, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

MSCM52

Case-based Review of Magnetic Resonance: Part II

Friday, Dec. 4 5:00PM - 6:00PM Room: Channel 1

GI GU MR OB

AMA PRA Category 1 Credit ™: 1.00

Participants
Alexander R. Guimaraes, MD, PhD, Portland, OR (*Moderator*) Speakers Bureau, Siemens AGConsultant, Takeda Pharmaceutical Company LimitedConsultant, Merck & Co, IncConsultant, Agfa-Gevaert GroupConsultant, PAREXEL International Corporation

Sub-Events

MSCM52A MRI of the Liver

Participants
Takeshi Yokoo, MD, PhD, Dallas, TX (*Presenter*) Nothing to Disclose

MSCM52B MRI of the Kidney

Participants
Stuart G. Silverman, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSCM52C MRI of the Female Pelvis

Participants
Rahel A. Kubik-Huch, MD, Dattwil, Switzerland (*Presenter*) Nothing to Disclose

MSCM52D MRI of the Male Pelvis

Participants
Bryan R. Foster, MD, Portland, OR (*Presenter*) Consultant , BotImage Inc

LEARNING OBJECTIVES

1) Explore common and uncommon MRI diagnoses in the male pelvis. 2) Understand where MRI is helpful in the male pelvis beyond other modalities. 3) Be able to test your knowledge in real time with case based approach.

MSCN21

Case-based Review of Neuroradiology: Part I

Sunday, Nov. 29 3:30PM - 4:30PM Room: Channel 1

HN NR PD

AMA PRA Category 1 Credit ™: 1.00

Participants
Amy F. Juliano, MD, Boston, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Know the imaging characteristics of common and interesting neuroradiologic entities presented. 2) Know the differential diagnoses based on imaging findings, and at times clinical presentation and location. 3) Have had a chance to test their knowledge in real-time by seeing interesting cases presented as unknowns and answering questions from the speakers, followed by a concise and pertinent review of important points for each case.

Sub-Events

MSCN21A Introduction

Participants
Amy F. Juliano, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSCN21B Pediatric Brain 'Time to Brainstorm'

Participants
Thierry Huisman, MD, Houston, TX (*Presenter*) Nothing to Disclose

MSCN21C Pediatric Spine 'I Got Your Back, Let's Figure It Out'

Participants
Jehan Al-Rayahi, MD, Doha, Qatar (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jalrayahi@sidra.org

LEARNING OBJECTIVES

1) To describe the imaging appearance of various pediatric congenital and acquired spine pathologies. 2) To discuss the appropriate imaging protocol for pediatric spine pathologies. 3) To highlight specific imaging features that help narrow the differential diagnosis.

MSCN21D Pediatric Head and Neck 'Lumps That Go Bump in the Night'

Participants
Amy F. Juliano, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the imaging characteristics of common pediatric neck masses. 2) Know the differential diagnosis based on clinical presentation, location, and imaging findings. 3) Know the relative advantages and disadvantages of US, CT, and MRI when assessing pediatric neck masses.

MSCN21E Neuro Potpourri 'I'll Take $500 For: This Could Be Anything...'

Participants
Carlos H. Torres, MD,FRCPC, Ottawa, ON (*Presenter*) Nothing to Disclose

MSCN22

Case-based Review of Neuroradiology: Part II

Monday, Nov. 30 5:00PM - 6:00PM Room: Channel 1

HN NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Amy F. Juliano, MD, Boston, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Know the imaging characteristics of common and interesting neuroradiologic entities presented. 2) Know the differential diagnoses based on imaging findings, and at times clinical presentation and location. 3) Have had a chance to test their knowledge in real-time by seeing interesting cases presented as unknowns and answering questions from the speakers, followed by a concise and pertinent review of important points for each case.

Sub-Events

MSCN22A Introduction

Participants
Amy F. Juliano, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSCN22B Adult Brain 'I Think Neuron to Something'

Participants
Joshua P. Nickerson, MD, Lake Oswego, OR (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

nickerjo@ohsu.edu

LEARNING OBJECTIVES

1) Know the imaging characteristics of common and interesting neuroradiologic entities presented. 2) Know the differential diagnoses based on imaging findings, and at times clinical presentation and location. 3) Have had a chance to test their knowledge in real-time by seeing interesting cases presented as unknowns and answering questions from the speakers, followed by a concise and pertinent review of important points for each case.

MSCN22C Adult Spine 'Don't Worry, You're Gonna Be Just Spine'

Participants
Timothy J. Amrhein, MD, Durham, NC (*Presenter*) Nothing to Disclose

MSCN22D Adult Head and Neck 'What the Heck Is That Thing in the (Head and) Neck'

Participants
Christine M. Glastonbury, MBBS, San Francisco, CA (*Presenter*) Author with royalties, Reed Elsevier

For information about this presentation, contact:

christine.glastonbury@ucsf.edu

LEARNING OBJECTIVES

1) To review unusual head and neck masses while using a simplified system to determine a succinct imaging differential. 2) To understand the key imaging findings which refine a differential into benign and malignant neoplasitc, infectious and inflammatory entities. 3) To feel more confident with reading scans for neck masses and recognize and how cool H&N imaging really is.

MSCN22E Interventional 'Catheter to the Rescue: Solving CT and MR Conundrums'

Participants
James M. Milburn, MD, New Orleans, LA (*Presenter*) Speakers Bureau, Penumbra, IncConsultant, Stryker Corporation

LEARNING OBJECTIVES

1) Learn imaging appearances of multiple vascular conditions to help recognize them in practice.

MSCP41

Case-based Review of Pediatric Radiology: Part I

Tuesday, Dec. 1 10:00AM - 11:00AM Room: Channel 1

CH MK PD VA

AMA PRA Category 1 Credit ™: .75

Participants
Abbey Winant, MD, Boston, MA (*Moderator*) Spouse, Research Grant, Bristol-Myers Squibb CompanySpouse, Research Grant, Novartis AGSpouse, Research Consultant, Tango Therapeutics

Sub-Events

MSCP41A Pediatric Pulmonary Disorders

Participants
Abbey Winant, MD, Boston, MA (*Presenter*) Spouse, Research Grant, Bristol-Myers Squibb CompanySpouse, Research Grant, Novartis AGSpouse, Research Consultant, Tango Therapeutics

MSCP41B Pediatric Mediastinal Disorders

Participants
Bernard F. Laya, DO, Quezon City, Philippines (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Classify abnormalities depending on mediastinal compartment2. Discuss mediastinal disorders in a case-based format3. Identify the typical imaging manifestations of these mediastinal abnormalities4. Present a practical & systematic approach in the evaluation of these abnormalities

ABSTRACT

The mediastinum is located in the central chest between the right and the left pleural cavities and spans from the thoracic inlet to the diaphragm. It contains vital structures of the circulatory, respiratory, digestive, and nervous systems. The mediastinum is a common location for non-vascular masses in children. The non-vascular lesions include congenital malformations, infectious processes, as well as benign or malignant neoplasms.Medical imaging plays a vital role in detection, localization, characterization, and definition of extent of these lesions in aid of prompt and appropriate management. Imaging also helps in the assessment of complications, prognostication, and in imaging aided interventions. For this lecture, various imaging techniques for the evaluation of mediastinal lesions are presented. The wide spectrum of non-vascular lesions will be discussed, with descriptions of typical imaging manifestations and current management considerations. This lecture will also present a practical and systematic approach in the evaluation of these abnormalities.

MSCP41C Pediatric Vascular Disorders

Participants
Alison R. Hart, MD, East Greenwich , RI (*Presenter*) Nothing to Disclose

MSCP41D Pediatric Musculoskeletal Disorders

Participants
Apeksha Chaturvedi, MD, Rochester, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

apeksha_chaturvedi@urmc.rochester.edu

LEARNING OBJECTIVES

1) Review characteristic radiologic findings of common pediatric musculoskeletal entities. 2) Describe imaging work-up for each presented case. 3) Recognize developmental phenomena in pediatric musculoskeletal imaging.

MSCP42

Case-based Review of Pediatric Radiology: Part II

Wednesday, Dec. 2 5:00PM - 6:00PM Room: Channel 1

GI GU PD

AMA PRA Category 1 Credit ™: .75

Participants
Abbey Winant, MD, Boston, MA (*Moderator*) Spouse, Research Grant, Bristol-Myers Squibb CompanySpouse, Research Grant, Novartis AGSpouse, Research Consultant, Tango Therapeutics

Sub-Events

MSCP42A Pediatric Hepatobiliary Disorders

Participants
Adina L. Alazraki, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

MSCP42B Pediatric Renal Disorders

Participants
Pedro Daltro, MD, Rio de Janeiro, Brazil (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daltro.pedro@gmail.com

MSCP42C Pediatric Gastrointestinal Disorders

Participants
Domen Plut, MD, Ljubljana, Slovenia (*Presenter*) Nothing to Disclose

MSCP42D Pediatric Genital Disorders

Participants
Gary R. Schooler, MD, Dallas, TX (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

MSCS51

Case-based Review of Musculoskeletal Radiology: Part I

Tuesday, Dec. 1 8:30AM - 9:30AM Room: Channel 1

MK

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Stacy E. Smith, MD, Weston, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) InTo review the multimodality imaging features of MSK injuries, disease processes, or anomalies of the shoulder, knee, hand, wrist, foot and ankle.

ABSTRACT

1. Using a case based approach, the imaging characteristis, diagnosis, differential diagnosis, and pitfalls of a variety of MSK entities will be presented using multiple modalities within the following categories: shoulder, knee, hand and wrist, foot and ankle.

Sub-Events

MSCS51A Shoulder MSK Imaging

Participants
Laura W. Bancroft, MD, Venice, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

LauraBancroftMD@gmail.com

LEARNING OBJECTIVES

1) Review multimodality imaging features of a variety of shoulder pathologies, with an emphasis on osseous and soft tissue trauma.

MSCS51B Knee MSK Imaging

Participants
Jonathan A. Flug, MD, MBA, Phoenix, AZ (*Presenter*) Nothing to Disclose

MSCS51C Hand and Wrist MSK Imaging

Participants
Jenny T. Bencardino, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jenny.bencardino@pennmedicine.upenn.edu

LEARNING OBJECTIVES

1) Review the imaging presentation of injuries and disease processes affecting the ligaments, tendons, and osseous structures of the hand and wrist.

MSCS51D Foot and Ankle MSK Imaging

Participants
Hilary R. Umans, MD, Ardsley, NY (*Presenter*) Nothing to Disclose

MSCS52

Case-based Review of Musculoskeletal Radiology: Part II

Wednesday, Dec. 2 3:30PM - 4:30PM Room: Channel 1

MK

AMA PRA Category 1 Credit ™: .75

Participants
Stacy E. Smith, MD, Weston, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1. Review the multimodality imaging features of injuries, disease processes, and anomalies of the MSK system including soft tissue, bone, MSK intervention, the elite athlete, infection and inflammation using a case based approach.

ABSTRACT

1. Using a case based approach, the imaging characteristics, diagnosis, differential diagnosis, and pitfalls of a variety of MSK entities will be presented using multiple modallities within the following categories: soft tissue and bone disorders, MSK intervention, injuries in the elite athlete, and infection/inflammation of the MSK system.

Sub-Events

MSCS52A Soft Tissue and Bone MSK Imaging

Participants
Stacy E. Smith, MD, Weston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review multimodalitie iimaging features of a variety of soft tissue and bone pathologies or injuries, with differential diagnosis and pertinent clinical features.

MSCS52B Infectious and Inflammatory MSK Imaging

Participants
Hugue A. Ouellette, MD, Vancouver, BC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the imaging characteristics of infectious and inflammatory conditions affecting the musculoskeletal system using a case based approach.

ABSTRACT

Using a case based approach, the imaging characteristics on Radiography, CT, MR imaging and Ultrasound of a variety of infectious and inflammatory conditions that affect the musculoskeletal system will be discussed.

MSCS52C MSK Intervention

Participants
Glenn C. Gaviola, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Using an image-rich, case-based presentation: Review some common musculoskeletal image-guided interventions (with a focus on arthrography and biopsy); Recognize common pitfalls associated with these interventions; Understand the evolving controversies associated with these interventions

ABSTRACT

Recognize that a subcoracoid bursal injection could mimic a full-thickness rotator cuff tendon tear Consider myositis ossificans in the differential of a soft-tissue mass, especially prior to biopsy Discuss the biopsy approaches with your orthopedic oncologist and see if they agree with compartmental anatomy approaches

MSCS52D MSK Imaging of Pitfalls in the Elite Athlete

Participants
Clarissa Canella, MD, Rio De Janeiro, Brazil (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

clacanella@yahoo.com.br

LEARNING OBJECTIVES

1) Review and improve basic knowledge of musculoskeletal imaging pitfalls in Elite Athlete using a case based approach.

ABSTRACT

The use of conventional and advanced MRI sequences will be discussed in order to enhance clinical practice, as well as help the differential diagnosis of musculoskeletal lesions in Elite Athletes.

Printed on: 05/05/21

MSCT41

Case-based Review of Thoracic Radiology: Part I

Tuesday, Dec. 1 5:00PM - 6:00PM Room: Channel 1

CH PD

AMA PRA Category 1 Credit ™: 1.00

Participants
Andetta R. Hunsaker, MD, Boston, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

ahunsaker@bwh.harvard.edu

LEARNING OBJECTIVES

1) Discuss some of the most important diseases in the thorax including, mediastinal lesions, airways and interstitial lung diseases and lesions that are easily missed on chest radiographs. 2) Be more equipped to identify 'hiding' places of lung lesions and will have reasonable differentials for mediastinal, pleural and lung parenchymal diseases.

ABSTRACT

No abstract as there are 8 presenters who will submit their own objectives.

Sub-Events

MSCT41A Congenital Pediatric Thoracic Pathology

Participants
Edward Y. Lee, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Edward.Lee@childrens.harvard.edu

LEARNING OBJECTIVES

1) Learn characteristic imaging findings of thoracic disorders in the pediatric population.

MSCT41B Lung Infections: Pearls and Pitfalls

Participants
Kristopher W. Cummings, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cummings.kristopher@mayo.edu

LEARNING OBJECTIVES

1) List the most likely pulmonary infectious pathogen based on predominate radiographic pattern.

MSCT41C Many Faces of Thoracic Neoplasms

Participants
Ioannis Vlahos, MRCP,FRCR, Houston, TX (*Presenter*) Director, Grayscale LtdCo-owner, Grayscale Ltd

LEARNING OBJECTIVES

1) Provide an interactive case based discussion of the diagnosis and management of important and unusual manifestations of thoracic malignancy.

MSCT41D Hiding in Plain Sight: Lesions Missed on Chest Radiography

Participants
Andetta R. Hunsaker, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ahunsaker@bwh.harvard.edu

LEARNING OBJECTIVES

1) Have greater understanding of the locations that small and large lesions can go undetected on a chest radiograph. 2) Become more confident in interpreting chest radiographs.

ABSTRACT

Cases of lesions hiding behind the heart, behind the diaphragm, and upper paramediastinal regions are most easily missed. A healty

Cases of lesions hiding behind the heart, behind the diaphragm, and upper paramediastinal regions are most easily missed. A healty suspicion and search pattern as well as a knowledge of anatomy will help prevent these errots

Printed on: 05/05/21

MSCT42

Case-based Review of Thoracic Radiology: Part II

Wednesday, Dec. 2 8:30AM - 9:30AM Room: Channel 1

CH

AMA PRA Category 1 Credit ™: .75

Participants
Andetta R. Hunsaker, MD, Boston, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

ahunsaker@bwh.harvard.edu

LEARNING OBJECTIVES

1) Learn common and not so common manifestations of diseases in the chest including mediastinal, pleural, airways and lung parenchymal abnormalities equipping the learner to make great differentials in their readings. 2) Be provided with common locations for often missed lung lesions on dhest radiographs. 3) Be better able to confidently read Chest X-Rays.

ABSTRACT

NO abstract at this time as there are eight speakers in this session

Sub-Events

MSCT42A Imaging Exploration of Mediastinal Maze

Participants
Theresa C. McLoud, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSCT42B HRCT Micronodular Pattern: Guide for the Perplexed

Participants
Phillip M. Boiselle, MD, Boca Raton, FL (*Presenter*) Nothing to Disclose

MSCT42C Practical Approach to Large Airways

Participants
Philippe A. Grenier, MD, Saint Cloud, France (*Presenter*) Nothing to Disclose

MSCT42D Esophageal Lesions: Typical to Surprising Lesions

Participants
Diane C. Strollo, MD, Gibsonia, PA (*Presenter*) Nothing to Disclose

MSCU51

Case-based Review of Ultrasound: Part I

Saturday, Dec. 5 11:00AM - 12:00PM Room: Channel 2

GI SQ US

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Deborah J. Rubens, MD, Rochester, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

deborah_rubens@urmc.rochester.edu

LEARNING OBJECTIVES

1) Learn current techniques and advances in ultrasound imaging. 2) Become famliar with current guidelines for diagnosis and management of imaging findings. 3) Review critical physiology and pathology as it is depicted by ultrasound. 4) Understand the vital role of ultrasound imaging in optimum patient care.

ABSTRACT

This course is designed to highlight the vital role ultrasound plays in imaging and diagnosis throughout the body. Special emphasis will be placed on technical advances including ultrasound contrast, elastography and interventional guidance. A wide range of applications will be covered including vascular, general abdominal, pediatric, ob-gyn and small parts ultrasound. Attendees will have the opportunity to test their knowledge in real time as interesting unknown cases are presented in a question/answer format with topic review by the speakers Our goal is to provide a broad update in the field while addressing new opportunites and challenges for everyday practice.

Sub-Events

MSCU51A Abdomen Ultrasound

Participants
William D. Middleton, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

MSCU51B Ultrasound Elastography

Participants
Vito Cantisani, MD, Roma, Italy (*Presenter*) Speaker, Canon Medical Systems CorporationSpeaker, Bracco GroupSpeaker, Samsung Electronics Co, Ltd

For information about this presentation, contact:

vito.cantisani@uniroma1.it

LEARNING OBJECTIVES

To familiarise with main US-elastography principles, indications and limitations.To show typical and atypical cases in which US-elastography was useful.To sho tips and tricks for improving US-elastography in daily practice.

MSCU51C Small Body Part Ultrasound

Participants
Daniel C. Oppenheimer, MD, Rochester, NY (*Presenter*) Nothing to Disclose

MSCU51D Contrast Enhanced Ultrasound

Participants
Andrej Lyshchik, MD, PhD, Philadelphia, PA (*Presenter*) Royalties, Reed ElsevierSpeaker, General Electric CompanyConsultant, General Electric CompanyResearch support, General Electric Company Speaker, SonoScape Co, LtdConsultant, BioClinica, IncAdvisory Board, Bracco GroupResearch support, Bracco Group Research support, Canon Medical Systems CorporationResearch support, Siemens AG

MSCU52

Case-based Review of Ultrasound: Part II

Friday, Dec. 4 2:00PM - 3:00PM Room: Channel 1

GU IN OB PD US VA

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Deborah J. Rubens, MD, Rochester, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

deborah_rubens@urmc.rochester.edu

LEARNING OBJECTIVES

1) Learn current techniques and advances in ultrasound imaging. 2) Become familiar with current guidelines for diagnosis and management of imaging findings. 3) Review critical physiology and pathology as it is depicted by ultrasound. 4) Understand the vital role of ultrasound imaging in optimum patient care.

ABSTRACT

This course is designed to highlight the vital role ultrasound plays in imaging and diagnosis throughout the body. Special emphasis will be placed on technical advances including ultrasound contrast, elastography and interventional guidance. A wide range of applications will be covered including vascular, general abdominal, pediatric, ob-gyn and small parts ultrasound. Attendees will have the opportunity to test their knowledge in real time as interesting unknown cases are presented in question/answer format with topic review by the speakers. Our goal is to provide a broad update in the field while addressing new opportunites and challenges for everyday practice.

Sub-Events

MSCU52A Interventional Ultrasound

Participants
Jason M. Wagner, MD, Edmond, OK (*Presenter*) Nothing to Disclose

MSCU52B Pediatric Ultrasound

Participants
Nathan C. Hull, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hull.nathan@mayo.edu

MSCU52C OB and Gyn Ultrasound

Participants
Mindy M. Horrow, MD, Philadelphia, PA (*Presenter*) Spouse, Employee, Bristol-Myers Squibb Company

MSCU52D Vascular Ultrasound

Participants
Leslie M. Scoutt, MD, Essex, CT (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Shenzhen Mindray Bio-Medical Electronics Co, Ltd;

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Understand the role of ultrasound in the evaluation of current areas of interest in vascular pathology. 2) Discuss pitfalls in interpretation of vascular ultrasound.

MSCZ41

Case-based Review of CT: Part I

Thursday, Dec. 3 3:30PM - 4:30PM Room: Channel 1

CH CT ER NR

AMA PRA Category 1 Credit ™: .75

Participants
Edward Y. Lee, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

MSCZ41A Best in Show: Adult Neuro CT

Participants
Amish H. Doshi, MD, New York, NY (*Presenter*) Nothing to Disclose

MSCZ41B Best in Show: Adult Small Airway CT

Participants
Maria D. Martin, MD, Madison, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mmartin3@uwhealth.org

MSCZ41C Best in Show: Adult Hepatobiliary Tract CT

Participants
Perry J. Pickhardt, MD, Madison, WI (*Presenter*) Stockholder, SHINE Medical Technologies, Inc; Stockholder, Elucent Medical; Advisor, Bracco Group; Advisor, Zebra Medical Vision Ltd;

For information about this presentation, contact:

ppickhardt2@uwhealth.org

LEARNING OBJECTIVES

1) To demonstrate a series challenging CT-based hepatobiliary cases. 2) To review the relevant differential diagnosis for each case. 3) To briefly review the final diagnosis for each case, including appropriate patient management.

ABSTRACT

N/A

MSCZ41D Best in Show: Adult Emergency CT

Participants
Douglas S. Katz, MD, Mineola, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

douglasscottkatzmd@gmail.com

LEARNING OBJECTIVES

1) To demonstrate challenging cases of the acute abdomen and pelvis which presented on CT. 2) To review the diferential diagnosis, or the exact diagnosis if there is no differential, based on the CT findings. 3) To briefly discuss the current literature on these diagnoses, as well as appropriate patient management.

MSCZ42

Case-based Review of CT: Part II

Friday, Dec. 4 8:30AM - 9:30AM Room: Channel 1

CT ER GU MK PD

AMA PRA Category 1 Credit ™: .75

Participants
Edward Y. Lee, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

MSCZ42A Best in Show: Pediatric Body CT

Participants
Geetika Khanna, MD, MS, Clayton, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize common and uncommon causes of bowel obstruction in children. 2) Review unique causes of abdominal pain in children. 3) Understand the complementary role of CT and sonography in evaluation of acute abdomen in children.

MSCZ42B Best in Show: Adult Genitourinary CT

Participants
Deborah A. Baumgarten, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

baumgarten.deborah@mayo.edu

LEARNING OBJECTIVES

1) Become more familiar with the CT presentation of several common and uncommon genitourinary entities in the adult. 2) Be able to provide a reasonable differential diagnosis for these common and uncommon entities. 3) Increase confidence in using CT to diagnose pathology in the GU system in adults.

MSCZ42C Best in Show: Adult Musculoskeletal CT

Participants
Donna G. Blankenbaker, MD, Fitchburg, WI (*Presenter*) Consultant, Reed ElsevierRoyalties, Reed Elsevier

MSCZ42D Best in Show: Adult Trauma CT

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier

MSES31

Essentials of Non-interpretive Skills

Tuesday, Dec. 1 3:30PM - 4:30PM Room: Channel 3

IN LM

AMA PRA Category 1 Credit ™: 1.00

Participants
Diane C. Strollo, MD, Gibsonia, PA (*Moderator*) Nothing to Disclose

Sub-Events

MSES31A The Confidence Conundrum: Embracing Imperfection

Participants
Robert M. DeWitt, MD, APO, AE (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dewittsenior@gmail.com

LEARNING OBJECTIVES

1) Recognize the importance of having an accurate self-awareness of your strengths and weaknesses as a radiologist. 2) Learn to convey an accurate estimation of your confidence for a diagnosis in the report impression so that peer reviewers and referring providers will understand your expected probability of the diagnosis. 3) Describe features of effective peer review systems which encourage the disclosure of mistakes, communal learning and creation of a culture of trust. 4) List options to incentivize quality over productivity when the two principles conflict on difficult cases. 5) Recognize the potential future impact of the increasing application of artificial intelligence and computer learning algorithms in assisting with image interpretation before, during and after radiologist review.

ABSTRACT

This lecture addresses the role a radiologist's confidence may play in dictation style and how it may potentially impact the quality of patient care. The fictitious "always confident but not so always correct" radiologist versus the "timid but capable" radiologist who is so risk adverse that they are never technically wrong- but may not be clinically helpful. Is there a way to attain the coveted confidence-to-competence ratio of 1:1? Could effective peer review assist in this journey? Is it OK to make mistakes? What role do imperfect humans have in a future which will be increasingly dominated by artificial intelligence and computer deep learning algorithms?

MSES31B Opioid Use Disorder in Physicians

Participants
Omar Almusa, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

MSES31C How Generosity Can Enrich Your Career and Life

Participants
Richard B. Gunderman, MD, PhD, Indianapolis, IN (*Presenter*) Nothing to Disclose

MSES31D Maximizing Reading Efficiency and Accuracy through Intelligent Radiology Reporting

Participants
Eduardo J. Mortani Barbosa JR, MD, Philadelphia, PA (*Presenter*) Research Consultant, FluiddaResearch Grant, Siemens AG

LEARNING OBJECTIVES

1) To present different reporting strategies in Radiology, from narrative to fully structured reports, showcasing the advantages of intelligent, adaptive reporting. 2) To emphasize the key principles that should guide Radiology reporting: accuracy, clarity, consistency, and conciseness. 3) To highlight why and how structured reporting can improve the quality of Radiology reports due to better internal organization, streamlined communication, reduced errors and potential for increased efficiency, if designed and utilized thoughtfully. 4) To demonstrate practical examples of how to construct efficient, adaptable structured report templates for a variety of situations and examinations. 5) To discuss how intelligent structured reports can positively augment the impact of Radiology in patient care at the same time that it can enhance efficiency.

ABSTRACT

Traditional training in Radiology has focused on what to say when dictating reports, but not on how to construct better reports. This lecture intends to demonstrate why and how intelligent structured reports can increase the value of Radiology reports, emphasizing the principles of report template design, the evidence supporting implementation of structured reports, and how to design them to maximize accuracy, clarity, conciseness, while at the same time increasing efficiency. Intelligent, adaptable report templates can leverage patient specific information to cater the report information and presentation to the patient's needs, maximizing value. Finally, a practical framework will be offered on how to implement and utilize intelligent structured reports with the following goals: reducing errors, improving accuracy, fostering better communication and potentially increasing efficiency.

MSES32

Essentials of Chest Imaging

Monday, Nov. 30 3:30PM - 4:30PM Room: Channel 3

CH

AMA PRA Category 1 Credit ™: 1.00

Participants
Diane C. Strollo, MD, Gibsonia, PA (*Moderator*) Nothing to Disclose

Sub-Events

MSES32A Over-imaging and Over-diagnosis of Pulmonary Embolism: Why You Should Care

Participants
James G. Ravenel, MD, Mt Pleasant, SC (*Presenter*) Nothing to Disclose

MSES32B Vaping and Acute Inhalation Disorders

Participants
Timothy J. Mickus, MD, Pittsburgh, PA (*Presenter*) Consultant, Boehringer Ingelheim GmbH

For information about this presentation, contact:

timothy.mickus@ahn.org

LEARNING OBJECTIVES

1) Explain what vaping/e-cigarette use is, who is at risk, and substances used. 2) Describe imaging patterns of lung injury seen in electronic cigarette or vaping product use-associated lung injury (EVALI). 3) Understand the role of imaging and the radiologist in the diagnosis of EVALI.

MSES32C High Yield Signs in Thoracic Imaging

Participants
Scott A. Simpson, DO, Philadelphia, PA (*Presenter*) Nothing to Disclose

MSES32D Challenges in Uniform Application of TNM8 Staging

Participants
Ioannis Vlahos, MRCP,FRCR, Houston, TX (*Presenter*) Director, Grayscale LtdCo-owner, Grayscale Ltd

LEARNING OBJECTIVES

1) To understand the nuances of applying the current lung cancer staging system, including defined disease extent categorizations that are not widely appreciated or not found in summary documents of TNM staging. 2) To highlight areas of radiologist variability in TNM application and propose uniformity for situations not covered in TNM classification.

MSES33

Essentials of Breast Imaging

Wednesday, Dec. 2 8:30AM - 9:30AM Room: Channel 2

BR MR US

AMA PRA Category 1 Credit ™: 1.00

Participants
Ellen B. Mendelson, MD, Chicago, IL (*Moderator*) Speaker, Siemens AG; Advisory Board, Seno Medical Instruments, Inc; Advisory Board, Delphinus Medical Technologies, Inc; ; ;

Sub-Events

MSES33A Urgent and Emergent US-guided Breast Interventions

Participants
Ellen B. Mendelson, MD, Chicago, IL (*Presenter*) Speaker, Siemens AG; Advisory Board, Seno Medical Instruments, Inc; Advisory Board, Delphinus Medical Technologies, Inc; ; ;

For information about this presentation, contact:

e-mendelson@northwestern.edu

LEARNING OBJECTIVES

1) Identify breast lesions that may require emergent or urgent interventions. 2) Diagnose and manage puerperal mastitis and abscess. 3) Recognize non-puerperal fluid collections related to trauma or surgical procedures. 4) Describe US-guided methods for abscess drainage. 5) List some leave-me-alone lesions.

MSES33B Parenchymal Enhancement in Breast MRI-A Clue to Breast Cancer Risk

Participants
Stamatia V. Destounis, MD, Rochester, NY (*Presenter*) Advisory Committee, Hologic, IncMedical Advisory Board, iCad, Inc

MSES33C Personalized Breast Imaging-Art and Practice of Digital Decision Making

Participants
Marcia C. Javitt, MD, Haifa, Israel (*Presenter*) Spouse, Employee, NeuroRx

MSES33D Supplemental Breast Cancer Screening with Automated Ultrasound: Why and How?

Participants
Georgia G. Spear, MD, Park Ridge, IL (*Presenter*) Research Grant, General Electric CompanyScientific Advisory Board, Hologic, Inc

For information about this presentation, contact:

gspear@northshore.org

MSES34

Essentials of Neuro Imaging

Monday, Nov. 30 8:30AM - 9:30AM Room: Channel 2

HN NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Vikas Agarwal, MD, Pittsburgh, PA (*Moderator*) Nothing to Disclose

Sub-Events

MSES34A Spinal Infectious, Toxic and Metabolic Abnormalities

Participants
James Y. Chen, MD, San Diego, CA (*Presenter*) Nothing to Disclose

MSES34B Imaging of Cognitive Impairment

Participants
Sapna Rawal, MD, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sapna.rawal@uhn.ca

MSES34C The 'Found Down' Patient: The Value of Imaging

Participants
Suyash Mohan, MD, Philadelphia, PA (*Presenter*) Grant, NovoCure Ltd; Grant, Galileo CDS, Inc

For information about this presentation, contact:

suyash.mohan@pennmedicine.upenn.edu

LEARNING OBJECTIVES

1) Discuss differential diagnosis for a 'found down' patient. 2) Recognize conditions and imaging findings that will acutely change patient management in this clinical setting. 3) Identify situations where neuroimaging makes a difference.

ABSTRACT

There are a variety of conditions that can acutely kill a patient e.g., hypoxia, ischemic stroke, traumatic/non-traumatic hemomorrhage, cerebral herniation, acute hydrocephalus as well as a variety of toxic-metabolic encephalopathies. Any of these conditions can be present in a patient who is 'found-down'. Clinical assessment of these founddown patients becomes very limited as there is no available history and physical exam is either not possible, or extremely limited, thus management becomes very challenging. Neuroimaging plays a critical role in recognizing conditions and findings that can acutely change patient management. In this talk we will discuss the differential diagnosis of a found-down patient and rapidly identify actionable diagnoses and potentially reversible conditions which would otherwise be life threatening.

MSES34D Sinonasal Anatomy

Participants
Courtney M. Tomblinson, MD, Nashville, TN (*Presenter*) Nothing to Disclose

MSES41

Essentials of Cardiac Imaging

Saturday, Dec. 5 5:00PM - 6:00PM Room: Channel 1

CA CH CT MR SQ

AMA PRA Category 1 Credit ™: .75

Participants
Diane C. Strollo, MD, Gibsonia, PA (*Moderator*) Nothing to Disclose

Sub-Events

MSES41B Evaluating the Ventricles on Routine Chest CT

Participants
Curtis E. Green, MD, Burlington, VT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be able to recognize common problems with the cardiac ventricles that can be seen on routine chest CT scans.

ABSTRACT

This lecture will review the usefulness and limitations of routine chest CT scans in evaluating the cardiac ventricles including recognition of chamber enlargement and signs of prior myocardial infarction

MSES41C CT of Coronary Artery Anomalies

Participants
Jill E. Jacobs, MD, New York, NY (*Presenter*) Nothing to Disclose

MSES41D Cardiac MRI of Patients with Implantable Defibrillators: Safety and Image Quality

Participants
Isabel Oliva Cortopassi, MD, New Haven, CT (*Presenter*) Author, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

isabel.cortopassi@yale.edu

LEARNING OBJECTIVES

1. To review cardiac MR imaging in patients with cardiac implantable electronic devices (cIEDs)2. To understand the potential effects of MRI in cIEDs3. To recognize cIED related artifacts when performing cardiac MRI4. To review strategies to minimize cIED related artifacts when performing cardiac MRI

ABSTRACT

See email from Dr Strollo

Printed on: 05/05/21

MSES42

Essentials of Genitourinary Imaging

Friday, Dec. 4 5:00PM - 6:00PM Room: Channel 2

ER GU OB US

AMA PRA Category 1 Credit ™: 1.00

Participants
Katherine M. Richman, MD, San Diego, CA (*Moderator*) Nothing to Disclose

Sub-Events

MSES42A Time is Short: Gynecologic Emergencies

Participants
Katherine M. Richman, MD, San Diego, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kmrichman@ucsd.edu

LEARNING OBJECTIVES

1) Identify adnexal causes of pain, including torsion, infection, and cancer. 2) Identify uterine cause of pain and bleeding, including hematometros, endometritis, and endometrial cancer. 3) Identify mimickers of gynecologic pain, including small bowel obstruction, intraperitoneal bleeding, and retroperitoneal bleeding.

ABSTRACT

We will discuss adnexal and uterine causes of pain and bleeding, as well as non gynecologic mimickers.

MSES42C Essentials for First Trimester US Diagnoses

Participants
Oksana H. Baltarowich, MD, Huntingdon Vy, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain features of a normal first trimester ultrasound and the definitive and suggestive features of an abnomal one.

ABSTRACT

The ultrasound appearance of a normal first trimester pregnancy will be discussed. The definite ultrasound signs and the suggestive signs of early pregnancy failure will be analyzed.

MSES42D Second and Third Trimester OB Emergencies

Participants
Roya Sohaey, MD, Portland, OR (*Presenter*) Author, Reed Elsevier

LEARNING OBJECTIVES

Accurately identify placental pathology that can lead to significant morbidity to the patient and fetus by developing a high index of suspicioun for these diagnoses and using appropriate imaging tools such as transvaginal ultrasound, Doppler ultrasound, and MR when indicated. Develop strategies for maternal imaging for non-obstetrical emergencies with sensitivity towards imaging safety and use of MR for maternal abdominal imaging.

ABSTRACT

Emergencies in the second and third trimester that threaten the patient and fetus will be discussed in two categories. First, placental 'don't miss' diagnoses such as abruption, previa, vasa previa, and placenta accreta will be reviewed with emphasis on how to make an accurate diagnosis. Next, non-obstetric emergencies which also threaten the patient and fetus, such as trauma, pulmonary embolism, and renal colic will be discussed with emphasis on the safety of imaging in pregnancy and the use of MR for maternal abdominal pathology.

MSES43

Essentials of Musculoskeletal Imaging

Thursday, Dec. 3 5:00PM - 6:00PM Room: Channel 1

HN MK MR NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Diane C. Strollo, MD, Gibsonia, PA (*Moderator*) Nothing to Disclose

Sub-Events

MSES43A Degenerative and Inflammatory Disorders of the Vertebral Column

Participants
Donald L. Resnick, MD, San Diego, CA (*Presenter*) Nothing to Disclose

MSES43B Essentials of Wrist MRI

Participants
Maha Torabi, MD, Winston Salem, NC (*Presenter*) Nothing to Disclose

MSES43C Blunt and Penetrating Neck Injuries

Participants
Matthew S. Parsons, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

parsonsms@wustl.edu

LEARNING OBJECTIVES

1) Develop an understanding of relevant anatomy for traumatic neck injuries. 2) Appreciate how the management of penetrating trauma has evolved through history. 3) Review the Denver Injury Grading Scale used in blunt cerebrovascular injuries. 4) Recognize some common imaging signs of aerodigestive trauma.

MSES43D Metabolic Disease of Bone

Participants
Leon Lenchik, MD, Winston-salem, NC (*Presenter*) Nothing to Disclose

MSES44

Essentials of Pediatric Imaging

Sunday, Nov. 29 8:30AM - 9:30AM Room: Channel 2

CH GI HN MK NR PD

AMA PRA Category 1 Credit ™: 1.00

Participants
Edward Y. Lee, MD, Boston, MA (*Moderator*) Nothing to Disclose

Sub-Events

MSES44A Pediatric Chest Essentials: Private Tour

Participants
Edward Y. Lee, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSES44B Pediatric Abdominal Essentials: Cubes and Tubes

Participants
Tracy N. Kilborn, MBChB, Cape Town, South Africa (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

tracykilborn@gmail.com

LEARNING OBJECTIVES

1) Learn a systematic approach to neonatal and pediatric abdominal radiographs. 2) Know the indications for Ultrasound, Fluoroscopy, CT and MRI in neonatal and pediatric patients and how best to perform them. 3) Be shown the essential 'not to be missed' conditions in the pediatric abdomen.

ABSTRACT

A systematic approach to the abdominal radiograph by looking for 'cubes & tubes', 'stones, bones, gases, masses' guides in making a diagnosis and in suggesting further imaging that may assist. The case-based lecture will cover the main not be missed conditions in the neonatal and pediatric abdomen by also looking at the characteristic ultrasound and cross-sectional imaging findings, with tips on when and how these studies are best performed. Congenital, neoplastic and infectious/ inflammatory conditions will be covered with a special focus on abdominal infections that are uncommon in high income countries resulting in delayed diagnosis.

MSES44C Pediatric Musculoskeletal Essentials: Things You Don't Want to Miss

Participants
Ricardo Restrepo, MD, Miami, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn how to approach radiographs of the elbow in pediatric patients including the normal development of the ossification centers and pattern recognition of the most common elbow injuries. 2) Learn pattern recognition on different imaging modalities of the pelvis and hips in pediatric patients and become familiar with the most common pathologies affecting the hips at different ages in childhood. 3) Learn pattern recognition on different imaging modalities of the knee in pediatric patients and become familiar with the most common pathologies affecting the knee at different ages in childhood.

ABSTRACT

First I will discuss and show examples of the normal appearance of the immature skeleton focusing in the elbow, hip and knee and normal appearance of the skeleton in childhood. In the elbow, I will discuss the development of the ossification centers and will discuss the approach to diagnose the most common injuries. In the hip and knee, I will discuss and show examples of the most common pathologies according to the age and the imaging modality of choice to diagnose it.

MSES44D Pediatric Head and Neck: Top 'Must Know' Diagnoses

Participants
Manohar M. Shroff, MD, Toronto, ON (*Presenter*) Nothing to Disclose

MSES51

Essentials of Emergency Radiology Imaging

Wednesday, Dec. 2 3:30PM - 4:30PM Room: Channel 2

CT ER GI IR VA

AMA PRA Category 1 Credit ™: 1.00

Participants
Matthew T. Heller, MD, Phoenix, AZ (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Summarize the imaging findings in trauma.

ABSTRACT

In this session, the imaging findings in trauma and their role in management will be discussed.

Sub-Events

MSES51A CT of Abdominal Trauma

Participants
Matthew T. Heller, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review and summarize CT findings in abdominal trauma.

ABSTRACT

In this session, we will review and summarize the CT findings of abdominal trauma and their role in patient management.

MSES51B Emergent Imaging of Patients with Acute Neurological Presentations

Participants
Mark E. Mullins, MD,PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

MSES51C Interventional Radiology in Vascular Trauma

Participants
Guillermo Elizondo-Riojas, MD, PhD, Monterrey, Mexico (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

elizondoguillermo@hotmail.com

LEARNING OBJECTIVES

1) To understand the role of imaging in vascular trauma. 2) To describe the different interventional radiology techniques that can be used to treat patients with vascular trauma.

ABSTRACT

Computed tomography angiography (CTA) is the main imaging modality for the diagnosis of the different conditions that cause vascular trauma.Angiography is the main imaging method to guide therapeutic procedures.

MSES51D CT of Cardiothoracic Trauma

Participants
Lamia G. Jamjoom, MD, Jeddah, Saudi Arabia (*Presenter*) Nothing to Disclose

MSES52

Essentials of GI Imaging

Saturday, Dec. 5 8:30AM - 9:30AM Room: Channel 2

GI

AMA PRA Category 1 Credit ™: 1.00

Participants
Giuseppe Brancatelli, MD, Palermo, Italy (*Moderator*) Speaker, Bayer AG Travel support, Bracco Group

Sub-Events

MSES52A Diagnosis and Management of GI Bleeding

Participants
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSES52B Focal Liver Lesions in Non-cirrhotic Patients

Participants
Daniele Marin, MD, Cary, NC (*Presenter*) Research support, General Electric Company

MSES52C MRI of the Upper Abdomen: Optimization of the Protocols

Participants
Yves M. Menu, MD, Paris, France (*Presenter*) Research Consultant, Bristol-Myers Squibb Company

For information about this presentation, contact:

yves.menu@aphp.fr

LEARNING OBJECTIVES

1) To understand why prepration is essential and improves quality. 2) To learn about the various sequences that could be useful for routine abdominal MRI. 3) To understand why each sequence is necessary or useless to reach the expected diagnosis, according to the clinical situation. 4) To appraise the technical developments that might improve image quality or optimize examination time.

ABSTRACT

Abdominal MRI is routinely used for detection, characterization or staging of various diseases of the liver, biliary tract and pancreas. However, Examination time and patient cooperation are important issues. Patient cooperation is essential and requires specific preparation, especially for breathhold acquisitions. Examination time is related to the number of acquisitions.T1 and T2 weighted sequences are necessary, as well as Diffusion weighted imaging in most cases. Optional sequences includes extra cellular Gadolinium chelate injection, use of liver specific contrast media and cholangio- and pancreatography. According to the clinical questions, the protocol can be tailored however it should not be entirely different for every patient. In this presentation, we will address the most common MRI protocols, as well as some siutations where the examination can be shortened without any compromise on quality.

MSES52D Imaging of Colon: Beyond Cancer and Polyps

Participants
Andrea Laghi, MD, Rome, Italy (*Presenter*) Speaker, General Electric CompanySpeaker, Guerbet SASpeaker, Bayer AGSpeaker, Bracco GroupSpeaker, Merck & Co, Inc

MSMC21

Cardiac CT Mentored Case Review: Part I (In Conjunction with the North American Society for Cardiovascular Imaging)

Sunday, Nov. 29 10:00AM - 11:00AM Room: Channel 1

CA CT

AMA PRA Category 1 Credit ™: 1.00

Participants
Diana Litmanovich, MD, Boston, MA (*Moderator*) Nothing to Disclose
Jill E. Jacobs, MD, New York, NY (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

dlitmano@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Know the imaging characteristics of common and interesting cardiac entities presented. 2) Know the differential diagnoses based on imaging findings, and at times clinical presentation and location. 3) Have had a chance to test their knowledge in real-time by seeing interesting cases presented as unknowns and answering questions from the speakers, followed by a concise and pertinent review of important points for each case.

Sub-Events

MSMC21A Normal Coronary Anatomy

Participants
Karen G. Ordovas, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe the most common coronary anatomy. 2) To list the most common coronary artery anatomy variants.

ABSTRACT

In this lecture, attendees will be able to review the most common coronary anatomy pattern and variants, and will learn how to identify origin and course of the vessels on coronary CT studies.

MSMC21B Benign and Malignant Coronary Arteries Anomalies

Participants
Prachi P. Agarwal, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

MSMC21C Non-atherosclerotic Coronary Artery Disease

Participants
Carole A. Ridge, MD, London, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the aetiology of non-atherosclerotic lesions of the coronary arteries. 2) To understand the imaging features of coronary artery dissection, fibromuscular dysplasia, aneurysm, and vasculitis. 3) To consider the appropriate imaging modalities for the diagnosis and surveillance of non atherosclerotic coronary artery disease.

ABSTRACT

This mentored review of cardiac CT of non-atherosclerotic contrary lesions will help the attendee understand the etiologic, clinical and imaging features of coronary artery dissection, fibromuscular dysplasia, aneurysm and vasculitis.

MSMC22

Cardiac CT Mentored Case Review: Part II (In Conjunction with the North American Society for Cardiovascular Imaging)

Monday, Nov. 30 10:00AM - 11:00AM Room: Channel 1

CA CT

AMA PRA Category 1 Credit ™: .50

Participants
Diana Litmanovich, MD, Boston, MA (*Moderator*) Nothing to Disclose
Jacobo Kirsch, MD, Weston, FL (*Moderator*) Medical Advisor, Zebra Medical Vision Ltd

For information about this presentation, contact:

dlitmano@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Identify cardiac and coronary artery anatomy. 2) Recognize cardiac disease processes, including coronary atherosclerosis, as diagnosed on CT. 3) Understand methods of cardiac CT and coronary CT angiography post-processing.

Sub-Events

MSMC22A Coronary Atherosclerosis I

Participants
Geoffrey D. Rubin, MD, Tucson, AZ (*Presenter*) Consultant, Fovia, IncAdvisor, HeartFlow, IncAdvisor, Boehringer Ingelheim GmbHAdvisor, Nano-X Imaging

MSMC22C Valves and Cardiac Function

Participants
Suhny Abbara, MD, Dallas, TX (*Presenter*) Royalties, Reed Elsevier; ;

MSMC23

Cardiac CT Mentored Case Review: Part III (In Conjunction with the North American Society for Cardiovascular Imaging)

CA CT

AMA PRA Category 1 Credit ™: 1.00

Participants
Diana Litmanovich, MD, Boston, MA (*Moderator*) Nothing to Disclose
Cristina Fuss, MD, Portland, OR (*Moderator*) Spouse, Officer, ViewRay, Inc

LEARNING OBJECTIVES

1) Identify cardiac and coronary artery anatomy. 2) Recognize cardiac disease processes, including coronary atherosclerosis, as diagnosed on CT. 3) Understand methods of cardiac CT and coronary CT angiography post-processing. 4) Understand the role of coronary artery calcium scoring. 5) Understand the role of Cardiac CTA in coronary artery pathologies including aneurysms, fistulae and other anomalies.

Sub-Events

MSMC23A Pulmonary Veins and Pericardial Diseases

Participants
Carole J. Dennie, MD, Ottawa, ON (*Presenter*) Nothing to Disclose

MSMC23B Coronary Artery Atherosclerosis III

Participants
U. Joseph Schoepf, MD, Charleston, SC (*Presenter*) Research Grant, Astellas Group Research Grant, Bayer AG Research Grant, Bracco Group Research Grant, Siemens AG Research Grant, Heartflow, Inc Research support, Bayer AG Consultant, Elucid BioImaging Inc Research Grant, Guerbet SA Consultant, HeartFlow, Inc Consultant, Bayer AG Consultant, Siemens AG

MSMC23C Pre- and Post Trans-catheter Valve Replacement Imaging

Participants
Amar B. Shah, MD, New York, NY (*Presenter*) Nothing to Disclose

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

MSMC24

Cardiac CT Mentored Case Review: Part IV (In Conjunction with the North American Society for Cardiovascular Imaging)

CA CT

AMA PRA Category 1 Credit ™: 1.00

Participants
Diana Litmanovich, MD, Boston, MA (*Moderator*) Nothing to Disclose
Phillip M. Young, MD, Rochester, MN (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the clinical indications for retrospective ECG gated cardiac CT. 2) Illustrate methods to assess myocardial function from cine cardiac CT images. 3) Illustrate methods to assess normal and abnormal valvular function from cine cardiac CT images.

Sub-Events

MSMC24A Congenital Heart Disease

Participants
Linda B. Haramati, MD, MS, New Rochelle, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To recognize complex congenital heart disease on chest CT scans performed for other indications. 2) To tailor cardiac CT protocols and reconstructions to answer specific clinical questions for patients with treated congenital heart disease. 3) To provide information that guides therapy related to longstanding complications of congenital heart disease and its treatment.

ABSTRACT

Adults with congenital heart disease (CHD) now outnumber children with CHD two to one. Thisphenomenon is due to the success of surgical palliation and medical management of patients with even themost severe forms of CHD. Surgical intervention is often performed at the time of diagnosis and in patientswith residual hemodynamic lesions is often required throughout life.Though echocardiography is typically the initial imaging modality of choice, diagnosis and imagingsurveillance of complex hemodynamic and anatomic CHD lesions is now most often accomplished with CTand MR. CT and CTA imaging techniques may be used to show detailed anatomic and functional images ofthe heart, postoperative changes and long term consequences of CHD.An organized, reproducible approach to identify cardiac anatomy of CHD lesions and surgical palliationshould be adopted in order to accurately and thoroughly describe findings.

MSMC24B Left Atrial Pre- and Post Ablation Imaging

Participants
Phillip M. Young, MD, Rochester, MN (*Presenter*) Nothing to Disclose

MSMC24C Coronary Artery Disease and Incidental Non-cardiac Findings

Participants
Diana Litmanovich, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognizing non-cardiac and non-coronary anatomic structures that can be seen on cardiac CT. 2) Become familiar with possible non-cardiac and non-coronary pathological findings that could be seen on cardiac CT. 3) Review the suggested work-up for patients with incidentally found non-cardiac and non-coronary pathologies on cardiac CTA.

ABSTRACT

ABSTRACTCardiac CT often includes information about surrounding structures such as lungs, meidastinum, airways, pleura, liver and bones. To accurately interpret the scan and not to overlook the possible non-cardiac pathologies, familiarity with potential incidental findings is required. Clinical importance and severity of incidental findings varies, thus currently existing algorithms for incidental findings on cardiac CT are helpful for further work-up.

MSMC24D Mixed Case-review Summary

Participants
Daniel Vargas, MD, Denver, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daniel.vargas@cuanschutz.edu

MSQI31

Quality Improvement Symposium: High Functioning Interventional Radiology Teams

IR SQ

AMA PRA Category 1 Credit ™: 1.00

Participants
Bettina Siewert, MD, Brookline, MA (*Presenter*) Editor, Wolters Kluwer nvReviewer, Wolters Kluwer nv

Sub-Events

MSQI31A The Importance of High Functioning Teams

Participants
Bettina Siewert, MD, Brookline, MA (*Presenter*) Editor, Wolters Kluwer nvReviewer, Wolters Kluwer nv

MSQI31B New Skill Sets for Leaders of High Functioning Teams

Participants
David B. Larson, MD, MBA, Portola Valley, CA (*Presenter*) Grant, Siemens AG Grant, Koninklijke Philips NV

MSQI31C Communication Within High Functioning Teams: From Team STEPPS to WhatsApp

Participants
Amber L. Liles, MD , Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

aliles@med.umich.edu

LEARNING OBJECTIVES

1) Describe and compare a variety of communication tools available to health care teams. 2) Discuss current privacy and security concerns (i.e. HIPAA) regarding communication in health care teams. 3) Assess and apply most effective communication tool(s) for a given team setting/circumstance.

MSQI31D Building Frontline Problem Solvers

Participants
Marta E. Heilbrun, MD,MS, Atlanta, GA (*Presenter*) Nothing to Disclose

MSQI31E Closing the Loop on Biopsy Results: Role of the Radiologist

Participants
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSQI32

Quality Improvement Symposium: High Functioning Diagnostic Radiology Teams

AI PR SQ

AMA PRA Category 1 Credit ™: 1.00

Participants
Neville Irani, MD, Stilwell, KS (*Moderator*) Nothing to Disclose

Sub-Events

MSQI32A Making Virtual Teams Work

Participants
Nadja Kadom, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

MSQI32B Making AI Part of Your Team

Participants
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed ElsevierGrant, Guerbet SAConsultant, Anderson Publishing, LtdAdvisory Board, IBM CorporationAdvisory Board, KLAS Enterprises LLC

MSQI32C Stepping Outside of the Reading Room

Participants
Jennifer L. Kemp, MD, Denver, CO (*Presenter*) Nothing to Disclose

MSQI32D The Business Case for Teamwork

Participants
Ben C. Wandtke, MD,MS, Rochester, NY (*Presenter*) Nothing to Disclose

MSQI33

Quality Improvement Symposium: High Functioning Multidisciplinary Teams-Role and Value of the Radiologist

PR SQ

AMA PRA Category 1 Credit ™: .75

Participants
Jonathan A. Flug, MD, MBA, Phoenix, AZ (*Presenter*) Nothing to Disclose

Sub-Events

MSQI33A Patient and Family: Partners in High Functioning Teams

Participants
Hanna M. Zafar, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

MSQI33B Tumor Board and Multidisciplinary Clinic

Participants
Ashley H. Aiken, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

MSQI33C The Radiology Consult: Virtual or Integrated

Participants
Andrew B. Rosenkrantz, MD, New York, NY (*Presenter*) Nothing to Disclose

MSQI33D High Functioning Multi-Disciplinary Teams in Trauma and Stroke

Participants
James V. Rawson, MD, Boston, MA (*Presenter*) Nothing to Disclose

MSQI33E The Social and Technical Domains of Culture as They Pertain to Teams

Participants
Lane F. Donnelly, MD, Woodside, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the contributions of both the technical domain (tasks and processes) and the social domain (relationships that make work effecient and effective) to creating a culture condusive to improvement work.

ABSTRACT

Related to the degree of complexity, accelerating improvement in healthcare can be challenging. We categorize the areas needed to create a culture of improvement into a technical and social domain. The technical domain focuses on the tasks and processes created to get the work done. The social domain focuses on the relationships needed to do that work efficiently and effectively. These domains are profoundly intertwined - with each effecting the other. In order to accelerate healthcare improvement, focus must be given to both the technical and social domains.

MSRO21

BOOST: Head and Neck-Anatomy and Treatment Planning

HN NR RO

Participants
Suresh K. Mukherji, MD, Carmel, IN (*DPS Upload*) Nothing to Disclose

Sub-Events

MSRO21A Lymph Nodes

Participants
Suresh K. Mukherji, MD, Carmel, IN (*Presenter*) Nothing to Disclose
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Consultant, Nanobiotix

LEARNING OBJECTIVES

1) Review the normal anatomy of the lymph nodes. 2) Discuss the lymph node levels. 3) Explain the concept of primary eschelon drainage pathways.

ABSTRACT

The intent of this presentation will be to review the lymph nodes of the head and neck. This presentation will review the normal anatomy of the lymph nodes of the head and neck and describe important anatomic landmarks to help separate the different lymph nodes. The presentation will also review the diagnostic criteria for metastatic lymph nodes. The audience will benefit by having a better understanding of head and neck lymph nodes and how to assess these lymph nodes for the presence of metastases.

MSRO21B Brachial Plexus

Participants
Suresh K. Mukherji, MD, Carmel, IN (*Presenter*) Nothing to Disclose
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Consultant, Nanobiotix

LEARNING OBJECTIVES

1) Review the normal anatomy of the brachial plexus. 2) Describe common tumors that involve the brachial plexus. 3) Review the post-radiation therapy appearance of the brachial plexus.

ABSTRACT

This presntation will review the normal anatomy of the brachial plexus and focus on specifc radiologic landmarks. We will describe common tumors that involve the brachial plexus. The post-radiation therapy appearance of the brachial plexus will also be reviewed.

MSRO22

BOOST: CNS-Case-based Multidisciplinary Review

HN NR RO

Participants
Christina I. Tsien, MD, Washington, DC (*DPS Upload*) Advisory Board, Blue Earth Diagnostics LtdSpeakers Bureau, Varian, IncSpeakers Bureau, Merck & Co, Inc

Sub-Events

MSRO22A Rapid Fire Tumor Board Case Review

Participants
Soonmee Cha, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

MSRO22B Updates in Primary and Recurrent GBM

Participants
Roger Stupp, MD, Chicago, IL (*Presenter*) Research Consultant, Celularity, IncResearch Consultant, Northwest BiotherapeuticsSpeakers Bureau, Zai Lab

MSRO22C Role of Immunotherapy in GBM

Participants
Clark C. Chen, MD,PhD, Minneapolis, MN (*Presenter*) Nothing to Disclose

MSRO22D Challenging Cases in Diffuse Gliomas

Participants
Christina I. Tsien, MD, Washington, DC (*Presenter*) Advisory Board, Blue Earth Diagnostics LtdSpeakers Bureau, Varian, IncSpeakers Bureau, Merck & Co, Inc

MSRO23

BOOST: CNS-Essential Neuro-Anatomy for RT Treatment Planning

HN NR RO

Participants
Soonmee Cha, MD, San Francisco, CA (*DPS Upload*) Nothing to Disclose

Sub-Events

MSRO23A Essential Neuro-Anatomy Primer

Participants
Soonmee Cha, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

MSRO23B CNS Tumor Contouring

Participants
Christina I. Tsien, MD, Washington, DC (*Presenter*) Advisory Board, Blue Earth Diagnostics LtdSpeakers Bureau, Varian, IncSpeakers Bureau, Merck & Co, Inc

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MSRO24

BOOST: Head and Neck-Case-based Multidisciplinary Review

Monday, Nov. 30 3:30PM - 4:30PM Room: Channel 5

HN NR RO

AMA PRA Category 1 Credit ™: 1.00

Participants

Suresh K. Mukherji, MD, Carmel, IN (*Presenter*) Nothing to Disclose
Sung Kim, MD, New Brunswick, NJ (*Presenter*) Consultant, Nanobiotix
Chad Zender, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Francis P. Worden, MD, Ann Arbor, MI (*Presenter*) Grant, Bayer AG; Consultant, Bayer AG; Grant, Eisai Co, Ltd; Grant, AstraZeneca PLC; Grant, Brooklyn ImmunoTherapeutics; Grant, Galera Therapeutics; Grant, Merck & Co, Inc; Consultant, Merck & Co, Inc; Grant, Bristol-Myers Squibb Company; Consultant, Bristol-Myers Squibb Company; Grant, CUE Biopharmaceuticals

LEARNING OBJECTIVES

1) Review applied nornal anatomy of head and primary sites. 2) Discuss the role of CT and MR in evluating and staging head and neck tumors. 3) Show examples of how imaging specifically changes management.

ABSTRACT

This session will be a multidisciplinary tumor board comprised of a medical oncologist, radiation oncologist, head and neck surgeon and head and neck radiologist. Wewill demonstrate the importance of a multidiciplinary apprach for head and neck cancers with a specific focus on imaging affects treatment and management.

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MSRO25

BOOST: Gynecologic-Case-based Multidisciplinary Review

Wednesday, Dec. 2 5:00PM - 6:00PM Room: Channel 3

GU RO

AMA PRA Category 1 Credit ™: .75

Participants
Aoife Kilcoyne, MBBCh, Boston, MA (*Presenter*) Author, Wolters Kluwer nv
Stephanie Markovina, MD, PhD, Saint Louis, MO (*Presenter*) Nothing to Disclose
Susanna I. Lee, MD,PhD, Boston, MA (*Presenter*) Royalties, Wolters Kluwer nv; Royalties, Springer Nature
Lilie Lin, MD, Houston, TX (*Presenter*) Investigator, AstraZeneca PLC

For information about this presentation, contact:

slee0@mgh.harvard.edu

LEARNING OBJECTIVES

1) Determine FIGO stage by integrating imaging data under the revised 2018 staging system. 2) Identify the accuracy of imaging studies for certain aspects of the clinical exam. 3) Describe the standard of care approaches to treatment for gynecological cancers.

Printed on: 05/05/21

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MSRO26

BOOST: Breast-Breast Anatomy and Treatment Planning

BR RO

Participants
Debbie L. Bennett, MD, Saint Louis, MO (*Presenter*) Advisory Board, Devicor Medical Products, IncSpeaker, Hologic, Inc
Neil K. Taunk, MD, Philadelphia, PA (*Presenter*) Speaker, RefleXion Medical IncSpeaker, Sensus HealthcareAdvisory Board, Varian Medical Systems, IncConsultant, IndiMolecule
Neil K. Taunk, MD, Philadelphia, PA (*DPS Upload*) Speaker, RefleXion Medical IncSpeaker, Sensus HealthcareAdvisory Board, Varian Medical Systems, IncConsultant, IndiMolecule

For information about this presentation, contact:

taunk@pennmedicine.upenn.edu

LEARNING OBJECTIVES

1) Understand breast and regional lymph node anatomy. 2) Become familiar with basic anatomic structures and breast pathology using various imaging modalities. 3) Be familiar with breast and regional lymph node contouring techniques used in radiation treatment planning for breast cancer. 4) Apply contouring knowledge to inform radiation treatment planning for breast cancer.

ABSTRACT

The goal of this session is to review breast and regional node anatomy using various imaging modalities, and applying this knowledge to optimize contouing knowledge to improve radiation treatment planning for breast cancer.

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MSRO28

BOOST: Breast-Case-based Multidisciplinary Review

BR RO

AMA PRA Category 1 Credit ™: 1.00

Participants
Bethany L. Niell, MD,PhD, Tampa, FL (*Presenter*) Nothing to Disclose
Jonathan B. Strauss, MD, Chicago, IL (*Presenter*) Reviewer, WellPoint, Inc
Olwen Hahn, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Andrea Madrigrano, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jstrauss@nmff.org

LEARNING OBJECTIVES

1) Describe the latest advances in breast cancer imaging before, during, and after treatment. 2) Facilitate a multidisciplinary approach to the diagnosis, management, and treatment of breast cancer.

ABSTRACT

This multi-disciplinary panel will use a case-based approach to highlight recent developments and advances in the diagnosis, management, and treatment of breast cancer patients.

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MSRO31

BOOST: Genitourinary-Anatomy and Treatment Planning

GU RO

Participants

Tristan Barrett, MBBS, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Nicole Curci, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Rohit Mehra, MD, Ann Arbor, MI (*Presenter*) Co-inventor, University of Michigan
Clare M. Allen, MBBCh, London, United Kingdom (*Presenter*) Nothing to Disclose
Tristan Barrett, MBBS, Cambridge, United Kingdom (*DPS Upload*) Nothing to Disclose

Printed on: 05/05/21

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MSRO32

BOOST: Genitourinary-Case-based Multidisciplinary Review

GU RO

AMA PRA Category 1 Credit ™: 1.00

Participants

Tristan Barrett, MBBS, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Nicole Curci, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Daniel A. Hamstra, MD, PhD, Dearborn, MI (*Presenter*) Consultant, Augmenix, Inc; Consultant, Boston Scientific Corporation
Robert Dess, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Arvin K. George, MD, Ann Arbor , MI (*Presenter*) Research Consultant, TROD Medical; Researcher, Nanospectra Biosciences, Inc

Printed on: 05/05/21

RSNA 2020
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MSRO33

BOOST: Gastrointestinal-Anatomy and Treatment Planning

GI RO

Participants
Jennifer Wo, MD, Boston, MA (*Presenter*) Nothing to Disclose
Spencer C. Behr, MD, San Francisco, CA (*Presenter*) Research Consultant, GenVivo, Inc; Grant, Navidea Biopharmaceuticals, Inc; Grant, Cancer Targeted Technology (CTT)
Jennifer Wo, MD, Boston, MA (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the normal anatomy of the pancreaticobiliary system. 2) To discuss patterns of spread, natural history, and prognosis of pancreaticobiliary tumors. 3) To discuss optimal treatment recommendations for pancreaticobiliary tumors. 4) To review the key imaging characteristics that serve as 'clinical' tipping poitns in clinical staging and management.

ABSTRACT

In this session, we will review the clinical and radiographic foundational knowledge of pancreaticobiliary tumors. Pretreatment imaging is critical for tumor staging and determination of optimal treatment recommendations. This session review the normal anatomy, patterns of spread and clinical tipping points of clinical management. The presentation will highlight integration of imaging techniques to RT treatment, and will also provide information on technique and provide a 'checklist' of information that should be included in the radiologist's report that will help determine treatment and management.

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MSRO34

BOOST: Gastrointestinal-Case-based Multidisciplinary Review

GI RO

AMA PRA Category 1 Credit ™: 1.00

Participants
Spencer C. Behr, MD, San Francisco, CA (*Presenter*) Research Consultant, GenVivo, Inc; Grant, Navidea Biopharmaceuticals, Inc; Grant, Cancer Targeted Technology (CTT)
Jennifer Wo, MD, Boston, MA (*Presenter*) Nothing to Disclose
Motaz Qadan, MD,PhD, Boston, MA (*Presenter*) Nothing to Disclose
Mekhail Anwar, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Noelle K. LoConte, MD, Madison, WI (*Presenter*) Consultant, AbbVie Inc

LEARNING OBJECTIVES

1) To explore optimal multidisciplinary treatment paradigms, including surgery, radiation, and systemic therapies inclusive of novel targeted therapies and immunotherapy, for pancreaticobiliary and hepatic maligancies.

ABSTRACT

Given the clinical complexity of pancreaticobiliary and hepatic malignanices, multidisciplinary discussions with radiation oncology, surgical oncology, and medical oncology are critical for development of a cohesive treatment plan. In this session, our panel of clinical experts, representing a spread of academic institutions, will discuss their treatment recommendations for challenging patient scenarios which are frequently encountered in clinical practices. We will explore the range of potential acceptable treatment algorithms, and well as subtitlies of clinical case presentation which may influence treatment recommendations.

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MSRO35

BOOST: Musculoskeletal-Case-based Multidisciplinary Review

MK RO

AMA PRA Category 1 Credit ™: .75

Participants
F. Joseph Simeone, MD, Boston, MA (*Presenter*) Nothing to Disclose
Kevin Raskin, MD, Boston, MA (*Presenter*) Nothing to Disclose
Edward Y. Kim, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Seth Pollack, MD, Seattle, WA (*Presenter*) Consultant, Back Bay Consulting; Consultant, Bayer AG; Consultant, Eli Lilly and Company; Consultant, Puretech; Consultant, Seattle Genetics, Inc; Consultant, DAIICHI SANKYO Group; Consultant, Blueprint Medicines Corporation; Consultant, GlaxoSmithKline plc

For information about this presentation, contact:

edykim@uw.edu

LEARNING OBJECTIVES

1) To review best practices for oncologic management of musculoskeletal tumors. 2) To understand best imaging practices with respect to bone and soft tissue tumors.

ABSTRACT

This session will review the multidisciplinary evaluation and treatment of musculoskeletal tumors (sarcomas and other soft tissue tumors) with discussion provided by diagnostic radiology, orthopedic oncology, medical oncology, and radiation oncology panelists.

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MSRO36

BOOST: Lung, Mediastinum, Pleura-Oncology Anatomy

CH RO

FDA Discussions may include off-label uses.

Participants
Subba R. Digumarthy, MD, Boston, MA (*Presenter*) Speaker, Siemens AGResearch Grant, Lunit IncResearcher, Merck & Co, IncResearcher, Pfizer IncResearcher, Bristol-Myers Squibb CompanyResearcher, Novartis AGResearcher, F. Hoffmann-La Roche LtdResearcher, Polaris Pharmaceuticals, IncResearcher, Cascadia Healthcare, LLCResearcher, AbbVie IncResearcher, Gradalis, IncResearcher, Clinical BayResearcher, Zai Lab
Melin J. Khandekar, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose
Mizuki Nishino, MD, Boston, MA (*Presenter*) Institutional Research Grant, Merck & Co, Inc; Institutional Research Grant, Canon Medical Systems Corporation; Institutional Research Grant, AstraZeneca PLC; Consultant, DAIICHI SANKYO Group; Research Grant, DAIICHI SANKYO Group; Consultant, AstraZeneca PLC
Alexander Louie, MD, FRCPC, Toronto, ON (*Presenter*) Speaker, AstraZeneca PLC; Speaker, Varian Medical Systems, Inc; Speaker, RefleXion Medical Inc;
Meng X. Welliver, MD, Columbus, OH (*Presenter*) Nothing to Disclose
Meng X. Welliver, MD, Columbus, OH (*DPS Upload*) Nothing to Disclose

For information about this presentation, contact:

mizuki_nishino@dfci.harvard.edu

LEARNING OBJECTIVES

1) Describe the mediastinal and pleural anatomy on imaging for treatment planning and monitoring for thoracic malignancy with a focus on thymic tumors and mesothelioma. 2) Discuss the cutting-edge strategies and pitfalls for treatment planning and disease surveillance for thymic tumors and mesothelioma. 3) Understand the importance of multidisciplinary approaches to thoracic malignancy involving the mediastinum and pleura.

ABSTRACT

The purpose of this course is to provide attendees with a practical knowledge of the mediastinal and pleural anatomy and the understanding of the treatment planning strategies and pitfalls for thoracic malignancy with a focus on thymic tumors and mesothelioma, highlighting the importance of multidisciplinary approaches to these tumors.

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MSRO38

BOOST: Lung, Mediastinum, Pleura-Case-based Multidisciplinary Review

Friday, Dec. 4 10:00AM - 11:00AM Room: Channel 5

CH RO

AMA PRA Category 1 Credit ™: 1.00

Participants
Simon S. Lo, MD, Seattle, WA (*Presenter*) Editor, Springer Nature; Committee member, Elekta AB
Subba R. Digumarthy, MD, Boston, MA (*Presenter*) Speaker, Siemens AGResearch Grant, Lunit IncResearcher, Merck & Co, IncResearcher, Pfizer IncResearcher, Bristol-Myers Squibb CompanyResearcher, Novartis AGResearcher, F. Hoffmann-La Roche LtdResearcher, Polaris Pharmaceuticals, IncResearcher, Cascadia Healthcare, LLCResearcher, AbbVie IncResearcher, Gradalis, IncResearcher, Clinical BayResearcher, Zai Lab
Feng-Ming Kong, MD,PhD, Pokfulam, Hong Kong (*Presenter*) Speakers Bureau, AstraZeneca PLCSpeakers Bureau, F. Hoffmann-La Roche LtdSpeakers Bureau, Varian Medical Systems, IncResearch Grant, Varian Medical Systems, Inc
David W. Johnstone, Milwaukee, WI (*Presenter*) Nothing to Disclose
Christina Baik, MD, Seattle, WA (*Presenter*) Institutional Research Grant, Bristol-Myers Squibb Company; Institutional Research Grant, Novartis AG; Institutional Research Grant, AstraZeneca PLC; Institutional Research Grant, F. Hoffmann-La Roche Ltd; Institutional Research Grant, Eli Lilly and Company; Institutional Research Grant, Pfizer Inc; Institutional Research Grant, Spectrum Pharmaceuticals, Inc; Institutional Research Grant, Blueprint Medicines Corporation; Institutional Research Grant, DAIICHI SANKYO Group; Institutional Research Grant, Rain Therapeutics Inc; Institutional Research Grant, AbbVie Inc; Institutional Research Grant, Turning Point Therapeutics, Inc; ; ;

LEARNING OBJECTIVES

1) Describe the multidisciplinary management of non-small cell lung cancer. 2) Describe the multidisciplinary management of small cell lung cancer. 3) Describe the multidisciplinary management of other thoracic tumors.

ABSTRACT

In this modern era, treatment outcomes of lung cancer and other thoracic tumors can be improved by using a multidisciplinary approach. This session will cover the multidisciplinary management of thoracic malignancies in a case-base format.

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MSRO41

BOOST: Artificial Intelligence-AI Applications in Radiation Oncology

AI RO

Participants
Sanjay Aneja, MD, New Haven, CT (*DPS Upload*) Research Consultant, AG Mednet, Inc

Sub-Events

MSRO41A Introduction to Artificial Intelligence

Participants
Sanjay Aneja, MD, New Haven, CT (*Presenter*) Research Consultant, AG Mednet, Inc

For information about this presentation, contact:

sanjay.aneja@yale.edu

MSRO41B Clinical Needs and Challenges for AI in Radiotherapy

Participants
Clifton D. Fuller, MD,PhD, Houston, TX (*Presenter*) Research Consultant, Elekta AB; Research Grant, Elekta AB; Speaker, Elekta AB

MSRO41C AI Tools for Tumor Segmentation and Quantification of Heterogeneity

Participants
John Onofrey, PhD, New Haven, CT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

john.onofrey@yale.edu

LEARNING OBJECTIVES

1) Understand the fundamentals of image segmentation. 2) Learn how to apply AI/machine learning to image segmentation tasks in medical imaging. 3) Survey current methods in segmentation. 4) Learn how to rigorously evaluate segmentation performance. 5) Understand methods for classifying tumor heterogeneity. 6) Recognize the limitations of AI/machine learning in medical image analysis problems.

ABSTRACT

Artificial intelligence and machine learning solutions have revolutionized how we analyze medical imaging data. Image segmentation, which is the process of extracting objects of interest from images, is a fundamental task in medical image analysis applications. Current AI/machine learning solutions are able to automatically segment anatomy and tumors from radiologic imaging. These methods can also be used to quantify heterogeneity in tumors. However, these tools have limitations and should be assessed with scientific rigor and care.

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MSRO42

BOOST: Lymphoma-Case-based Multidisciplinary Review

RO

AMA PRA Category 1 Credit ™: 1.00

Participants
Sarah A. Johnson, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Yolanda D. Tseng, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Case-based review of staging and treatment response in lymphoma. 2) Discuss imaging findings in lymphoma and their clinical significance (PET, CT, MRI). 3) Describe the management of patients with lymphoma, including the role of imaging and radiation treatment options.

ABSTRACT

Management of lymphoma continues to evolve in the setting of improved imaging, pathologic understanding of this heterogeneous disease, systemic therapy, and radiotherapy techniques. This interactive, multi-disciplinary session is geared to general radiologists and radiation oncologists with the goal to provide clinically relevant, up-to-date knowledge and skills in evaluating and treating these patients. Through cases, we will review common manifestations of Hodgkin and non-Hodgkin lymphoma and imaging features of these lymphomas that are important for workup, staging, and assessment of treatment response. Cases will be used to walk participants through the management of common lymphomas with a focus on the role of radiotherapy.

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MSRO44

BOOST: Challenges in Cancer Therapy: Case-based Multidisciplinary Review

RO

Participants
Susanna I. Lee, MD,PhD, Boston, MA (*Presenter*) Royalties, Wolters Kluwer nv; Royalties, Springer Nature
Florence K. Keane, MD, Boston, MA (*Presenter*) Advisory Board, AstraZeneca PLC; Speakers Bureau, OncLive; Author, Wolters Kluwer nv
Michael C. Soulen, MD, Lafayette Hill, PA (*Presenter*) Consultant, F. Hoffmann-La Roche Ltd Consultant, Guerbet SA Research support, Guerbet SA Research support, BTG International Ltd Proctor, Sirtex Medical Ltd
Homer A. Macapinlac, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jennifer Wo, MD, Boston, MA (*Presenter*) Nothing to Disclose
Onofrio A. Catalano, MD, Boston, MA (*Presenter*) Nothing to Disclose
Susanna I. Lee, MD,PhD, Boston, MA (*DPS Upload*) Royalties, Wolters Kluwer nv; Royalties, Springer Nature

For information about this presentation, contact:

slee0@mgh.harvard.edu

LEARNING OBJECTIVES

1) Appropriately apply modern CT, MR, PET-CT and PET-MR technologies for treatment planning of solid malignancies in the chest, abdomen and pelvis. 2) Explain the indications, efficacy and potential morbidity associated with chemo-embolization, thermal ablation and molecular targeting theranostics.

ABSTRACT

The last decade has seen emergence of important advances in cancer therapy. Use of functional and molecular imaging and advanced radiotherapy often integrated with targeted chemotherapy have improved patient outcomes. Advanced radiotherapy techniques such as Image Guided Radiotherapy (IGRT), Intensity Modulated Radiation Therapy (IMRT), and Stereotactic Body Radiation Therapy (SBRT) can be applied using image guidance with Xray, CT, MRI, PET-CT and PET-MRI. Image-guided chemoembolization and thermal ablation also offer loco-regional therapy options for many disease sites. For patients with metastatic prostate or neuroendocrine cancer, the theranostic approach in nuclear medicine that couples diagnostic imaging and therapy using the same or very similar molecule is emerging as an important approach for tumor control.

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MSRP31

RSNA Resident and Fellow Symposium: Job Market Update

AMA PRA Category 1 Credit ™: .50

Participants

Stephane Desouches, DO, Milwaukee, WI (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

MSRP32

RSNA Resident and Fellow Symposium: Review of the Changing Radiology Marketplace

AMA PRA Category 1 Credit ™: .50

Participants

Howard B. Fleishon, MD, Norcross, GA (*Presenter*) Nothing to Disclose

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MSRP33

RSNA Resident and Fellow Symposium: ABR Virtual Exams Overview

AMA PRA Category 1 Credit ™: .25

Participants
Brent J. Wagner, MD, Wernersville, PA (*Presenter*) Nothing to Disclose
Erik M. Velez, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Thomas J. An, MD, Boston, MA (*Presenter*) Nothing to Disclose
Kristen A. McConnell, PhD, Birmingham, AL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

tan1@partners.org

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MSRP34

RSNA Resident and Fellow Symposium: Radiology Residency Program Management in the COVID Era - Strategy and Reality

AMA PRA Category 1 Credit ™: .50

Participants
Eric B. England, MD, Fort Thomas, KY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

eric.england@uc.edu

LEARNING OBJECTIVES

1) Discuss the challenges the COVID-19 pandemic placed on radiology residency programs and the need to adapt.2) Propose solutions for residency programs to maintain the educational mission and resident well-being during the COVID-19 pandemic.3) Examine how changes to the residency program during the COVID-19 pandemic could become permanent improvements to the residency learning environment.

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MSRT41

ASRT@RSNA 2020: Standards of Ethics in Practice

PR

AMA PRA Category 1 Credit ™: .75

Participants
Cheryl DuBose, ARRT, Jonesboro, AR (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Participants will explain the relationship between the ARRT mission, Standards of Ethics, and the Equation for Excellence. 2) Participants will compare the aspirational Code of Ethics from the enforceable Rules of Ethics. 3) Participants will discuss the ARRT Ethics Committee structure and detail the procedures for handling challenges raised under the Rules of Ethics.

ABSTRACT

The American Registry of Radiologic Technologists (ARRT) promotes high standards of patient care by recognizing qualified individuals in medical imaging, interventional procedures, and radiation therapy. Sometimes these high standards are compromised by individuals who violate the Rules of Ethics. This presentation will discuss the three primary components of the ARRT Standards of Ethics: the Code of Ethics, the Rules of Ethics, and the administrative procedures followed when there is concern of potential ethical compromise.

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MSRT43

ASRT@RSNA 2020: How CT Protocols Affect Technologist Repeat Rates, Throughput, and Image Quality

CT SQ

AMA PRA Category 1 Credit ™: .75

Participants
Timothy P. Szczykutowicz, PhD, Madison, WI (*Presenter*) Equipment support, General Electric CompanyLicense agreement, General Electric CompanyFounder, Protocolshare.org LLCMedical Advisory Board, medInt Holdings, LLCConsultant, General Electric CompanyConsultant, Takeda Pharmaceutical Company Limited

For information about this presentation, contact:

tszczykutowicz@uwhealth.org

LEARNING OBJECTIVES

1) Learn the factors motivating CT scans to be repeated. 2) Understand the negative departmental and workflow issues arising from poor CT protocols. 3) Obtain guidance on how to develop robust CT protocols as a physician/technologist/physicist team which will free technologists to focus on the patient at scan time, not CT scan parameters.

ABSTRACT

This course will review what a CT protocol is and some common scan time adjustments CT technologists have to make. We will review how many scan time adjustments can be pre-programmed into a protocol accounting for specific indications and body sizes. We will discuss some common reasons for poor image quality leading to reduced diagnostic utility or requiring a repeated CT scan. We will also discuss the time involved in making protocol adjustments and extra reconstructions on the fly as opposed to having them pre-programmed. The theme of the course will be how a priori protocol development frees the CT technologist from technical considerations at scan time and lets them focus on the patient. We will discuss options on a CT scanner that should be adjusted for specific indications and patient presentations (size, heart rate, presence of metal, etc.).

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MSRT52

ASRT@RSNA 2020: The Changing World of Contraband Smuggling

OT

AMA PRA Category 1 Credit ™: .75

Participants
Barry D. Daly, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bdaly@umm.edu

LEARNING OBJECTIVES

1) To outline the recent evolution of newer formulations and packaging of concealed illegal drugs designed to avoid detection by traditional imaging (X-ray based) techniques. 2) To describe recent advances in imaging techniques for detection and characterization of concealed illegal opioids. 3) To address the recent sharp increase in abuse of synthetic opioids and the implications for detection of such contraband. 4) To briefly outline the growth in contraband smugging into and within prisons.

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MSRT54

ASRT@RSNA 2020: Current Use of MRI in Radiation Oncology

MR RO

AMA PRA Category 1 Credit ™: 1.00

Participants
Amy Heath, MS, RT, Poynette, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

aheath@uwhealth.org

LEARNING OBJECTIVES

1) Discuss the typical radiation oncology patient process. 2) Learn current use of MRI scans during the simulation for external beam radiation therapy. 3) Explain why MRI is preferred for brachytherapy treatment planning. 4) Discuss commercially available MRI-Linacs. 5) Review treatment plans for patients who have received treatment with a MRI-Linac.

ABSTRACT

Magnetic resonance imaging is being utilized in all aspects of the radiation therapy process. Traditionally, MR scans were used primarily for the diagnosis and follow-up of oncology patients. In recent years, MRI has become an essential tool for simulation and treatment alignment for radiation therapy. MRI scanners are being installed in radiation oncology departments for simulation procedures and radiation therapy treatment machines are now capable of acquiring these images as well. This will require further collaboration and integration of radiology and radiation oncology personnel. This course will educate radiologic science professionals about the emerging role MRI has in the radiation therapy process, including how workflows and treatment techniques have changed with the new technologies.

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MSSR41

RSNA/ESR Symposium: Stroke Imaging and Endovascular Treatment: Now and the Future-Current Status of Stroke Work-up and Treatment

CT ER MR NR VA

AMA PRA Category 1 Credit ™: 1.00

Participants
Achala S. Vagal, MD, Cincinnati, OH (*Moderator*) Research Grant, Cerovenus
Raman Uberoi, MBChB, FRCR, Oxford, United Kingdom (*Moderator*) Grant, W. L. Gore & Associates, Inc

Sub-Events

MSSR41A Current Status of Endovascular Management of Acute Ischemic Stroke: Evidence and Guidelines

Participants
Raman Uberoi, MBChB, FRCR, Oxford, United Kingdom (*Presenter*) Grant, W. L. Gore & Associates, Inc

LEARNING OBJECTIVES

1) To learn about current evidence of endovascular treatment in acute ischemic stroke. 2) To become familiar with evidence-based guidelines (AHA/ASA and ESO/ESMINT) in stroke treatment.

MSSR41B CT-based Evaluation of Acute Stroke: Advantages and Challenges

Participants
Achala S. Vagal, MD, Cincinnati, OH (*Presenter*) Research Grant, Cerovenus

LEARNING OBJECTIVES

1) To learn about advantages and challenges of CT-based stroke imaging work-up. 2) To become familiar with pitfalls of CT perfusion imaging.

MSSR41C MR-based Evaluation of Acute Stroke: Advantages and Challenges

Participants
Max Wintermark, MD, San Carlos, CA (*Presenter*) Consultant, More HealthConsultant, Magnetic InsightConsultant, icoMetrix NVConsultant, NinesConsultant, Subtle MedicalConsultant, Nous

For information about this presentation, contact:

max.wintermark@gmail.com

LEARNING OBJECTIVES

1) To learn about advantages MR-based stroke imaging work-up. 2) To become familiar about challenges of MR-based stroke imaging work-up.

MSSR42

RSNA/ESR Symposium: Stroke Imaging and Endovascular Treatment: Now and the Future-Practical Stroke Imaging and Mimics

ER NR VA

AMA PRA Category 1 Credit ™: 1.00

Participants
Jean-Pierre Pruvo, MD, PhD, Lille, France (*Moderator*) Nothing to Disclose
Achala S. Vagal, MD, Cincinnati, OH (*Moderator*) Research Grant, Cerovenus

Sub-Events

MSSR42A Stroke Mimics and 'Chameleons': How To Recognize Them

Participants
Didier Leys, Lille, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about definitions of stroke mimics and chameleons. 2) To understand the clinical challenges of stroke mimics. 3) To become familiar with the imaging signs and differential diagnosis of stroke mimics.

MSSR42B Practical Review of Stroke Imaging and Triage: Within Six Hours and Beyond Including Wake-up Strokes

Participants
Lotfi Hacein-Bey, MD, Carmichael, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lhaceinbey@yahoo.com

LEARNING OBJECTIVES

1) To learn about optimal patient triage in acute ischemic stroke in early and delayed time windows. 2) To understand stroke imaging in wake-up stroke and unknown onset time. 3) To appreciate the importance of efficient work-up and time metrics.

MSSR42C Interactive Case Discussion

Participants
Lotfi Hacein-Bey, MD, Carmichael, CA (*Presenter*) Nothing to Disclose
Didier Leys, Lille, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn how imaging can help in decision making in acute stroke. 2) To consolidate the knowledge gained from the session with interactive cases.

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MSSR43

RSNA/ESR Stroke Imaging and Endovascular Treatment: Now and the Future-Endovascular Treatment

ER NR VA

AMA PRA Category 1 Credit ™: .25

FDA Discussions may include off-label uses.

Participants

Jean-Pierre Pruvo, MD, PhD, Lille, France (*Moderator*) Nothing to Disclose
Raman Uberoi, MBChB, FRCR, Oxford, United Kingdom (*Moderator*) Grant, W. L. Gore & Associates, Inc

Sub-Events

MSSR43B Where to Perform and How to Organize Thrombectomy

Participants
Jeremy J. Heit, MD,PhD, Los Altos, CA (*Presenter*) Consultant, Medtronic plcConsultant, Terumo CorporationScientific Advisory Board, iSchemaView, IncMedical Advisory Board, iSchemaView, Inc

For information about this presentation, contact:

jheit@stanford.edu

LEARNING OBJECTIVES

1) To learn about the number of persons and regulatory recommendations. 2) To understand the optimal organization in angiosuite and workflow. 3) To appreciate the implications and management for continuity of care.

MSSR43C Interactive Discussion with Illustrative Cases of Endovascular Thrombectomy

Participants
Ansgar Berlis, MD, Augsburg, Germany (*Presenter*) Proctor, Stryker Corporation; Speaker, Penumbra, Inc; Speaker, phenox GmbH
Jeremy J. Heit, MD,PhD, Los Altos, CA (*Presenter*) Consultant, Medtronic plcConsultant, Terumo CorporationScientific Advisory Board, iSchemaView, IncMedical Advisory Board, iSchemaView, Inc
Gregoire Boulouis, MD, MSc, Paris, France (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jheit@stanford.edu

LEARNING OBJECTIVES

1) To learn about tricks and tips of endovascular treatment using illustrative cases. 2) To appreciate the optimal time metrics in angiosuite. 3) To become familiar with the different approaches (stent retriever, ADAPT) and challenging cases (tandem occlusions, distal occlusions).

ABSTRACT

NA

MSSR44

RSNA/ESR Symposium: Stroke Imaging and Endovascular Treatment: Now and the Future-The Future Strategy for Stroke Thrombectomy

ER IR NR VA

AMA PRA Category 1 Credit ™: 1.00

Participants
Jean-Pierre Pruvo, MD, PhD, Lille, France (*Moderator*) Nothing to Disclose
Raman Uberoi, MBChB, FRCR, Oxford, United Kingdom (*Moderator*) Grant, W. L. Gore & Associates, Inc
Achala S. Vagal, MD, Cincinnati, OH (*Moderator*) Research Grant, Cerovenus

Sub-Events

MSSR44A Addressing Workforce Needs: Who and How to Train Specialists

Participants
Hans Van Overhagen, MD, Den Haag, Netherlands (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about the number and type of specialist trained. 2) To understand the global organization of stroke interventionists and neurologists. 3) To appreciate the future potential number of cases.

MSSR44B The Future for Stroke Thrombectomy: What Is Next

Participants
Mahesh V. Jayaraman, MD, Providence, RI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about the subgroups that were not studied in the recent stroke trials. 2) To understand about use of artificial intelligence in stroke. 3) To become familiar with use of artificial intelligence in stroke.

MSSR44C New Innovations in Stroke Thrombectomy Techniques and Technology

Participants
Klaus A. Hausegger, MD, Klagenfurt, Austria (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the current limitations of current devices and techniques. 2) To appreciate the evolution in stroke thrombectomy technology. 3) To understand how the different devices and techniques may improve outcomes.

PS10

Opening Session and President's Address: One World, One Radiology Community-A Vision for Tomorrow

Sunday, Nov. 29 11:00AM - 11:30AM Room: Channel 1

AMA PRA Category 1 Credit ™: .50

Participants
James P. Borgstede, MD, Colorado Springs, CO (*Presenter*) Nothing to Disclose

Abstract

The highly resourced world of radiology inventions, products, and professionalism are conduits for health care improvement worldwide. These conduits connect our radiology community domestically and across the globe. They have the powerful potential to equalize care for all patients, regardless of where they live and seek healthcare. All patients require and deserve basic healthcare, but there is a deep chasm between the resourced and under-resourced worlds of healthcare. We in radiology are fortunate to have so many advantages that can make us a worldwide specialty. We need to put to work the power and potential of our professional and technical resources to close the gap in the quality of care across the world. Achieving the vision of a collaborative, more equitable radiology world will not be without its challenges. Each of us will have to make a conscious choice to collaborate worldwide. We must all decide to learn from each other, and we will need to be good stewards of our technology. Winners in our equal, one-world of radiology will be radiologists who learn the habits, processes, and skills most quickly to adapt to globalization. Winning organizations will have the infrastructure, education, and governance to technologically innovate. The ultimate winners will be our patients.

Printed on: 05/05/21

PS10-11

Opening Session and President's Address

Sunday, Nov. 29 11:00AM - 12:30PM Room: NA

AMA PRA Category 1 Credits ™: 1.25

Printed on: 05/05/21

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PS11

Opening Session Lecture: The Power of Radiology to Drive Collective Action and Transform Global Health

Sunday, Nov. 29 11:30AM - 12:00PM Room: Channel 1

AMA PRA Category 1 Credit ™: .50

Participants
Kristen K. DeStigter, MD, Burlington, VT (*Presenter*) Nothing to Disclose

Abstract

Major shifts have taken place in global burden of disease over past 25 years and present new challenges for reducing global health inequalities within each of the main medical cause groups. The world's member nations adopted the UN Sustainable Development Goals in 2015, including a specific target to achieve Universal Health Coverage (UHC) by 2030.Radiology is vital to disease detection and treatment, yet has remained essentially invisible in health policy and funding recommendations on the global stage. Inequitable access to essential imaging is one of the greatest health challenges in resource-limited areas and has the greatest negative impact on socially and economically disadvantaged or otherwise marginalized populations. Core issues include the lack of access to affordable technology, a limited skilled workforce, insufficient infrastructure, and systems gaps, all compounded by social inequities.The Global Burden of Disease data represent the most comprehensive observational epidemiological prediction looking at 250 causes of death from 2016 to 2040 in 195 countries. By evaluating years of life lost and mortality for certain causes, top conditions are forecasted and ranked for both adults and children. The future needs of radiology diagnostics are evident with large gaps in access and service. Although many countries are impacted, a disproportionately high burden of disease will remain in sub-Saharan Africa.Without access to integrated high quality imaging services in low resource areas, effective UHC will not be achievable. We are faced with a "wicked problem" - a problem that is so difficult to solve that our traditional methods of addressing radiology services in global health are unlikely to effect significant change. Cross-sector collaboration that engages academia, industry, civil society and NGOs, governments, local radiologists and communities is paramount.Our collaborative focus must be on capacity building and capability strengthening, including through scientific discovery and dissemination, education, mentorship, regulatory advisement, and advocacy to policy makers. Sustainable radiology interventions will be safe, cost-effective, integrate into systems of care with a delicate balance of centralized and decentralized services, and cultivate the trust of the communities served. It is our moral obligation to convene effective partnerships with multipronged approaches that improve equitable access to radiology services.

PS12

Image Interpretation Session: Neuroradiology & Head and Neck

Monday, Nov. 30 2:00PM - 2:30PM Room: Channel 1

AMA PRA Category 1 Credit ™: .50

Participants
Christine M. Glastonbury, MBBS, San Francisco, CA (*Moderator*) Author with royalties, Reed Elsevier
C. Douglas Phillips, MD, New York, NY (*Presenter*) Nothing to Disclose
Achala S. Vagal, MD, Cincinnati, OH (*Presenter*) Research Grant, Cerovenus

For information about this presentation, contact:

dphillips@med.cornell.edu

LEARNING OBJECTIVES

1) Identify key abnormal findings on radiologic studies that are critical to making a specific diagnosis. 2) Construct a logical list of differential diagnoses based on the radiologic findings, focusing on the most probable differential diagnoses. 3) Determine which, if any, additional radiologic studies or procedures are needed in order to make a specific final diagnosis. 4) Choose the most likely diagnosis based on the clinical and the radiologic information.

PS13

Image Interpretation Session: Chest & Breast

Tuesday, Dec. 1 2:00PM - 2:30PM Room: Channel 1

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Glastonbury, MBBS, San Francisco, CA (*Moderator*) Author with royalties, Reed Elsevier
Stamatia V. Destounis, MD, Rochester, NY (*Presenter*) Advisory Committee, Hologic, IncMedical Advisory Board, iCad, Inc
Sujal R. Desai, MBBS, London, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify key abnormal findings on radiologic studies that are critical to making a specific diagnosis. 2) Construct a logical list of differential diagnoses based on the radiologic findings, focusing on the most probable differential diagnoses. 3) Determine which, if any, additional radiologic studies or procedures are needed in order to make a specific final diagnosis. 4) Choose the most likely diagnosis based on the clinical and the radiologic information.

PS14

Image Interpretation Session: Pediatric & Abdominal

Wednesday, Dec. 2 2:00PM - 2:30PM Room: Channel 1

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Glastonbury, MBBS, San Francisco, CA (*Moderator*) Author with royalties, Reed Elsevier
Fergus V. Coakley, MD, Portland, OR (*Presenter*) Founder, OmnEcoil Instruments, IncShareholder, OmnEcoil Instruments, Inc
Harriet J. Paltiel, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify key abnormal findings on radiologic studies that are critical to making a specific diagnosis. 2) Construct a logical list of differential diagnoses based on the radiologic findings, focusing on the most probable differential diagnoses. 3) Determine which, if any, additional radiologic studies or procedures are needed in order to make a specific final diagnosis. 4) Choose the most likely diagnosis based on the clinical and the radiologic information.

PS15

Image Interpretation Session: Nuclear Medicine & Musculoskeletal

Thursday, Dec. 3 2:00PM - 2:30PM Room: Channel 1

AMA PRA Category 1 Credit ™: .50

Participants

Christine M. Glastonbury, MBBS, San Francisco, CA (*Moderator*) Author with royalties, Reed Elsevier
Homer A. Macapinlac, MD, Houston, TX (*Presenter*) Nothing to Disclose
Jenny T. Bencardino, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify key abnormal findings on radiologic studies that are critical to making a specific diagnosis. 2) Construct a logical list of differential diagnoses based on the radiologic findings, focusing on the most probable differential diagnoses. 3) Determine which, if any, additional radiologic studies or procedures are needed in order to make a specific final diagnosis. 4) Choose the most likely diagnosis based on the clinical and the radiologic information.

PS20

New Horizons Lecture: Insights for Radiology from the Hidden Brain

Monday, Nov. 30 11:00AM - 12:00PM Room: Channel 1

CME credit is not available for this session.

Participants

Shankar Vedantam, Washington, DC (*Presenter*) Nothing to Disclose
Ann L. Brown, MD, Cincinnati, OH (*Moderator*) Nothing to Disclose

DESCRIPTION

A Conversation with Shankar Vedantam About Change, AI and Diversity.

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PS30

Annual Oration in Diagnostic Radiology: Building a Better Future for the Global Radiology Community-Selfless Service, Innovative Technologies & Online Radiology Education for COVID-19 & Beyond

Tuesday, Dec. 1 11:00AM - 12:00PM Room: Channel 1

AMA PRA Category 1 Credit ™: .75

Participants
Bhavya Rehani, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

ABSTRACT

We are all one. As we look forward to the post Covid-19 era, radiologists around the world can unite to make a difference in the health of human beings throughout the world. The concept of "seva" or selfless service has never been more important. The impact of COVID19 has highlighted the healthcare disparities in vulnerable populations. As physicians, we feel that it is our moral obligation to help our colleagues & patients in areas of need. How do we radiologists make a difference and build a better future for the world community? The use of virtual education, telemedicine, mobile health & machine learning provide powerful platforms for the education and support of healthcare workers and patients throughout the world. This lecture will discuss the lessons, challenges and solutions learned over our 5-year experience in international virtual education in 80 countries by radiologists from more than 22 academic institutions. Other technologies such as telemedicine, mobile health and machine learning offer the promise to advance imaging and patient care in different parts of the world. There are opportunities for research and mentorship with international radiologists that will be helpful in creating collaborative solutions & cutting-edge advancements in imaging. Various international initiatives offered by different non-profit organizations & academic societies will be discussed. Inspiring stories from radiologists around the world during COVID-19 will be shared. This will demonstrate the courage shown by our colleagues in different parts of the world and proud moments for our radiology community to cherish.

Printed on: 05/05/21

PS31

RSNA/AAPM Symposium: Together We Can Make a Difference: Radiology/Physics Collaboration in the Development of New Imaging Techniques

Thursday, Dec. 3 11:00AM - 12:00PM Room: Channel 1

AMA PRA Category 1 Credit ™: .75

Participants

Guang-Hong Chen, PhD, Madison, WI (*Moderator*) Nothing to Disclose
Thomas M. Grist, MD, Madison, WI (*Presenter*) Institutional research support, General Electric CompanyInstitutional research support, Bracco GroupInstitutional research support, Siemens AGInstitutional research support, Hologic, IncInstitutional research support, McKesson CorporationOwner, Elucent MedicalStockholder, Elucent MedicalOwner, HistoSonics, IncStockholder, HistoSonics, Inc
Charles A. Mistretta, PhD, Madison, WI (*Presenter*) Founder, Mistretta Medical Intellectual Property Licensing Activities

LEARNING OBJECTIVES

1) Undersampling in medical imaging. 2) Benefit of interdisciplinary collaboration. 3) Opportunities and challenges in dissemination of new imaging technology.

The development of new imaging methods is almost always inspired by clinical need, enabled by advances in technology, and disseminated through partnerships with industry. The interdisciplinary collaborations between medical physicists who leverage these technical advances to solve clinical problems identified by practicing radiologists are critical factors in the success of our field. Likewise, translation of these new methods from bench to bedside and into clinical practice requires partnerships beyond the walls of academia. In this presentation we focus on the individuals and events that contributed to a series of X-Ray, MR and CT techniques for diagnostic and interventional angiographic applications, and share lessons learned from the successes and challenges of these efforts. Specifically, we will begin with the origins of 2D Digital Subtraction Angiography (DSA) which has facilitated the development of interventional radiology. Subsequently the need for time-resolved MRA data led to the creation of accelerated data acquisition schemes in MR angiography which introduced the general concept of under-sampled data acquisition in the time domain. These efforts led to the development of time-resolved 3D Time-Resolved Imaging of Contrast Kinetics (3D-TRICKS MRA), an analog of X-ray DSA. Partnerships between academia and industry were key factors in the dissemination of these methods to ultimately benefit human health. The concept of under-sampling in MR angiography was then extended to the spatial domain using radial acquisition methods to significantly accelerate 4D flow phase-contrast MRA acquisitions, thus enabling simultaneous anatomic and functional assessment of vascular health and disease. The simultaneous spatial and temporal under-sampling methods developed for MRA have since been applied to cone-beam x-ray CTA, therefore creating 4D DSA, a time-resolved 3D version of DSA capable of measuring of blood velocities. All of these developments were grounded in physical principles, developed in response to clinical needs perceived by collaborating radiologists, and ultimately disseminated to improve patient care through partnerships with organizations beyond the walls of academia.

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PS40

Annual Oration in Radiation Oncology: Imagers and Images-My friends; My Indispensable Guide

Wednesday, Dec. 2 11:00AM - 12:00PM Room: Channel 1

AMA PRA Category 1 Credit ™: .75

Participants
Beth A. Erickson, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose

ABSTRACT

Diagnostic Radiology and Radiation Oncology have been closely aligned since their evolution from a single specialty, often residing in the same department, to the present day. Increasingly, imaging has proven essential to the successful design and delivery of radiation therapy for cancer. In the 1980s, when CT scanners became available, these machines were shared and used selectively for radiation treatment planning. Image-based planning then evolved such that CT simulators became standard equipment in radiation oncology departments. However, diagnostic CT images remained integral to the staging and follow up of patients treated by radiation oncologists. Magnetic resonance imaging more slowly integrated into radiation planning and delivery systems, but used for diagnostic purposes, it gave radiation oncologists critical information about the cancers they were treating with the excellent soft tissue resolution provided by these images. Initially fused with radiation planning images, MR imaging has also gradually moved into radiation oncology departments for external beam and brachytherapy planning, especially for gynecologic cancers. Recently, linear accelerators equipped with online MR imaging capabilities have enabled real time monitoring of tumor and organ motion during each treatment as well as the ability to adapt the dose specification as tumors change over the course of treatment. Defining and treating cancers with this level of precision has allowed for dose escalation with or without treatment acceleration, improved cure rates and decreased morbidity. In addition, these images themselves have become biomarkers, informing radiation oncologists of tumor response and identifying radiomic features, previously untapped, which provide a window into prognosis. PET imaging has provided similar diagnostic and prognostic information. Use of ultrasound to guide invasive brachytherapy procedures is an invaluable asset ensuring procedural accuracy and safety. Interventional radiology has further enabled strategic placement of radiation as well as expertise in mitigating radiation morbidity such as insufficiency fractures. Though often working apart, diagnostic radiologists and the images they interpret and share, are fundamental to the success of radiation therapy. Radiation oncologists remain essentially and integrally aligned with our diagnostic colleagues and friends in our mutual quest to cure cancer.

RC101

Lung Cancer Screening

Saturday, Dec. 5 5:00PM - 6:00PM Room: Channel 2

CH CT

AMA PRA Category 1 Credit ™: 1.00

Participants
Caroline Chiles, MD, Winston-salem, NC (*Moderator*) Advisory Board, AstraZeneca PLC

LEARNING OBJECTIVES

1) Confirm compliance with screening guidelines, including patient eligibility, scanning protocols, radiation dose, CMS requirements and National Lung Screening Registry. 2) Incorporate shared decision making and smoking cessation in the lung screening visit. 3) Assign Lung-RADS categories to nodules encountered at baseline and annual screening CT. 4) Evaluate atypical screening findings. 5) Manage incidental findings, including COPD, coronary artery calcification, and potential extrapulmonary malignancies.

Sub-Events

RC101A Introduction

Participants
Caroline Chiles, MD, Winston-salem, NC (*Presenter*) Advisory Board, AstraZeneca PLC

For information about this presentation, contact:

cchiles@wakehealth.edu

RC101B Feasible Approaches to Shared Decision-making for Lung Cancer Screening

Participants
Robert Volk, PhD, Houston, TX (*Presenter*) Nothing to Disclose

RC101C Nodule Assessment and Lung-RADS™ Categories

Participants
Mylene T. Truong, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review Lung-RADS categories and nodule management strategies. 2) To review how patient risk can impact nodule management.

RC101D Interesting Cases Encountered in a Screening Program

Participants
Brett M. Elicker, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the role of imaging in the multi-disciplinary approach to suspected lung cancer. 2) Compare the different management options in suspected lung nodules detected on lung cancer screening CT. 3) Summarize how to appropriately use Lung-RADS when interpreting lung cancer screening CTs.

RC101E Incidental Findings on the Low-Dose CT

Participants
Carol C. Wu, MD, Houston, TX (*Presenter*) Author, Reed Elsevier

LEARNING OBJECTIVES

1) Describe the prevalence and significance of incidental findings on LDCT. 2) Apply the latest evidence-based management recommendations for various incidental findings on LDCT.

RC101F Compliance and Reimbursement

Participants
Jared D. Christensen, MD,MBA, Durham, NC (*Presenter*) Advisory Board, Riverain Technologies, LLC

RC102

Creating a Culture of Well-being in Education

ED

AMA PRA Category 1 Credit ™: 1.00

Participants
Achala Donuru, MD, Philadelphia, PA (*Moderator*) Nothing to Disclose

Sub-Events

RC102A Dr. Mom's Balancing Act

Participants
Achala Donuru, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

achala.donuru@jefferson.edu

LEARNING OBJECTIVES

1) Identify some of the physical and mental effects of stress and learn ways to minimize these effects. 2) Develop strategies for balancing both work and personal life. 3) Develop tasks, actions and communications to implement the objectives. 4) Pursue one action over the next month focused on your own well-being outside of work or family responsibilities.

RC102B Challenges, Stressors, and Coping in Radiology Residency

Participants
Neeraj Lalwani, MD, Richmond, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

neeraj.lalwani@vcuhealth.org

LEARNING OBJECTIVES

Stressors in residency; Different stresses at different levels; Negative behavioral outcomes of stress; How to cope?; Conclusion

ABSTRACT

Residency is stressful and stressors can lead to negative behavioral outcomes:depression, anxiety, anger and addiction. Social support, resident support groups and co-residents can play crucial role in coping mechanism. The warning symptoms should not be ignored and an empathetic conversation and offer to help may save a life.

RC102C Zen and the Art of Interventional Radiology: Taming Tension and Building Mindfulness

Participants
Drew M. Caplin, MD, Manhasset, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dcaplin@northwell.edu

LEARNING OBJECTIVES

1. Understand how the Sympathetic and Parasympathetic systems frame our stress response.-2. Describe four immediate stress relief techniques-3. Perform an immediate stress relieving activity

RC102D Art in Imaging: Creativity as a Mechanism to Battle Burnout

Participants
Susan L. Summerton, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

susan.summerton@pennmedicine.upenn.edu

LEARNING OBJECTIVES

The learner should understand the definition of burnout.The learner should be apply to understand mechanisms for preventing burnout

ABSTRACT

NA

RC102E Recruitment of Women and Minority in Radiology: Mitigate Unconscious Bias

Participants
Amita Kamath, MD,MPH, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

amita.kamath@mountsinai.org

LEARNING OBJECTIVES

1) Understand the challenges facing program directors in recruiting women and minorities to radiology residency training. 2) Discuss strategies to mitigate unconscious bias in the interview and ranking process. 3) How to Maintain and Sustain an effective recruitment strategy.

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RC103

Current Practice and Emerging Techniques in Coronary CT

CA CT

Participants
Geoffrey D. Rubin, MD, Tucson, AZ (*Moderator*) Consultant, Fovia, IncAdvisor, HeartFlow, IncAdvisor, Boehringer Ingelheim GmbHAdvisor, Nano-X Imaging
Brian B. Ghoshhajra, MD, Boston, MA (*DPS Upload*) Research Grant, Siemens AG;

LEARNING OBJECTIVES

Understand the indications for myocardial perfusion CT.Review the contraindications to stress perfusion agents.Review the physics and physiology relevant to myocardial CT imaging.Learn the methods for qualitative and quantitative interpretation of myocardial perfusion CT, and how it can be applied in daily practice.Review future directions for myocardial perfusion CT.

Sub-Events

RC103A Interpreting and Reporting Coronary CTA Using CAD-RADS

Participants
Ricardo C. Cury, MD, Coral Gables, FL (*Presenter*) Research Grant, General Electric CompanyConsultant, EssilorLuxotticaConsultant, Covera Health

LEARNING OBJECTIVES

1) Describe the CAD-RADS classification with clear examples. 2) Discuss appropriate use of the CAD-RADS lexicon in reporting Coronary CT Angiography. 3) Discuss recommendations to facilitate decision making regarding further patient management after Coronary CT Angiography.

RC103B CT Derived Fractional Flow Reserve

Participants
Geoffrey D. Rubin, MD, Tucson, AZ (*Presenter*) Consultant, Fovia, IncAdvisor, HeartFlow, IncAdvisor, Boehringer Ingelheim GmbHAdvisor, Nano-X Imaging

RC103C Myocardial Perfusion Imaging in Cardiac CT

Participants
Brian B. Ghoshhajra, MD, Boston, MA (*Presenter*) Research Grant, Siemens AG;

RC104

Advanced Imaging of Hand and Wrist

MK

AMA PRA Category 1 Credit ™: 1.00

Participants
Linda Probyn, MD, Toronto, ON (*Moderator*) Nothing to Disclose

Sub-Events

RC104A Extensor Tendon Injuries

Participants
Theodore T. Miller, MD, New York, NY (*Presenter*) Nothing to Disclose

RC104B Ligament Injuries

Participants
Mihra S. Taljanovic, MD, Tucson, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mihrat@radiology.arizona.edu

RC104C Finger Pearls and Pitfalls

Participants
Tetyana A. Gorbachova, MD, Huntingdon Valley, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gorbacht@einstein.edu

LEARNING OBJECTIVES

1) Recognize normal osseous and soft issue anatomy of the fingers on MRI. 2) Describe various types of finger injuries and their clinical and treatment implications. 3) Identify common pitfalls in diagnosis of finger injuries on MRI.

RC104D Thumb Pearls and Pitfalls

Participants
Linda Probyn, MD, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe relevant anatomy of the thumb. 2) Explain common pathologies related to thumb injuries. 3) Compare various imaging modalities and how they can be compimentary to assist in diagnosing injuries of the thumb.

RC105

High-Yield Pediatric Neuroradiology

NR PD

Participants
Birgit B. Ertl-Wagner, MD, Toronto, ON (*Moderator*) Spouse, Employee, Siemens AG Spouse, Stockholder, Siemens AGAuthor, Springer Nature
Erin S. Schwartz, MD, Philadelphia, PA (*Moderator*) Editor, Anderson Publishing, LtdResearch Consultant, TissueTech, Inc
Tina Y. Poussaint, MD, Boston, MA (*Moderator*) Nothing to Disclose
Birgit B. Ertl-Wagner, MD, Toronto, ON (*DPS Upload*) Spouse, Employee, Siemens AG Spouse, Stockholder, Siemens AGAuthor, Springer Nature

Sub-Events

RC105A Congenital Disorders of the Brain: My Top Five Tips

Participants
A. James Barkovich, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To be able to identify the most likely disorders responsible for the patients' symptoms based upon the imaging characteristics seen on the MRI. 2) To understand the malformation type by using a standard approach to assess 6 areas of the brain.

RC105B Brain Tumor Imaging in the Molecular Era: My Top Five Tips

Participants
Zoltan Patay, MD, PhD, Memphis, TN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Familiarize with new concepts introduced in the 2016 update of the WHO Classification of Tumors of the Central Nervous System and explain their relevance for the practicing radiologist. 2) Review strategies to use imaging biomarkers to characterize pediatric brain tumors based on their histoarchitectural and pathophysiological features. 3) Explain the role of radiomics and imaging genomics in pediatric brain tumors in the molecular era.

RC105C Metabolic Disorders: My Top Five Tips

Participants
Birgit B. Ertl-Wagner, MD, Toronto, ON (*Presenter*) Spouse, Employee, Siemens AG Spouse, Stockholder, Siemens AGAuthor, Springer Nature

LEARNING OBJECTIVES

1) Appreciate the importance of the topographic distribution (e.g. centrifugal, centripetal, spatial gradients of involvement) of signal abnormalities in common metabolic disorders of the brain. 2) Describe important additional discriminating features to distinguish common metabolic disorders of the brain. 3) Differentiate common metabolic disorders of the brain based on their imaging pattern.

RC105D Hypoxic Ischemic Disorders: My Top Five Tips

Participants
Thierry Huisman, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

huisman@texaschildrens.org

LEARNING OBJECTIVES

1) Learn to correlate patterns of hypoxic-ischemic brain injury as seen by MRI with a. gestational age of the neonate, b. duration and c. severity of injury. 2) Discuss contributing factors including maternal infection, placental complications, congenital heart disease, and possible maternal and/or fetal metabolic challenges.

RC106

2020 Vision: Disease of the Orbit and Visual Pathway

HN NR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC106A Orbital Trauma

Participants
Mary Beth E. Cunnane, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC106B An Anatomic Approach to Orbital Pathology

Participants
Ashok Srinivasan, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ashoks@med.umich.edu

LEARNING OBJECTIVES

1) To discuss an approach to diagnosis of orbital pathologies based on clinical features and anatomical localization of lesions.

RC106C Vision Loss

Participants
Tabassum A. Kennedy, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the anatomy of the visual pathway. 2) Have a systematic approach to analyzing patients presenting with visual loss based on pattern of scotoma.

RC106D Diplopia

Participants
Ilona M. Schmalfuss, MD, Gainesville, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the location and course of cranial nerves 3,4 and 6 and theri relations to pertinent adjacent anatomical structures. 2) Analyze CT or MRI studies to determine the most likely diagnosis causing the neuropathy of cranial nerves 3,4 and 6.

RC107

Prostate MRI and Molecular Imaging: Core and Advanced Applications

GU MI MR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Sub-Events

RC107A Prostate MR Update: Protocol and Interpretation Tips

Participants
Aytekin Oto, MD, Chicago, IL (*Presenter*) Research Grant, Koninklijke Philips NVResearch Grant, Guerbet SAResearch Grant, Profound Medical IncMedical Advisory Board, Profound Medical IncConsultant, IBM CorporationFounder and co-owner, QMIS TBS Capital Group Corp

For information about this presentation, contact:

oto@uchicago.edu

LEARNING OBJECTIVES

1) Describe the evolving role of MRI in prostate cancer management. 2) Discuss the recent updates on prostate MR protocol and interpretation. 3) Provide tips that can help to improve image quality and optimize MR protocol. 4) Illustrate the added value of some of the novel MR approaches on image interpretation.

RC107B Molecular Imaging of Prostate Cancer for Biochemical Recurrence and Metastatic Disease

Participants
Thomas A. Hope, MD, San Francisco, CA (*Presenter*) Research Grant, Koninklijke Philips NVAdvisory Board, Ipsen SAConsultant, CuriumResearcher, Advanced Accelerator Applications SA

For information about this presentation, contact:

thomas.hope@ucsf.edu

LEARNING OBJECTIVES

1) To review the mechanism of PSMA PET, and how it may be beneficial over existing PET radiotracers. 2) To describe the various PSMA radiotracers and potential differences between the radiotracers. 3) To understand the the potential roles of PSMA PET in patients with biochemical recurrence. 4) To present the potential roles of PSMA PET in castration resistant prostate cancer.

ABSTRACT

Prostate Specific Membrane Antigen (PSMA) is a trans-membrane protein that is overexpressed on prostate cancer cells. New small molecules that target PSMA have been developed and are currently being used to imaging prostate metastases. These new radioligands have a high sensitivity for the detection of disease compared to existing radiotracers, and their clinical use is leading to significant changes in management with prostate cancer.

RC107C Quality Control for Prostate MRI and MRI-targeted Biopsy

Participants
Anwar R. Padhani, MD,FRCR, Northwood, United Kingdom (*Presenter*) Advisory Board, Siemens AGSpeakers Bureau, Siemens AGSpeakers Bureau, Johnson & Johnson

For information about this presentation, contact:

anwar.padhani@stricklandscanner.org.uk

LEARNING OBJECTIVES

(1) To understand the need to certify readers, biopsy operators and accredit diagnostic units. (2) To innumerate the causes of variability in the ability of mpMRI to deliver patient benefits in men with negative and positive results. (3) To get to know of international efforts regarding reader training, performance assessments and certification. (4) To realise the magnitude of patient benefits attainable in an accredited environment.

ABSTRACT

None

RC107D Quantitative Prostate MRI

Participants
Fiona M. Fennessy, MD,PhD, Brookline, MA (*Presenter*) Consultant, VirtualScopics, Inc

For information about this presentation, contact:

ffennessy@bwh.harvard.edu

LEARNING OBJECTIVES

1) To outline the importance of quantitative prostate MRI in assessing prostate cancer heterogeneity. 2) To review current status of radiomic assessment of the imaging phenotype and its correlation with biological features of prostate cancer. 3) To review novel quantitative methods for assessing underlying prostate tissue microstructural features.

RC107E AI in Prostate MRI

Participants
Masoom A. Haider, MD, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe some good AI use cases for Prostate MRI. 2) Describe the performance of AI computer aided diagnostic and prognostic tools for prostate MRI. 3) Understand some basic terms and steps related to convolutional neural networks and their development for prostate MRI.

RC107F PET-MRI for Local Prostate Cancer Detection

Participants
Nelly Tan, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review limitations of Prostate MRI for prostate cancer detection and staging. 2) Understand the added Value of PET/MR for Prostate Cancer Detection and Staging. 3) Case-base review demonstrating complementary role of PET and MRI.

ABSTRACT

Prostate MRI is an outstanding initial evaluation for prostate cancer, however has significant limitations for prostate cancer detection and staging. Major limitations for prostate MRI include the evaluation of T3 disease, low inter-reader agreement for transition zone and PIRADS 3 lesions, and limited evaluation for multifocal prostate cancer. PET provides a complementary role in prostate MRI detection and staging by closing the gaps that currently exist with prostate MRI, in addition to providing functional information such as the biologic aggressiveness of the cancer. In the lecture, we will review the complimentary roles and review cases demonstrating the added value for PET in PET/MR for prostate cancer detection and staging.

RC108

Emergency Neuroradiology: Tumoral Emergencies

ER HN NR

AMA PRA Category 1 Credit ™: 1.00

Participants
A. Orlando Ortiz, MD, MBA, New Rochelle, NY (*Moderator*) Nothing to Disclose

Sub-Events

RC108A Brain Tumor Emergencies

Participants
Wayne S. Kubal, MD, Tucson, AZ (*Presenter*) Author, Reed ElsevierEditor, Reed Elsevier

RC108B Spine Tumor Emergencies

Participants
A. Orlando Ortiz, MD, MBA, New Rochelle, NY (*Presenter*) Nothing to Disclose

RC108C Head and Neck Tumor Emergencies

Participants
Alain A. Cunqueiro, MD, Bronx, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To recognize the imaging appearances of the most common emergency conditions associated with head and neck neoplasms and their associated treatments.

Printed on: 05/05/21

RC109

Challenging Abdominal Imaging Cases

CT GI MR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC109A Challenging Cases: Pancreas/Biliary

Participants
Silvia D. Chang, MD, Vancouver, BC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Silvia.Chang@vch.ca

LEARNING OBJECTIVES

1) Apply an approach to assessing challenging panceatic and biliary masses. 2) Develop a resonable differential diagnosis for challenging pancreatic and biliary masses. 3) Identify imaging pitfalls of pancreatic and biliary masses.

RC109B Challenging Cases: Liver

Participants
Aarti Sekhar, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

aarti.sekhar@gmail.com

RC109C Challenging Cases: CT Colonography

Participants
Kevin J. Chang, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Kevin.Chang@gmail.com

LEARNING OBJECTIVES

1) Improve basic knowledge and skills related to interpretation of CT colonography exams.2) Develop techniques to approach challenging CT colonography cases.3) Identify significant imaging pitfalls in CT colonography.

RC109D Challenging Cases: Rectal MR

Participants
Courtney C. Moreno, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

courtney.moreno@emoryhealthcare.org

LEARNING OBJECTIVES

1) Improve basic knowledge and skills related to interpretation of rectal cancer staging MR exams. 2) Apply techniques to improve approach challenging rectal MR cases. 3) Assess the results of new research and their application to interpretation of recal cancer MR exams.

RC110

Hepatobiliary Sonography 2020: Update Controversies

Thursday, Dec. 3 3:30PM - 4:30PM Room: Channel 3

GI US

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC110A **Sonography of Diffuse Liver Disease: Pearls and Pitfalls**

Participants
Mitchell E. Tublin, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

RC110B **Sonography of Focal Liver Lesions**

Participants
Helena Gabriel, MD, Chicago, IL (*Presenter*) Nothing to Disclose

RC110C **Gallbladder and Biliary Sonography**

Participants
Aya Kamaya, MD, Stanford, CA (*Presenter*) Royalties, Reed Elsevier

Printed on: 05/05/21

RC111

Response Assessment on PET/CT

Sunday, Nov. 29 10:00AM - 11:00AM Room: Channel 3

CT NM

AMA PRA Category 1 Credit ™: 1.00

Participants
Esma A. Akin, MD, Washington, DC (*Moderator*) Nothing to Disclose
Phillip H. Kuo, MD,PhD, Tucson, AZ (*Moderator*) Consultant, Novartis AGMedical Director, Konica Minolta, IncConsultant, Konica Minolta, IncConsultant, Bayer AGConsultant, Eisai Co, LtdSpeaker, Eisai Co, LtdConsultant, General Electric CompanySpeaker, General Electric CompanyGrant, General Electric CompanyGrant, Blue Earth Diagnostics Ltd

Sub-Events

RC111A An Overview of Response Assessment on PET/CT

Participants
Eric M. Rohren, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose

RC111B Illustrative Cases Part I

Participants
Esma A. Akin, MD, Washington, DC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the utility of PET/CT in management and follow up gynecologic malignancies including cervical and ovarian cancer. 2) Discuss the advantages of PET/CT in various clinical scenarios throughout the disease process, supported by updated data analysis in each disease entity. 3) Highlight both the advantages as well as the limitations of PET/CT in evaluation of treatment response in these gynecologic tumors including inchallenging cases.

RC111C Illustrative Cases Part II

Participants
Phillip H. Kuo, MD,PhD, Tucson, AZ (*Presenter*) Consultant, Novartis AGMedical Director, Konica Minolta, IncConsultant, Konica Minolta, IncConsultant, Bayer AGConsultant, Eisai Co, LtdSpeaker, Eisai Co, LtdConsultant, General Electric CompanySpeaker, General Electric CompanyGrant, General Electric CompanyGrant, Blue Earth Diagnostics Ltd

RC112

Body CT Angiography: 2020 Update

CT VA

Participants
Alan H. Stolpen, MD,PhD, Iowa City, IA (*Moderator*) Royalties, Reed Elsevier
Smita Patel, FRCR,MBBS, Ann Arbor, MI (*Moderator*) Nothing to Disclose
Edwin A. Takahashi, MD, Rochester, MN (*DPS Upload*) Nothing to Disclose

Sub-Events

RC112A Thoracic CTA

Participants
Smita Patel, FRCR,MBBS, Ann Arbor, MI (*Presenter*) Nothing to Disclose

RC112B Abdominal CTA

Participants
Edwin A. Takahashi, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RC112C Peripheral CTA

Participants
Alan H. Stolpen, MD,PhD, Iowa City, IA (*Presenter*) Royalties, Reed Elsevier

RC113

Fetal/Neonatal Imaging

OB PD

AMA PRA Category 1 Credit ™: .75

Sub-Events

RC113A Fetal Bowel Imaging

Participants
Brandon P. Brown, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose

RC113B Sonography in Neonatal Bowel Evaluation

Participants
Monica Epelman, MD, Orlando, FL (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

RC115

Screen Recommendation

BR

AMA PRA Category 1 Credit ™: 1.00

Participants
Edward A. Sickles, MD, San Francisco, CA (*Moderator*) Nothing to Disclose

Sub-Events

RC115A ACR Updates

Participants
Edward A. Sickles, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

RC115B New Approaches to the Evaluation of Population-based Mammography Screening: The Incidence Rate of Fatal Breast Cancer

Participants
Robert A. Smith, PhD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

New Approaches to the Evaluation of Population-based Mammography Screening-the Incidence Rate of Fatal Breast Cancer1) The attendee will understand inherent limitations in the different study designs in the evaluation of mammography2) The attendee will be able to describe how measuring the incidence of fatal breast cancer overcomes the limitations of other observational study designs3) The attendee will be able to understand how the question of the relative contributions of treatment versus screening are answered using incidence of fatal breast cancer methodology4) The attendee will be able to describe recent findings on the benefit of mammography among women who attend mammography screening compared with those who do not.

RC115C NCCN Updates

Participants
Mark A. Helvie, MD, Ann Arbor, MI (*Presenter*) Institutional Grant, General Electric CompanyInstitutional Grant, IBM Corporation

Printed on: 05/05/21

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

RC116

Tips from the Editors: RSNA's Scientific Publications

ED RS

Participants
David A. Bluemke, MD,PhD, Madison, WI (*Moderator*) Nothing to Disclose
Gary D. Luker, MD, Ann Arbor, MI (*Presenter*) Research Grant, Polyphor, Ltd; Consultant, Polyphor, Ltd
Suhny Abbara, MD, Dallas, TX (*Presenter*) Royalties, Reed Elsevier; ;
Charles E. Kahn JR, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose
David A. Bluemke, MD,PhD, Madison, WI (*Presenter*) Nothing to Disclose
David A. Bluemke, MD,PhD, Madison, WI (*DPS Upload*) Nothing to Disclose

For information about this presentation, contact:

ckahn@upenn.edu

LEARNING OBJECTIVES

1) Learn about the goals, organization, and content of RSNA's scientific journals. 2) Describe the manuscript types and their requirements. 3) Understand how to be a successul author or reviewer for an RSNA journal.

Printed on: 05/05/21

RC118

Challenges and Opportunities for Cancer Screening

MR OI

Participants
Marc J. Gollub, MD, New York, NY (*Moderator*) Nothing to Disclose
Giuseppe Petralia, MD, Milan, Italy (*DPS Upload*) Nothing to Disclose

For information about this presentation, contact:

es220@cam.ac.uk

giuseppe.petralia@ieo.it

LEARNING OBJECTIVES

1) Examine the principles for assessing the evidence of benefit for cancer screening. 2) Assess the current advances in cancer prevention, early detection and genetic evaluation. 3) Describe how more sophisticated risk stratification could lead to tailored screening approaches. 4) Appraise the unintended consequences of screening and the need for new approaches to minimise harm. 5) Appreciate the various ways risk for developing breast cancer can be assessed. 6) Understand the contribution mammographic breast density to risk of developing breast cancer. 7) Recognise the problem of masking caused by breast density. 8) Appreciate the various supplemental imaging methods that can be offered to women with dense breasts. 9) Gain knowledge about the evidence supporting HCC surveillance. 10) Understand the modalities of HCC surveillance. 11) Be aware of main limitations and controversies. 12) Understand and compare the surveillance policies in different countries. 13) Describe the best use of Whole Body MRI for cancer screening. 14) Apply the most appropriate protocol when using Whole Body MRI for cancer screening. 15) Classify the findings detected on a Whole Body MRI for cancer screening.

Sub-Events

RC118A Cancer Screening Advantages and Pitfalls

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

rcarlos@med.umich.edu

LEARNING OBJECTIVES

1) Review patient-centered financial considerations that influence cancer screening utilization.

RC118B Breast Cancer Risk Adaptive Screening

Participants
Fiona J. Gilbert, MD, Cambridge, United Kingdom (*Presenter*) Research Grant, Hologic, IncResearch Grant, General Electric Company Research Consultant, Alphabet IncResearch support, Bayer AGResearch collaboration, Volpara Health Technologies Limited

For information about this presentation, contact:

fjg28@cam.ac.uk

LEARNING OBJECTIVES

1) Appreciate the various ways risk for developing breast cancer can be assessed. 2) Understand the contribution mammographic breast density to risk of developing breast cancer. 3) Recognise the problem of masking caused by breast density. 4) Appreciate the various supplemental imaging methods that can be offered to women with dense breasts.

ABSTRACT

There are a number of factors that contribute to the risk of developing breast cancer. In those individuals with a genetic predisposition the lifetime risk can be up to 80%. For those without a genetic predisposition age is still the greatest risk but family history can play a role as well as breast density. Single nucleotide polymorphisms have a very small risk but can give an additive effect. Together this information can be used to create a risk profile. For those women in the higher risk categories a more targetted imaging strategy can be used. This is being explored in the WISDOM and MyPEBS trials where frequency of mammography is being varied according to risk. Breast density can mask breast cancers and lead to detection at a later stage or presentation as interval cancers. These larger cancers have a much worse prognosis. Supplemental imaging is being advocated to to detect cancers at an earlier stage. However it is important to evaluate the variaous techniquessuch as abbreviated MRI, Contrast enhanced mammography and breast ultrasound as in the BRAID trial. The size, type and grade of additional cancers that are found as well as interval cancer rates are important to estimate the benefits of making such changes to a screening programme.

RC118C Lung Cancer Screening

Participants
Claudia I. Henschke, MD,PhD, New York, NY (*Presenter*) Nothing to Disclose

RC118D Liver Screening for HCC

Participants
Maxime Ronot, MD, Clichy, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Gain knowledge about the evidence supporting HCC surveillance. 2) Understand the modalities of HCC surveillance. 3) Be aware of main limitations and controversies. 4) Understand and compare the surveillance policies in different countries.

RC118E Whole Body MRI for Cancer Screening

Participants
Giuseppe Petralia, MD, Milan, Italy (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the latest evidences on the use of WB-MRI for cancer screening. 2) Provide the basic knowledge on MRI technology and on the interpretation of findings for WB-MRI in cancer screening. 3) Discuss the application of new reporting systems for WB-MRI in cancer screening. 4) Discuss the management of findings detected on WB-MRI performed for cancer screening.

RC121

Innovations in Medical Imaging Physics with Deep Learning

Saturday, Dec. 5 8:30AM - 9:30AM Room: Channel 1

AI PH

AMA PRA Category 1 Credit ™: 1.00

Participants
Guang-Hong Chen, PhD, Madison, WI (*Moderator*) Nothing to Disclose
Lifeng Yu, PhD, Rochester, MN (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To cover machine learning demystified from a physicist's perspective. 2) Teach 'machine' to reduce image noise in CT. 3) Teach 'machine' to remove image artifacts in CT. 4) Teach 'machine' to reconstruct images.

ABSTRACT

In this presentation, we will share with audience on how we can leverage the power of deep learning computational framework to improve image quality in CT fields. We will cover four aspects in this presentation to help audience get some sense on machine learning, deep learning, artificial intelligence in medical CT.

Sub-Events

RC121A Applications of Deep Learning in CT Image Formation

Participants
Guang-Hong Chen, PhD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the connection between deep learning and other conventional learning methods. 2) Understand CT image reconstruction pipeline can be implemented using deep learning framework. 3) Understand the need of extra scientific rigor to ensure deep learning can work in practice.

RC121B Applications of Deep Learning in MRI and PET/MRI Image Formation

Participants
Fang Liu, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Present a technical overview of DL in medical imaging and discuss some recent DL applications that successfully translate new learning-based approaches into performance improvement in MR and PET/MR imaging workflow. 2) Draw tightly connections between fundamental DL concepts and technical challenges in medical imaging. 3) Cover rapid image acquisition and reconstruction to image post-processing such as image segmentation and synthesis in MR and PET/MR. 4) Discuss open problems in DL that are particularly relevant to medical imaging and the potential challenges and opportunities in this emerging field.

ABSTRACT

Medical imaging is a research field that remains lots of technical and clinical challenges. The recent development of Artificial Intelligence, particularly Deep Learning (DL), has demonstrated great potentials to resolve such challenges.

RC121C Applications of Deep Learning in CT Image Quality Evaluation

Participants
Lifeng Yu, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the state-of-the-art CT image quality evaluation methods and challenges. 2) Review the applications of deep learning-based methods in CT image quality evaluation.

RC122

Functional MR Imaging for Normal Tissue Response Assessment in Radiotherapy

BQ MR PH RO

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) Grant, RaySearch Laboratories AB; License agreement, RaySearch Laboratories AB; Research support, Mirada Medical Ltd
Martha M. Matuszak, PhD, Ann Arbor, MI (*DPS Upload*) Research funding, Varian Medical Systems, Inc; Consultant, Varian Medical Systems, Inc

Sub-Events

RC122A State of the Art in Functional MR Imaging for Normal Tissue Assessment

Participants
Kiaran P. McGee, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify underlying biological processes associated with functional magnetic resonance imaging techniques. 2) List most commonly used functional imaging techniques in magnetic resonance imaging. 3) Explain the physics of various functional magnetic resonance imaging technique described in the presentation.

RC122B Clinical Need for Functional MR Imaging for Normal Tissue Assessment in Radiation Therapy

Participants
Clifton D. Fuller, MD,PhD, Houston, TX (*Presenter*) Research Consultant, Elekta AB; Research Grant, Elekta AB; Speaker, Elekta AB

LEARNING OBJECTIVES

1) Discuss the relevant needs for normal tissue imaging after radiotherapy, using head and neck radiotherapy as a use case. 2) Define opportunities for enhanced normal tissue imaging procedures for post-therapy toxicity and monitoring.

RC122C Technical Challenges in the Integration of Functional MR Imaging for Normal Tissue Assessment into Radiotherapy

Participants
Martha M. Matuszak, PhD, Ann Arbor, MI (*Presenter*) Research funding, Varian Medical Systems, Inc; Consultant, Varian Medical Systems, Inc

LEARNING OBJECTIVES

1) Discuss the challenges in incorporating functional MR into treatment planning.

RC123

Advanced Ultrasound Technology and Applications

PH US

FDA Discussions may include off-label uses.

Participants
William F. Sensakovic, PhD, Phoenix, AZ (*Moderator*) Founder, Telerad Physics Teaching, LLC
Thaddeus A. Wilson, PhD, Memphis, TN (*Moderator*) Nothing to Disclose
Richard G. Barr, MD, PhD, Canfield, OH (*DPS Upload*) Consultant, Siemens AGSpeakers Bureau, Siemens AGResearch Grant, Siemens AGConsultant, Koninklijke Philips NVSpeakers Bureau, Koninklijke Philips NVConsultant, Canon Medical Systems CorporationResearch Grant, SuperSonic ImagineResearch Grant, Bracco GroupResearch Grant, Esaote SpAResearch Grant, BK UltrasoundResearch Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) Understand the role of contrast agents in ultrasound. 2) Explain the science and technology behind strain imaging. 3) Implement strain imaging and ultrasound contrast in clinical practice.

Sub-Events

RC123A Contrast Agents

Participants
Peter N. Burns, PhD, Toronto, ON (*Presenter*) Research collaboration, Koninklijke Philips NV

LEARNING OBJECTIVES

1) Understand the physical composition of microbubble contrast agents and how they interact with an ultrasound field. 2) Describe the principles of contrast specific imaging modes found on modern ultrasound scanners. 3) Review the characteristics of contrast images and flow measurements as the basis for their interpretation in a clinic setting.

RC123B Elasticity Imaging

Participants
Stephen McAleavey, PhD, Rochester, NY (*Presenter*) Research collaboration, Siemens AG;

For information about this presentation, contact:

stephen.mcaleavey@rochester.edu

LEARNING OBJECTIVES

1) Explain the physical principles of several elasticity imaging methods in clinical use. 2) Understand capabilities and limitations of elasticity methods. 3) Describe current and emerging clinical applications of elasticity imaging.

RC123C Clinical Advice on the Use of CEUS and Elastography

Participants
Richard G. Barr, MD, PhD, Canfield, OH (*Presenter*) Consultant, Siemens AGSpeakers Bureau, Siemens AGResearch Grant, Siemens AGConsultant, Koninklijke Philips NVSpeakers Bureau, Koninklijke Philips NVConsultant, Canon Medical Systems CorporationResearch Grant, SuperSonic ImagineResearch Grant, Bracco GroupResearch Grant, Esaote SpAResearch Grant, BK UltrasoundResearch Grant, Hitachi, Ltd

LEARNING OBJECTIVES

1) To review appropriate use of ultrasound contrast in the clinical setting. 2) Discuss which patients would benefit from a contrast enhanced ultrasound. 3) Review the requirements for performing a contrast enhanced ultrasound. 4) Review which applications are appropriate for elastography. 5) Discuss how elastography can help in diagnosis.

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

RC127

Payment Reform and Radiology: A Critical Look

HP

AMA PRA Category 1 Credit ™: 1.00

Participants
Andrew B. Rosenkrantz, MD, New York, NY (*Moderator*) Nothing to Disclose

Sub-Events

RC127A The Future of the MIPS

Participants
Lauren P. Golding, MD, Summerfield, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

laurengoldingmd@gmail.com

LEARNING OBJECTIVES

Discuss current state of MIPS and updates related ot the COVID 19 pandemic. Discuss updates to the QPP for 2021 and future direction of the program.

RC127B Trends in Hospital-based Reimbursement

Participants
Kurt A. Schoppe, MD, Grapevine, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Describe the different between HOPPS and Medicare Physician Fee Schedule.Undertand how HOPPS payments affect payments at facilities NOT affiliated with hospitals.Know how you can help ensure accurate payments to hospitals.

RC127C Medicaid and Radiology

Participants
Raymond K. Tu, MD, Washington, DC (*Presenter*) Nothing to Disclose

RC127D Getting Paid for Population Health in Radiology

Participants
Melissa M. Chen, MD, Houston , TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

A. Define population health based payments in healthcare.B. Review opportunities for radiology to participate in population based payments

ABSTRACT

In the move towards value-based payments, population-based payments have been identified as a type of alternative payment model that would require physicians to assume financial risk. This discussion will highlight opportunities for radiologists to participate in these types of payment systems and ways that radiologists may be held accountable for the health of patients.

RC129

Machine Learning and Radiomics in MRI

AI MR

FDA Discussions may include off-label uses.

Participants
Andrea G. Rockall, FRCR,MRCP, London, United Kingdom (*DPS Upload*) Speaker, Guerbet SA

Sub-Events

RC129A Basics of Radiomics Applied to MRI

Participants
Olivier Gevaert, PhD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) How to use radiomics for multi-modal MR imaging with examples using brain MRI. 2) How to develop robust radiomics pipeline from MRI data by using normalization approaches. 3) How to place radiomics in the era of deep learning and convolutional neural networks for MRI data.

RC129B Applications of Machine Learning for Image Reconstruction

Participants
Florian Knoll, New York, NY (*Presenter*) Facebook AI research: Research partnership, Siemens Healthcare: Research partnership, Amazon Web Services: Dataset grant

For information about this presentation, contact:

florian.knoll@nyumc.org

LEARNING OBJECTIVES

1) Brief review of state-of-art MR acquisition and reconstruction schemes. 2) Examine why deep learning is of interest in MR image reconstruction. 3) Explore some of the novel proposed methods for image reconstruction and discuss potential applications.

ABSTRACT

Machine learning or deep learning is a powerful tool that is already impacting or will impact the entire imaging life cycle. In this talk we will focus on the role of machine learning (specifically deep learning) in MR image generation (reconstruction).

RC129C MRI Applications of Machine Learning for Cancer Diagnosis

Participants
Andrea G. Rockall, FRCR,MRCP, London, United Kingdom (*Presenter*) Speaker, Guerbet SA

LEARNING OBJECTIVES

1) To be familiar with some key examples of clinical development of machine learning tools in MRI in oncology. 2) To know about many of the challenges related to MRI oncology datasets. 3) To be aware of methods of clinical validation of machine learning tools in MRI in oncology.

RC132

Show Me the Money: Financial Outlook of Radiology

HP LM

AMA PRA Category 1 Credit ™: .75

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose
James A. Brink, MD, Boston, MA (*Moderator*) Board of Directors, Accumen, Inc

Sub-Events

RC132A Financial Outlook of Large Private Practice

Participants
Gregory N. Nicola, MD, New York, NY (*Presenter*) Conultant, Xstrahl Ltd; Consultant, NeuTigers

For information about this presentation, contact:

gnnicola@yahoo.com

LEARNING OBJECTIVES

1) Review categories of disruptors to the large radiology group practice type. 2) Encourage innovator thinking strategies to mitagate downside of these disruptors.

RC132B Financial Outlook of Large Academic Radiology Department

Participants
James A. Brink, MD, Boston, MA (*Presenter*) Board of Directors, Accumen, Inc

For information about this presentation, contact:

jabrink@mgh.harvard.edu

LEARNING OBJECTIVES

1) To understand key drivers of financial performance in academic radiology. 2) To explore various factors that may improve the financial outlook of a large academic radiology department. 3) To consider specific revenue cycle enhancements and expense management initiatives that may have a favorable financial impact.

RC132C Financial Outlook of Radiology from International Perspective-Japan

Participants
Shigeki Aoki, MD, PhD, Tokyo, Japan (*Presenter*) GE, Toshiba/Canon, Fuji Film, Fuji RI/Toyama Kagaku, Eisai, Daiichi-Sankyo/GE pharma, Mediphysics, Siemens, Bayer, Guerbet, Bracco-Eisai, Shimazu

LEARNING OBJECTIVES

1) To understand differences of the healthcare systems between US and Japan including pricing and reimbursement strategies. 2) To clarify the advantages and disadvanages of high availability of CT/MR in Japanese health care system. 3) To provide an overview of trends in radiology reimbursement and volume in Japan.

RC153

Structured Reporting: How Can We Make it Better?

IN

Participants
Olga R. Brook, MD, Boston, MA (*Moderator*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn benefits of disease-specific vs simple structured reporting in debate format. 2) To learn value of structured reporting for machine learning. 3) To learn about added value of specific disease-specific structured reports in neuroradiology and thoracic imaging.

Sub-Events

RC153A Change Management for Implementation of Structured Reporting in the Radiology Enterprise

Participants
Shlomit Goldberg-Stein, MD, Bronx, NY (*Presenter*) Nothing to Disclose

RC153B Added Value of Disease-specific Structured Reporting in Thoracic Radiology

Participants
Jonathan H. Chung, MD, Chicago, IL (*Presenter*) Royalties, Reed ElsevierConsultant, Boehringer Ingelheim GmbHSpeakers Bureau, Boehringer Ingelheim GmbHConsultant, F. Hoffmann-La Roche LtdSpeakers Bureau, F. Hoffmann-La Roche LtdConsultant, Veracyte, Inc

LEARNING OBJECTIVES

1) Understand that structured reports encourage positive radiologist behavior. 2) Recognize how structured, disease specific templates can aid in quality improvement. 3) Understand how structured, disease specific templates can help our clinical colleagues.

RC153C The Importance of Structured Reporting for Machine Learning

Participants
Wieland H. Sommer, MD, Munich, Germany (*Presenter*) Founder, Smart Reporting GmbH

LEARNING OBJECTIVES

1) To understand the challenges for integrating machine learning algorithms into a radiological reporting workflow. 2) To understand the importance of analyzable data for training of machine learning algorithms.

RC153D Debate: Simple-structured versus Disease-specific Structured Reporting-Simple-structured is Better

Participants
Marta E. Heilbrun, MD,MS, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain why simple reporting templates facilitate workflow and efficiency. 2) Understand solutions also provide to disease specific or tailored reporting.

RC153E Debate: Simple-structured versus Disease-specific Structured Reporting-Disease-specific is Better

Participants
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about benefits of disease-specific structured reporting and its implementation.

ABSTRACT

Disease-specific structured reporting is the next step in the evolution of radiology reporting. Simple structured reporting (organ level, paragraph style) is great solution for normal or near normal studies. However, when dealing with a specific disease entity, a tailored report serves better needs of referral physicians, as it provides all pertinent negative and positive findings needed to make a clinical decision.

RC153F Impact of LIRADS on Patient's Management

Participants
Victoria Chernyak, MD,MS, Bronx, NY (*Presenter*) Consultant, Bayer AG

For information about this presentation, contact:

vichka17@hotmail.com

LEARNING OBJECTIVES

1) To review LI-RADS diagnostic categories. 2) To review management recommendations for LI-RADS categories. 3) To review advantages of structured reporting for liver cancer. 4) To review impact of structured reporting on management of patients at risk for HCC.

Printed on: 05/05/21

RC154

Radiology Informatics Mistakes and War Stories from the Physician Front Lines

Thursday, Dec. 3 2:00PM - 3:00PM Room: Channel 3

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Peter B. Sachs, MD, Aurora, CO (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

peter.sachs@cuanschutz.edu

LEARNING OBJECTIVES

1) Provide attendees with an informative and often humorous look at challenging situations that have faced leading imaging informaticists over their careers. 2) To share some of our most significant mistakes in the hopes of helping others to avoid them and grow as informatics providers and leaders.

ABSTRACT

N/A

Sub-Events

RC154A 'And Yes, I AM Yelling at You!'

Participants
Peter B. Sachs, MD, Aurora, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

peter.sachs@cuanschutz.edu

LEARNING OBJECTIVES

1) Discuss the complexities of functioning as an imaging informaticist in a department, hospital and large health system. 2) Review some basic do's and don'ts of communication as a physician informaticist in a management/leadership role.

RC154B I Almost Got Fired as the Enterprise IT Doc

Participants
Christopher J. Roth, MD, Durham, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the importance of communication and outreach in informatics project success. 2) Reinforce the value of calling reference sites for how applications are used and by whom it is being used. 3) Appreciate that professional activity and burnout have significant influences on personal life.

RC154C System Upgrades Can Be Downgrades

Participants
Safwan Halabi, MD, Mountain View, CA (*Presenter*) Officer, InterfierceStockholder, DNAFeedAdvisor, Bunker Hill

RC154D Hope is Not a Downtime Solution

Participants
James Whitfill, MD, Scottsdale, AZ (*Presenter*) President, Lumetis LLCSpouse, Shareholder, Radiology Partners

LEARNING OBJECTIVES

1) Understand the impact of a prolonged downtime on a radiology practice. 2) Review the steps to implementing a formal downtime solution. 3) Review common points of failure leading to need for a downtime solution.

RC154E When CTRL-ALT-DEL Won't Work

Participants
Peter A. Harri, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pharri@emory.edu

LEARNING OBJECTIVES

1) To understand the most common reasons for major failures of clinical imaging informatics efforts. 2) To gain exposure to

1) To understand the most common reasons for major failures of clinical imaging informatics efforts. 2) To gain exposure to techniques to recover from leadership failures and manage expectations. 3) To explore resources available to help avoid catastrophic failures in informatics leadership.

ABSTRACT

Any informaticist leading major efforts and projects in healthcare will eventually fail miserably. In this session, we'll explore the nature of these failures, how to recover from them, and how to avoid them in the first place when possible.

RC154F What We've Got Here is a Failure to Communicate

Participants
Amy L. Kotsenas, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. To develop effective communicaiton skills2. To foster collaboration and bring people together to support disruptive change3. To review the critical role of building and maintaining relationships in change management success

Printed on: 05/05/21

RC201

Current Issues in HRCT Imaging

CH CT

AMA PRA Category 1 Credit ™: .75

Participants
David A. Lynch, MBBCh, Denver, CO (*Moderator*) Research Consultant, Siemens AGResearch Consultant, PAREXEL International CorporationResearch Consultant, Boehringer Ingelheim GmbHResearch Consultant, Veracyte, IncResearch Consultant, DAIICHI SANKYO Group

Sub-Events

RC201A Drug Treatment in ILD: Indications, Requirements, Surveillance

Participants
Nicola Sverzellati, MD, Parma, Italy (*Presenter*) Consultant, PAREXEL International CorporationConsultant, Biomedic SystemConsultant, F. Hoffmann-La Roche LtdConsultant, Boehringer Ingelheim GmbHConsultant, GalapagosAdvisory Board, F. Hoffmann-La Roche LtdAdvisory Board, Boehringer Ingelheim GmbHSpeaker, F. Hoffmann-La Roche LtdSpeaker, Boehringer Ingelheim GmbH

RC201B Current Concepts in Immune-related Lung Disease

Participants
Sujal R. Desai, MBBS, London, United Kingdom (*Presenter*) Nothing to Disclose

RC201C Early Interstitial Abnormality on CT: What to Do and Why?

Participants
David A. Lynch, MBBCh, Denver, CO (*Presenter*) Research Consultant, Siemens AGResearch Consultant, PAREXEL International CorporationResearch Consultant, Boehringer Ingelheim GmbHResearch Consultant, Veracyte, IncResearch Consultant, DAIICHI SANKYO Group

RC201D Private Tour of Pediatric Interstitial Lung Disease in 2020

Participants
Edward Y. Lee, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC201E AI and Quantification in ILD

Participants
Jonathan G. Goldin, MBChB, PhD, Santa Monica, CA (*Presenter*) Nothing to Disclose

RC202

Interactive Teaching Tools

ED

AMA PRA Category 1 Credit ™: 1.00

Participants
Achint K. Singh, MD, San Antonio, TX (*Moderator*) Nothing to Disclose

Sub-Events

RC202A Stay Awake: Introduction and Demonstration of Interactive Teaching Tools in Radiology

Participants
Achint K. Singh, MD, San Antonio, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Introduction and importance of interactive teaching tools. 2) Tips to increase audience participation in the radiology conferences. 3) Demonstration of a few programs related to interactive teaching.

RC202B Using Drawing and Quizzes to Teach Anatomy and Radiology

Participants
Stefan Tigges, MD, Atlanta, GA (*Presenter*) Stockholder, Microsoft Corporation; Stockholder, General Electric Company

For information about this presentation, contact:

stigges@emory.edu

LEARNING OBJECTIVES

1) List 3 steps that instructors/learners can use to produce educational drawings. 2) List 3 ways that testing can be used to improve learning.

RC202C Flipping without Flopping

Participants
Joshua P. Nickerson, MD, Lake Oswego, OR (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

nickerjo@ohsu.edu

LEARNING OBJECTIVES

1) Compare and contrast the role of the faculty as a teacher in a traditional didactic paradigm as opposed to the flipped classroom approach to teaching. 2) Understand the supporting evidence for improved learner engagement using the flipped classroom approach. 3) Recognize the potential of alternative means of engagement including use of social media in the delivery of flipped classroom material.

RC202D Free Tools for Bringing PowerPoint Case Presentations into the 21st Century

Participants
T. Shawn Sato, MD, Iowa City, IA (*Presenter*) Research Grant, Bracco Group

For information about this presentation, contact:

shawn-sato@uiowa.edu

LEARNING OBJECTIVES

Understand the importannce of updating traditional powerpoint conferences to engage today's tech savvy trainees.Become familiar with QR codes: What they are and how to use themDemonstrate an easy way to add cross sectional videos to presentations.

RC202E Teaching in a Busy Clinical Environment

Participants
Mitva J. Patel, MD, Columbus, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mitva.patel@osumc.edu

LEARNING OBJECTIVES

Learner should be able to apply techniques and tools discussed to make teaching more effective in a clinical environment.

RC203

CT of Structural Heart Disease: Guiding Interventional Procedures

CA CT IR

FDA Discussions may include off-label uses.

Participants
Eric E. Williamson, MD, Rochester, MN (*Moderator*) Nothing to Disclose
Jonathon A. Leipsic, MD, Vancouver, BC (*DPS Upload*) Consultant, MVRx, IncConsultant, Heartflow, IncConsultant, Circle Cardiovascular Imaging IncSpeakers Bureau, General Electric CompanyResearch Grant, Edwards Lifesciences CorporationSpeakers Bureau, Edwards Lifesciences CorporationSupport, Edwards Lifesciences CorporationSpeakers Bureau, Koninklijke Philips NVSupport, Medtronic plcSupport, Abbott LaboratoriesSupport, Pi-Cardia LtdSupport, Boston Scientific Corporation

LEARNING OBJECTIVES

1) Identify the changes in the most recent guidelines for the use of CTA in TAVR. 2) Apply these to reproducibly quantify the annulus, root, and sinus features of the valve. 3) Develop a technique to translate these techniques into non-standard root anatomy such as in patients with bicuspid aortic valves. 4) Stratify the risk of complications from TAVR based on the CT features. 4) To review the role of MDCT for the diagnosis and characterization of mitral regurgitation. 5) Discuss the role of MDCT to guide transcatheter mitral interventions. 6) Review the ongoing limitations and challenges with regards to procedural planning and resultant opportunities for improved imaging guidance.

Sub-Events

RC203A TAVR Planning: Review of the Guidelines

Participants
Jonathan Weir-McCall, MBBCh, FRCR, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jw2079@cam.ac.uk

LEARNING OBJECTIVES

1) Identify the changes in the most recent guidelines for the use of CTA in TAVR. 2) Apply these to reproducibly quantify the annulus, root, and sinus features of the valve. 3) Develop a technique to translate these techniques into non-standard root anatomy such as in patients with bicuspid aortic valves. 4) Stratify the risk of complications from TAVR based on the CT features.

RC203B Planning Mitral Interventions

Participants
Jonathon A. Leipsic, MD, Vancouver, BC (*Presenter*) Consultant, MVRx, IncConsultant, Heartflow, IncConsultant, Circle Cardiovascular Imaging IncSpeakers Bureau, General Electric CompanyResearch Grant, Edwards Lifesciences CorporationSpeakers Bureau, Edwards Lifesciences CorporationSupport, Edwards Lifesciences CorporationSpeakers Bureau, Koninklijke Philips NVSupport, Medtronic plcSupport, Abbott LaboratoriesSupport, Pi-Cardia LtdSupport, Boston Scientific Corporation

LEARNING OBJECTIVES

1) To review the role of MDCT for the diagnosis and characterization of mitral regurgitation. 2) Discuss the role of MDCT to guide transcatheter mitral interventions. 3) Review the ongoing limitations and challenges with regards to procedural planning and resultant opportunities for improved imaging guidance.

RC203C Left Atrial Appendage Closure

Participants
Prabhakar Rajiah, MD, FRCR, Rochester, MN (*Presenter*) Royalties, Reed Elsevier

RC204

Knee Imaging in Athletes

Saturday, Dec. 5 11:00AM - 12:00PM Room: Channel 3

ER MK MR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC204A Meniscal Injuries

Participants
Robert S. Campbell, MBBCh, Liverpool, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rob.campbell@liverpoolft.nhs.uk

LEARNING OBJECTIVES

1) Discuss Normal Meniscal Anatomy Nomenclature and types of meniscal injury. 2) Discuss pitfalls in interpretation of meniscal injury. 3) Discuss difficult meniscal injuries.

RC204B ACL and Associated Injuries

Participants
Nogah Shabshin, MD, Raanana, Israel (*Presenter*) Consultant, Active ImplantsConsultant, CartiHeal LtdConsultant, NanoxConsultant, Greenbone

For information about this presentation, contact:

Shabshin@gmail.com

LEARNING OBJECTIVES

1) Recognize the primary and secondary imaging finding of partial and complete ACL tears. 2) Identify associated injuries that can be subtle on imaging but important for surgical outcomes.

RC204C Extensor Mechanism Injuries

Participants
Bruce B. Forster, MD, Vancouver, BC (*Presenter*) Stockholder, Canada Diagnostic CentresTravel reimbursement, Sectra AB

LEARNING OBJECTIVES

1) Differentiate congenital variants such as bipartitie patella, dorsal defect of the patella, and articular muscle of the knee from true pathology. 2) Recognize US and MRI features of patellar tendinopathy/rupture, Sinding-Larsen-Johansson Syndrome, quadriceps tendinopathy/rupture and pre-patellar burisits. 3) Iterate the radiographic and advanced imaging findings in patellar fracture, patellar dislocation/relocation, and chondromalaica patella.

RC204D Posterolateral Corner

Participants
William B. Morrison, MD, Philadelphia, PA (*Presenter*) Consultant, AprioMed ABPatent agreement, AprioMed ABConsultant, Zimmer Biomet Holdings, IncConsultant, Samsung Electronics Co, LtdConsultant, Medical Metrics, Inc

For information about this presentation, contact:

william.morrison@jefferson.edu

LEARNING OBJECTIVES

1) Understand basic anatomy of the posterolateral corner of the knee. 2) Recognize common injuries of the posterolateral corner on MRI. 3) Realize the clinical importance of these injuries.

ABSTRACT

This lecture will review the anatomy of the posterolateral corner of the knee and discuss common injury patterns.

RC204E MCL and Posteromedial Corner

Participants
Andrew J. Grainger, MD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

RC204F Postoperative Knee MRI

Participants

Robert D. Boutin, MD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

[1] Review the general surgical strategies for treating meniscus tears (the 3 R's: Resection, Repair, & Replacement) -- each with a unique MRI appearance. [2] For each surgical strategy, review the MRI findings of recurrent tear vs. no tear using a case-based approach.

Printed on: 05/05/21

RC205

Stroke

ER NR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Mahmud Mossa-Basha, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Ajay Gupta, MD, New York, NY (*Moderator*) Support, Siemens AGSupport, General Electric Company

Sub-Events

RC205A Imaging and Clinical Characteristics of Cryptogenic Stroke

Participants
Hooman Kamel, MD, New York, NY (*Presenter*) Investigator, Pfizer Inc; In-kind support, F. Hoffmann-La Roche Ltd; Committee member, Medtronic plc; Committee member, Boehringer Ingelheim GmbH

LEARNING OBJECTIVES

1) Understand the definition, scope, and clinical importance of cryptogenic stroke. 2) Identify imaging characteristics of potential underlying mechanisms of cryptogenic stroke. 3) Understand potential treatment approaches to prevent recurrence after cryptogenic stroke.

RC205B Stroke Intervention: Current Patient Selection and Future Treatment Expansion

Participants
Waleed Brinjikji, MD, Rochester, MN (*Presenter*) Consultant, Terumo CorporationConsultant, Johnson & JohnsonOwnership Interest, Marblehead Medical LLC

RC205C Current Stroke Imaging Paradigms

Participants
Howard A. Rowley, MD, Madison, WI (*Presenter*) Research Consultant, iSchemaView, IncConsultant, W. L. Gore & Associates, IncConsultant, General Electric Company

For information about this presentation, contact:

hrowley@uwhealth.org

LEARNING OBJECTIVES

1) Be able to build fast imaging protocols for stroke triage and intervention. 2) Identify CT and MR features of stroke and stroke mimics seen in emergency settings. 3) Develop an orderly conceptual approach to exam design, review, and reporting.

RC205D Intracranial Vessel Wall MRI in Stroke

Participants
Mahmud Mossa-Basha, MD, Seattle, WA (*Presenter*) Nothing to Disclose

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RC206

Pearls and Pitfalls of Sinus/Maxillofacial Imaging

HN NR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC206A Normal Sinus/Maxillofacial Anatomy

Participants
Harprit S. Bedi, MD, Wellesley, MA (*Presenter*) Nothing to Disclose

RC206B Lesions of the Jaw

Participants
Luke N. Ledbetter, MD, Los Angeles, CA (*Presenter*) Royalties, Reed Elsevier

RC206C Sinus Masses

Participants
Karen L. Salzman, MD, Salt Lake City, UT (*Presenter*) Consultant, Reed ElsevierAuthor, Reed Elsevier

For information about this presentation, contact:

karen.salzman@hsc.utah.edu

LEARNING OBJECTIVES

1) Identify common masses of the sinus. 2) Apply the knowledge to help differentiate the various sinus lesions based on clinical and imaging features.

RC206D Sinusitis and Its Complications

Participants
Ashley H. Aiken, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ashley.aiken@emoryhealthcare.org

LEARNING OBJECTIVES

1) Recognize the imaging appearance of early acute invasive fungal sinusitis on CT and MR2) Recognize the intraorbital and intracranial complications of IFS and bacterial rhinosinusitis3) Develop a standard approach and checklist for the interpretation of the sinus CT.

ABSTRACT

A specific search pattern and certain red flags will help the audience to suspect more aggressive infection or inflammation rather than routine sinusitis on the initial workhorse non-contrast sinus CT. Both CT and MR imaging play an important role in the timely diagnosis of aggressive sinonasal processes,especially invasive fungal sinusitis (IFS) . Early CT imaging findings will be reviewed, along with the clinical presentation and population at risk, in order to emphasize the importance of high clinical suspicion and early diagnosis. The complimentary role of MRI to characterize late complications of bacterial and fungal infection will also be covered.

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RC207

Advances in Imaging of Small Incidental Renal Masses (Including Cancers): Implications for Management

GU OI

Participants
Nicole M. Hindman, MD, New York, NY (*Presenter*) Nothing to Disclose
Nicola Schieda, MD, Ottawa, ON (*Presenter*) Nothing to Disclose
Stuart G. Silverman, MD, Boston, MA (*Presenter*) Nothing to Disclose
Matthew S. Davenport, MD, Ann Arbor, MI (*Presenter*) Royalties, Wolters Kluwer nv
Matthew S. Davenport, MD, Ann Arbor, MI (*DPS Upload*) Royalties, Wolters Kluwer nv

LEARNING OBJECTIVES

1) Recommend appropriate management for the incidental renal mass using the latest guidelines. 2) Describe the details of Bosniak v.2019. 3) Predict malignant subtypes of renal cancers (and differentiate from benign masses) using new developments in CT and MRI. 4) Manage small renal masses, including select renal cancers, with active surveillance based on imaging and biopsy.

Printed on: 05/05/21

RC208

Hot Topics in Emergency Radiology Practice

Sunday, Nov. 29 2:00PM - 3:00PM Room: Channel 1

ER HP

AMA PRA Category 1 Credit ™: .75

Participants
Douglas S. Katz, MD, Mineola, NY (*Moderator*) Nothing to Disclose

Sub-Events

RC208A Being an Expert Witness in Emergency Radiology

Participants
Douglas S. Katz, MD, Mineola, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

douglasscottkatzmd@gmail.com

LEARNING OBJECTIVES

1) To explain the various steps involved in becoming and being an expert witness in emergency radiology. 2) To briefly overview the process of a malpractice action from start to finish, and what the roles of an expert witness in radiology are in this process. 3) To explain the ethical issues involved in being a credible and honest expert witness in emergency radiology.

RC208B Running a Busy Private Practice Emergency Radiology Service

Participants
Robert M. Abbott, MD, Owings Mills, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rabbott@advancedradiologymd.com

LEARNING OBJECTIVES

1) Explain the development and organization of a private practice Emergency Radiology Service. 2) Describe the recommendations for recruitment, retention and sustainability in private practice Emergency Radiology. 3) Identify current challenges and future developments in private practice Emergency Radiology.

RC208C The Changing Scene of Teleradiology: Impact on Emergency Radiology

Participants
Anjali Agrawal, MD, Delhi, India (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

anjali.agrawal@telradsol.com

LEARNING OBJECTIVES

1. To highlight the challenges in emergency radiology2. To trace the evolution of teleradiology to its current state3. To study the effect of teleradiology on the practice of emergecy radiology

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RC210

First Trimester Ultrasound: Consensus and Controversies

GU OB US

Participants
Peter M. Doubilet, MD, PhD, Boston, MA (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the typical appearances of a tubal ectopic pregnancy. 2) List findings that suggest an interstitial ectopic pregnancy. 3) Differentiate a spontaneous abortion in progress from a cervical ectopic pregnancy. 4) Recommend the appropriate follow up for early pregnancies of unknown location (PUL) identified on transvaginal sonography. 5) Differentiate with certainty a failed pregnancy from a pregnancy suspicious for but not diagnostic of failed pregnancy based on the sonographer finding. 6) Diagnose ectopic pregnancy and identify its location. 7) Recognize normal fetal anatomy in the first trimester and differentiate the normal fetus from an abnormal fetus. 8) Predict the sex of the developing fetus during the first trimester and understand the importance of sex determination in some conditions. 9) Recognize 'must know' major anomalies evident in first trimester. 10) Understand the role of first trimester sex designation. 11) Evaluate first trimester assessment of multiple pregnancies.

Sub-Events

RC210A Ectopic Pregnancy

Participants
Mindy M. Horrow, MD, Philadelphia, PA (*Presenter*) Spouse, Employee, Bristol-Myers Squibb Company

LEARNING OBJECTIVES

1) Describe the typical appearances of a tubal ectopic pregnancy. 2) List findings that suggest an interstitial ectopic pregnancy. 3) Differentiate a spontaneous abortion in progress from a cervical ectopic pregnancy.

RC210B Abnormal Early Intrauterine Pregnancy

Participants
Peter M. Doubilet, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recommend the appropriate follow up for early pregnancies of unknown location (PUL) identified on transvaginal sonography. 2) Differentiate with certainty a failed pregnancy from a pregnancy suspicious for but not diagnostic of failed pregnancy based on the sonographer finding. 3) Diagnose ectopic pregnancy and identify its location. 4) Recognize normal fetal anatomy in the first trimester and differentiate the normal fetus from an abnormal fetus. 5) Predict the sex of the developing fetus during the first trimester and understand the importance of sex determination in some conditions.

ABSTRACT

During this session, findings in early pregnancy on transvaginal ultrasound will be discussed including pregnancies of unknown location (PUL), intrauterine pregnancies of uncertain viability (IPUV), and ectopic pregnancy. Criteria for definitive diagnosis of failed pregnancy will be reviewed, as will sonographic findings suspicious for but not diagnostic of failed pregnancy. Diagnosis of ectopic pregnancy will be discussed, including sonographic findings and determination of the location of the ectopic pregnancy. In addition, sonographic evaluation of the fetus during the first trimester will be presented with attention to the early diagnosis of some fetal malformation and the importance of sex determination for some conditions.

RC210C First Trimester Anomalies: Sex and Other Things

Participants
Kalesha Hack, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize 'must know' major anomalies evident in first trimester. 2) Understand the role of first trimester sex designation. 3) Evaluate first trimester assessment of multiple pregnancies.

ABSTRACT

This refresher course will review the major anomalies which must be recognized in the later half of first trimester. We will also discuss the role of assessment of external genitalia in first trimester and what key features should be documented in the assessment in twin gestation.

RC211

Advances and Updates in Scintigraphy and PET

NM

AMA PRA Category 1 Credits ™: 1.25

FDA Discussions may include off-label uses.

Sub-Events

RC211A Infection and Inflammation Imaging

Participants
Christopher J. Palestro, MD, New Hyde Park, NY (*Presenter*) Research Grant, MicroMedicine

LEARNING OBJECTIVES

1) Be knowledgeable about available SPECT and PET molecular imaging agents for inflammation and infection, including their indications. 2) Recognize and avoid pitfalls in the interpretiaon of SPECT and PET molecualr imaging studies for inflammation and infection. 3) Be acquainted with recent developments in infection specific SPECT and PET molecular imaging agents.

ABSTRACT

This lecture is designed for imaging specialists, investigators, technologists, and clinicians, who want a review of the current status of SPECT and PET molecular imaging of inflammation and infection as well as updates on new and evolving developments in the field. In addition to a review of currently available single photon and positron emitting radiopharmaceuticals, along with their indications, pitfalls and artifacts, this lecture will highlight the role of molecular imaging in cardiovascular and musculoskeletal infections as well as fever of unknown origin,.

RC211B Oncology and Endocrinology Imaging

Participants
Esma A. Akin, MD, Washington, DC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Familiarize the attendant with identifying indications of SPECT-CT imaging in various clinical scenarios to aid in diagnosis and follow up of thyroid cancer, parathyroid adenomas and neuroendocrine tumors.

RC211C A Primer on Fluciclovine PET

Participants
David M. Schuster, MD, Decatur, GA (*Presenter*) Institutional Research Grant, Nihon Medi-Physics Co, LtdInstitutional Research Grant, Blue Earth Diagnostics LtdInstitutional Research Grant, Advanced Accelerator Applications SAInstitutional Research Grant, Telix Pharmaceuticals IncInstitutional Research Grant, FUJIFILM Holdings CorporationConsultant, Syncona LtdConsultant, AIM Specialty Health, IncConsultant, Global Medical Solutions Taiwan

LEARNING OBJECTIVES

1) Describe the mechanism of uptake of the PET radiotracer fluciclovine. 2) Identify normal biodistribution and variants of fluciclovine. 3) Identify the FDA approved clinical indication of fluciclovine. 4) Discuss clinical interpretive criteria of fluciclovine PET.

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RC212

Vascular Applications for Machine Learning

Sunday, Nov. 29 3:30PM - 4:30PM Room: Channel 3

AI VA

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Tim Leiner, MD, PhD, Utrecht, Netherlands (*Moderator*) Speakers Bureau, Koninklijke Philips NVResearch Grant, Bayer AGCo-founder, Quantib BV
Vincent B. Ho, MD,MBA, Bethesda, MD (*Moderator*) Research collaboration, General Electric Company

For information about this presentation, contact:

timleiner@gmail.com

Sub-Events

RC212A Introduction

Participants
Tim Leiner, MD, PhD, Utrecht, Netherlands (*Presenter*) Speakers Bureau, Koninklijke Philips NVResearch Grant, Bayer AGCo-founder, Quantib BV

For information about this presentation, contact:

timleiner@gmail.com

LEARNING OBJECTIVES

1) Review how machine learning can be used to improve imaging of vascular disease. 2) Review how machine learning can be used for analysis of images of patients with suspected or known vascular disease.

RC212B Machine Learning for Carotid MR Plaque Detection and Segmentation

Participants
Chun Yuan, PhD, Seattle, WA (*Presenter*) Research Grant, Koninklijke Philips NV

For information about this presentation, contact:

cyuan@uw.edu

LEARNING OBJECTIVES

1) Understand the need for carotid MRI plaque detecton. 2) Outline image review and analysis need. 3) Introduce several techniques based on AI and machine learning to perform carotid plaque detection and segmentation and discuss their incorporation into clinical practice.

RC212C Deep Learning for Aortic and Peripheral Vascular Disease Characterization

Participants
Ivana Isgum, PhD, Amsterdam, Netherlands (*Presenter*) Research Grant, Pie Medical Imaging BVResearch Grant, 3mensio Medical Imaging BVResearch Grant, Koninklijke Philips NVCo-founder, Quantib B.V.Shareholder, Quantib B.V.Scientific Advisor, Quantib B.V.

For information about this presentation, contact:

i.isgum@amsterdamumc.nl

LEARNING OBJECTIVES

1) To provide an overview of state-of-the-art deep learning methods for analysis of the aorta and peripheral arteries. 2) To show the potential and current limitations of deep learning methods for quantification of abnormalities and diagnosis of vascular diseases.

ABSTRACT

Deep learning approaches, primarily relaying on convolutional neural networks, are increasingly being developed for analysis of the aorta and peripheral arteries. Most of current methods have been developed for segmentation of the aorta and other arteries. These segmentations are subsequently used for e.g. detection of aortic aneurysms, dissections and rupture in CT angiography and X-ray imaging, temporal analysis of the arteries in MR exams, and analysis of the vascular tree in cine-angiography. Deep learning methods have also been developed for detection of atherosclerosis, primarily in the aorta. In this presentation we will: Present basics of deep learning methodology used for analysis of vasculature; Describe current state-of-the art deep learning methods for analysis of the aorta and peripheral arteries; Discuss application potential of current methods in radiology research and practice.

RC212D Predicting Future Cardiovascular Events in Patients with Peripheral Artery Disease

Participants
Elsie G. Ross, Stanford, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

elsie.ross@stanford.edu

LEARNING OBJECTIVES

1) Identify challenges in the care of patients with vascular disease 2) Understand next generation infrastructure used for research using electronic health records 3) Enumerate a framework for implementation of machine learning-based models in health care

ABSTRACT

Electronic health records include hundreds of millions of data points, and is central to the care of patients throughout the world. This makes EHR data an important resource for analyzing clinical data, building predictive models to provide insights and predictions, and for implementation. In this presentation I will outline our EHR infrastructure at Stanford and how we've leveraged it to build classification and prediction models for patients with peripheral artery disease.

RC212E Panel Discussion

Printed on: 05/05/21

RC213

Pediatric Chest/Cardiovascular Imaging

Saturday, Dec. 5 2:00PM - 3:00PM Room: Channel 1

CA CH PD

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

RC213A Practical Considerations in the Evaluation of the Aortic Arch/PDA

Participants
Lindsay Griffin, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ligriffin@luriechildrens.org

LEARNING OBJECTIVES

1) Apply feed and swaddle technique for evaluation of aorta in neonates/infants < 6 months to avoid anesthesia risks. 2) Describe surgical and interventional approaches to repair/stenting to provide relevant description to referring clinicians. 3) Develop and enhance a non-coronary CTA protocol, including use of 3D and multiplanar reconstructions.

RC213B Imaging of Pediatric Pulmonary Hypertension

Participants
Jason P. Weinman, MD, Aurora, CO (*Presenter*) Nothing to Disclose

RC213C Pulmonary Vein Imaging in Children

Participants
Christopher Z. Lam, MD, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

christopher.lam@sickkids.ca

LEARNING OBJECTIVES

1) Diagnose various pulmonary vein pathologies seen in children and adolescents. 2) Add value by understanding key imaging information relevant to management.

RC213D Pearls and Pitfalls of Congenital Lung Anomaly Imaging

Participants
Paul G. Thacker JR, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RC214

Liver Cancer Interventions

Monday, Nov. 30 8:30AM - 9:30AM Room: Channel 1

GI IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Participants
Ryan P. Lokken, MD, San Francisco, CA (*Moderator*) Consultant, Neptune Medical Inc

Sub-Events

RC214A Diagnosis and Response to Treatment of Liver Cancer

Participants
Winnie A. Mar, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

wmar@uic.edu

LEARNING OBJECTIVES

1) Describe imaging work up and diagnostic strategies for liver cancer, including LIRADS. 2) Recognize imaging differences between hepatocellular carcinoma, cholangiocarcinoma, and metastasis. 3) Review post locoregional treatment appearances of liver cancer, including viable and non-viable tumor.

RC214B Ablation: Hepatocellular Carcinoma

Participants
Ryan P. Lokken, MD, San Francisco, CA (*Presenter*) Consultant, Neptune Medical Inc

LEARNING OBJECTIVES

1. Biological basis of radiofrequency ablation and microwave ablation technology 2. Clinical application of thermal ablation for hepatocellular carcinoma in the context of current practice guidelines 3. Practical guidance for achieving successful thermal ablation (achieving an adequate margin, recognizing heat sinks, combination chemoembolization/ablation for tumors >3.0 cm, identifying challenging or unsafe locations for ablation).

RC214C Chemoembolization: Hepatocellular Carcinoma

Participants
Yasuaki Arai, Tokyo, Japan (*Presenter*) Royalties, Sumitomo Bakelite Co, LtdSpeakers Bureau, Sumitomo Bakelite Co, LtdSpeakers Bureau, Merit Medical Systems, IncSpeakers Bureau, Fuji Pharma Co, LtdSpeakers Bureau, Canon Medical Systems CorporationSpeakers Bureau, Terumo CorporationSpeakers Bureau, Bristol-Myers Squibb CompanySpeakers Bureau, Nippon Kayaku Co, LtdSpeakers Bureau, Boston Scientific CorporationSpeakers Bureau, Bayer AGSpeakers Bureau, SYNEXMEDSpeakers Bureau, Otsuka Holdings Co, LtdSpeakers Bureau, Guerbet SASpeakers Bureau, Sumitomo CorporationSpeakers Bureau, KYORIN Holdings, IncSpeakers Bureau, AstraZeneca PLC

RC214D Combination Therapy for Hepatocellular Carcinoma

Participants
Patrick D. Sutphin, MD,PhD, Boston, MA (*Presenter*) Scholarship, Surefire Medical, Inc Travel support, Teclison Inc Stockholder, Gilead Sciences, Inc Stockholder, Editas Medicine Stockholder, CRISPR Therapeutics

For information about this presentation, contact:

psutphin@partners.org

LEARNING OBJECTIVES

1) Describe the rationale for combining therapies with different and compmlementary mechanisms of action for the treatment of hepatocelluar carcinoma. 2) Discuss the systemic therapies which have been combined with locoregional therapies with relevant clinical trials.

RC215

The ABCs of Radiogenomics

Wednesday, Dec. 2 10:00AM - 11:00AM Room: Channel 1

BR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC215A Omics Terminology Primer

Participants
Katja Pinker-Domenig, MD, New York, NY (*Presenter*) Speakers Bureau, Siemens AG Advisory Board, Merantix Healthcare GmbH

For information about this presentation, contact:

pinkerdk@mskcc.org

LEARNING OBJECTIVES

1) Understand the concept of radiomics/genomics. 2) Learn the current applications in breast imaging. 3) Recognize its challenges and limitations.

ABSTRACT

One of the most promising areas of health innovation is the application of AI in biomedical imaging. Medical imaging has always been an integral part of disease diagnosis and treatment decisions. With the possibility to use AI for image, i.e radiomics analysis to identify findings either detectable or not by the human eye, radiology is now moving from a subjective perceptual skill to a more objective science. Out of the myriad proposed use-cases for AI in radiology, breast cancer is one of the most researched. Advances in radiomics analysis, i.e. the extraction and correlation of multiple imaging parameters with different variables of interest (patients' characteristics, histopathologic, genomic, molecular or outcome data) and machine learning (such as deep learning) are on the cusp of providing more effective, more efficient, and even more patient-centric breast cancer care support than ever before. Radiogenomics aims to correlate imaging characteristics (i.e., the imaging phenotype) with gene expression patterns, such as molecular subtypes, gene mutations, and other genome-related characteristics. Radiogenomics is designed to facilitate a deeper understanding of molecular tumor biology through the extraction of parameters derived from image processing and analyses of medical images that are linked to the geno- and phenotypic characteristics of the tissue. Due to the non-invasive nature of medical imaging and its ubiquitous use in clinical practice, the field of radio/-genomics is rapidly evolving and initial results are encouraging. This presentation will explain the concept and methodology of radiomics/genomics and AI, summarize the current applications of radiomics/genomics in breast imaging and address its challenges and limitations.

RC215B Genetic Mutations Associated with Breast Cancer

Participants
Cindy S. Lee, MD, Garden City, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the genetic mutations associated with breast cancer. 2) Discuss the screening recommendations for genetic mutation carriers.

RC215C Phenotypes of Breast Cancer

Participants
Cherie M. Kuzmiak, DO, Chapel Hill, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cherie_kuzmiak@med.unc.edu

LEARNING OBJECTIVES

1) Understand the definitions of phenotype and biomarker. 2) Learn the molecular subtypes of breast cancer with integration of imaging and pathology. 3) Discuss imaging as a biomarker and its role in radiogenomics.

RC215D Prediction to Treatment Response by Subtype

Participants
Lars J. Grimm, MD, Durham, NC (*Presenter*) Editorial Advisory Board, Medscape, LLCEducational program support, Hologic, Inc

LEARNING OBJECTIVES

1) Identify the different molecular subtypes and means of assessing treatment response. 2) Explain the varying means of image analysis for prediction purposes. 3) Appraise the limitations of current studies to date. 4) Critique the feasibility of applying prediction algorithms to clinical practice.

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RC216

Tips from the Editors: How to Engage with RSNA's Education Publications

ED RS

Participants
Jeffrey S. Klein, MD, Burlington, VT (*Moderator*) Editor with royalties, Wolters Kluwer nv
Jeffrey S. Klein, MD, Burlington, VT (*Presenter*) Editor with royalties, Wolters Kluwer nv
Mariam Moshiri, MD, Bellevue, WA (*Presenter*) Nothing to Disclose
Christine O. Menias, MD, Phoenix, AZ (*Presenter*) Royalties, Reed Elsevier
Jeffrey S. Klein, MD, Burlington, VT (*DPS Upload*) Editor with royalties, Wolters Kluwer nv

For information about this presentation, contact:

menias.christine@mayo.edu

mmoshiri@rsna.org

LEARNING OBJECTIVES

1) List the opportunities to participate as an author for the RSNA educational publications RadioGraphics and RSNA Case Collection. 2) Know the steps to becoming a peer reviewer for RadioGraphics and the RSNA Case Collection. 3) Use the Case Collection for Point-of-Care educational activities. 4) Find educational resources in RadioGraphics online.

ABSTRACT

The RSNA offers two publications that are dedicated to providing educational materials in support of practioner's continuing educational and lifelong learning needs. In this session the editors of RadioGraphics and the new RSNA Case Collection will review the opportunities for RSNA members to contribute their own material to these publications, understand how to become involved in these journal's peer review processes, and learn how to use the online journals at the point of care and for clinical practice.

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RC218

Whole Body MRI for Precision Oncology in Malignant Bone Disease

BQ MR MK OI

AMA PRA Category 1 Credit ™: 1.00

Participants
Giuseppe Petralia, MD, Milan, Italy (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

es220@cam.ac.uk

LEARNING OBJECTIVES

1) Describe the limitations of current imaging modalities in evaluation of metastatic bone disease. 2) Learn the added value of whole body MRI in evaluation of metastatic bone disease in various malignancies including prostate cancer and multiple myeloma. 3) Understand the role of quantitative whole body MRI in delivering precision medicine in oncology.

Sub-Events

RC218A Imaging of Metastatic Bone Disease: Current Limitations

Participants
Hebert Alberto Vargas, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the challenges associated with the diagnosis and interpretation of bone findings in patients with metastatic disease.

ABSTRACT

Conventional imaging of metastatic disease to the bone is notoriously difficult. Unlike soft tissue metastases, significant cortical disruption is required before a bone metastases is visible on CT, and bone scan demonstrates the effect of the metastases on bone, rather than the metastases themselves. MR partially overcomes these limitations, as early bone metastases can be detected. However, even after bone metastases are apparent on imaging, it is difficult to assess their evolution with regards to therapy response.

RC218B WB-MRI of Multiple Myeloma: My-RADS

Participants
Christina Messiou, MD, BMBS, London, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List indications for WB-MRI in multiple myeloma. 2) Describe the core and comprehensive protocols for WB-MRI in multiple myeloma. 3) Apply a systematic approach to reporting WB-MRI in multiple myeloma as outlined in MY-RADS. 4) Review the MY-RADS criteria for assessing disease phenotype, burden and response assessment with case examples.

ABSTRACT

Acknowledging the increasingly important role of WB-MRI for directing myeloma patient care, a multidisciplinary international expert panel of radiologists, medical physicists and haematologists convened to discuss the performance standards, merits and limitations of WB-MRI in myeloma. The MY-RADS imaging recommendations are designed to promote standardization and diminish variations in the acquisition, interpretation, and reporting of WB-MRI in myeloma both in the clinical setting and within clinical trials. MY-RADS comprehensive disease classification requires validation within clinical trials including assessments of reproducibility.

RC218C WB-MRI of Metastatic Bone: MET-RADS

Participants
Anwar R. Padhani, MD,FRCR, Northwood, United Kingdom (*Presenter*) Advisory Board, Siemens AGSpeakers Bureau, Siemens AGSpeakers Bureau, Johnson & Johnson

LEARNING OBJECTIVES

1) MET-RADS measurement protocols distinguishing between tumor detection (core) and response (comprehensive) assessments. 2) To highlight and review the MET-RADS response assessment criteria and their application. 3) To illustrate MET-RADS usage with case examples and to provide efficacy data on MET-RADS use in clinical practise. 4) Outline development steps for MET-RADS.

ABSTRACT

MET-RADS provides the minimum standards for whole body MRI with DWI regarding image acquisitions, interpretation, and reporting of both baseline and follow-up monitoring examinations of patients with advanced, metastatic cancers. MET-RADS is suitable for guiding patient care in practice (using the regional and overall assessment criteria), but can also be incorporated into clinical trials when accurate lesion size and ADC measurements become more important (the recording of measurements is not mandated for clinical practice). MET-RADS enables the evaluation of the benefits of continuing therapy to be assessed, when there are signs

that the disease is progressing (discordant responses). MET-RAD requires validation within clinical trials initially in studies that assess the effects of known efficacious treatments. METRADS measures should be correlated to other tumor response biomarkers, quality of life measures, rates of skeletal events, radiographic progression free survival and overall survival. The latter will be needed for the introduction of WB-MRI into longer term follow-up studies, that will allow objective assessments of whether WB-MRI is effective in supporting patient care

RC218D Quantitative WB-MRI for Promoting Precision Oncology

Participants
Dow-Mu Koh, MD,FRCR, Sutton, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the quantitative parameters that can be derived from WB-MRI studies. 2) To understand the evolving role of quantitative WB-MRI for the evaluation of metastatic bone disease. 3) To appreciate the application of quantitative WB-MRI for precision oncology in assessing tumour treatment response and disease heterogeneity.

RC221

Innovations in MR and CT Perfusion

CT MR PH

FDA Discussions may include off-label uses.

Participants
Roland Bammer, PhD, Parkville, Australia (*Moderator*) Founder, iSchemaView, IncDirector, iSchemaView, IncStockholder, iSchemaView, IncFounder, HobbitView, IncDirector, HobbitView, IncStockholder, HobbitView, Inc
Roland Bammer, PhD, Parkville, Australia (*DPS Upload*) Founder, iSchemaView, IncDirector, iSchemaView, IncStockholder, iSchemaView, IncFounder, HobbitView, IncDirector, HobbitView, IncStockholder, HobbitView, Inc

LEARNING OBJECTIVES

1) A survivors guide for perfusion methodology. 2) Practical considerations of perfusion imaging and leakage measurements in tumors. 3) How to use and interpret perfusion imaging in cerebro-vascular disease.

Sub-Events

RC221A MR and CT Perfusion and Pharmacokinetic Imaging

Participants
Roland Bammer, PhD, Parkville, Australia (*Presenter*) Founder, iSchemaView, IncDirector, iSchemaView, IncStockholder, iSchemaView, IncFounder, HobbitView, IncDirector, HobbitView, IncStockholder, HobbitView, Inc

LEARNING OBJECTIVES

1) Close the circle between blood pool based and diffusible tracers for measuring perfusion. 2) Learn how perfusion and related parameters can be imaged with different modalities. 3) Understand how to compute perfusion parameters with and without extravasation and common pitfalls. 4) Real-world examples.

RC221B Evidence-Based Best Acquisition Protocols for DSC-MRI in Brain Tumors

Participants
Jerrold L. Boxerman, MD, PhD, Providence, RI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain the DSC-MRI contrast mechanism and vessel size dependence of gradient-echo and spin-echo signal changes. 2) Identify the major protocol decisions for single-echo, gadolinium-based DSC-MRI. 3) Describe techniques for reducing contrast agent leakage effects in DSC-MRI. 4) Recommend an evidence-based best-practice protocol for DSC-MRI applications in neuro-oncology and clinical trials.

RC221C Perfusion Imaging in Cerebrovascular Disease

Participants
Shalini A. Amukotuwa, BMedSc,MBBS, Melbourne, Australia (*Presenter*) Spouse, Founder, iSchemaView, Inc

RC222

Anatomical MR Imaging for Radiotherapy Planning and Guidance

MR PH RO

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) Grant, RaySearch Laboratories AB; License agreement, RaySearch Laboratories AB; Research support, Mirada Medical Ltd
Aradhana M. Venkatesan, MD, Houston, TX (*DPS Upload*) Nothing to Disclose

Sub-Events

RC222A State of the Art in Anatomical MR Imaging

Participants
Aradhana M. Venkatesan, MD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review opportunities and unmet needs for state of the art imaging techniques to inform radiotherapy strategies. 2) Summarize the current state of the art role for contemporary MRI in radiotherapy, with an emphasis on gynecologic and prostate cancer therapy. 3) Describe emerging solutions enabled by MR imaging guidance and their potential gains for patients.

RC222B Technical Challenges in the Integration of Anatomical MR Imaging into Radiotherapy

Participants
Carri Glide-Hurst, PHD, Madison, WI (*Presenter*) Research Collaboration, ViewRay, IncResearch Collaboration, Modus Medical Devices Inc

LEARNING OBJECTIVES

1) To understand the unique imaging challenges and benefits for incorporating MRI into radiation therapy treatment planning. 2) To describe the magnetic resonance simulation (MR-SIM) process to yield images that are more robust for radiation therapy planning. 3) To describe emerging technologies in MR-only treatment planning and MR-guided radiation therapy and opportunities for collaboration between imaging and radiation therapy colleagues.

RC223

CT Radiation Dose Reduction: Techniques and Clinical Implementation

CT PH SQ

Participants
Lifeng Yu, PhD, Rochester, MN (*Moderator*) Nothing to Disclose
Lifeng Yu, PhD, Rochester, MN (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review techniques that are currently available for radiation dose reduction. 2) Understand general dose management and optimization strategies and how they are implemented in adult CT. 3) Understand strategies to optimize scanning protocols in pediatric CT.

ABSTRACT

This course will provide an overview of techniques and clincial implementations of radiation dose reduction in CT.

Sub-Events

RC223A Overview of Technology for Radiation Dose Reduction

Participants
Joseph W. Stayman, PhD, Baltimore, MD (*Presenter*) Research Grant, Canon Medical Systems Corporation; Research Grant, Carestream Health, Inc; Research Grant, Elekta AB; Research Grant, Fischer Medical; Research Grant, Medtronic plc; Research collaboration, Koninklijke Philips NV; Research collaboration, Varex Imaging Corporation; Research Grant, Siemens AG; Research Grant, General Electric Company;

LEARNING OBJECTIVES

1) Identify targets for radiation dose reductions in x-ray CT. 2) Gain an understanding of dose reduction strategies based on innovations in hardware design and development. 3) Gain an understanding of dose reduction strategies based on data processing chain improvements including iterative reconstruction methods. 4) Understand some of the trade-offs in dose reduction as well as limitations on dose reduction.

RC223B Dose Optimization Strategy and Clinical Implementation in Adult CT

Participants
Lifeng Yu, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Introduce dose management and optimization strategies in adult CT. 2) Describe how dose reduction techniques are clinical implemented in adult CT, including neuro, chest, abdominal, cardiovascular, and MSK.

RC223C Dose Reduction and Protocol Optimization in Pediatric CT

Participants
Robert MacDougall, PhD, Tustin, CA (*Presenter*) Employee, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Recognize the important of clinical indication on CT protocol design. 2) Describe the different commercial implementations of kV and mA modulation algorithms and understand methods of standardizing image quality across platforms. 3) Understand the effect of reconstruction algorithms on acquisition parameter selection in pediatric CT.

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RC224

Fakes, Forgeries, and Hidden Repairs in Art and Archaeology-The Role of Forensic Imaging

OT

AMA PRA Category 1 Credit ™: .75

Participants
Barry D. Daly, MD, Baltimore, MD (*Moderator*) Nothing to Disclose
Barry D. Daly, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Vahid Yaghmai, MD, Orange, CA (*Presenter*) Nothing to Disclose
Jonathan P. Brown, MS, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bdaly@umm.edu

LEARNING OBJECTIVES

1) To describe the adaptation of modern imaging techniques to confirm or refute the authenticity of ancient treasures and artworks. 2) To learn about 'fingerprinting' of valuable artifacts with 3D imaging as a technique for identifying stolen art treasures. 3) To differentiate bona fide from fake restorations in ancient artifacts.

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RC227

Health Policy and Practice Series: Quality & Health Policy: Leading Change

HP SQ

AMA PRA Category 1 Credit ™: .75

Participants
Summer L. Kaplan, MD, MS, Philadelphia, PA (*Moderator*) Nothing to Disclose
Michael A. Bruno, MD, Hummelstown, PA (*Moderator*) Nothing to Disclose
Neville Irani, MD, Stilwell, KS (*Moderator*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

kaplans2@email.chop.edu

obrook@bidmc.harvard.edu

mbruno@pennstatehealth.psu.edu

Sub-Events

RC227A Leadership from the Bottom

Participants
Shlomit Goldberg-Stein, MD, Bronx, NY (*Presenter*) Nothing to Disclose

RC227B Change Management: Nuts and Bolts

Participants
Nadja Kadom, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

RC227C High-functioning Teams

Participants
Phuong-Anh T. Duong, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

RC227D Leading Change: Incorporating AI

Participants
Ryan K. Lee, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

leeryan1@einstein.edu

LEARNING OBJECTIVES

1. Describe factors to consider in implementing AI in the radiology workflow.2. Learn how AI can affect changes in the work of a radiologist.3.Understand how a patient centric model of radiology aligns with the triple aim.

RC227E Discussion

Participants
Summer L. Kaplan, MD, MS, Philadelphia, PA (*Presenter*) Nothing to Disclose
Michael A. Bruno, MD, Hummelstown, PA (*Presenter*) Nothing to Disclose
Neville Irani, MD, Stilwell, KS (*Presenter*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose
Shlomit Goldberg-Stein, MD, Bronx, NY (*Presenter*) Nothing to Disclose
Nadja Kadom, MD, Atlanta, GA (*Presenter*) Nothing to Disclose
Phuong-Anh T. Duong, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose
Ryan K. Lee, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kaplans2@email.chop.edu

RC229

Protocol Optimization in MRI

GI GU MR

Participants
Stephanie Nougaret, MD, Montpellier, France (*DPS Upload*) Nothing to Disclose

Sub-Events

RC229A How to Build an Efficient MRI Workflow

Participants
Steven S. Raman, MD, Santa Monica, CA (*Presenter*) Consultant, Johnson & JohnsonConsultant, Bayer AGConsultant, Merck & Co, IncConsultant, Amgen IncConsultant, Profound Medical Inc

LEARNING OBJECTIVES

1) Understand the components of an MRI workflow Understand customer needs. 2) Develop a culture of quality. 3) Develop a culture of ongoing disruption. 4) Develop feedback loops to improve quality of key personnel. 5) Develop ongoing PQI metrics.

ABSTRACT

In this talk, we will discuss how to develop an innovative, efficient and flexible MRI workflow that maximizes image quality, mimizes imaging time, improves technologist performance, develops a culture of quality and innovation, and improves the patient and referring physician experience.

RC229B Optimized Abdominal MRI Protocol

Participants
Scott B. Reeder, MD,PhD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1)Understand emerging strategies for optimized liver MRI protocols.2)Describe at least three examples of optimized liver MRI protocols.3)Be familiar with the challenges with implementing liver MRI protocols.

RC229C Optimized Prostate MRI Protocol

Participants
Aytekin Oto, MD, Chicago, IL (*Presenter*) Research Grant, Koninklijke Philips NVResearch Grant, Guerbet SAResearch Grant, Profound Medical IncMedical Advisory Board, Profound Medical IncConsultant, IBM CorporationFounder and co-owner, QMIS TBS Capital Group Corp

For information about this presentation, contact:

oto@uchicago.edu

LEARNING OBJECTIVES

1) Review the critical sequences of multi-parametric prostate MR protocol and their added values to the interpretation. 2) Illustrate the impact of different technical approaches on image quality of different sequences. 3) Provide different options for optimized prostate MR protocol.

RC229D Optimized Female Pelvis MRI Protocol

Participants
Stephanie Nougaret, MD, Montpellier, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss the technical and practical requirements for optimizing female pelvis MRI. 2) To become familiar with the optimal female pelvis MRI protocols. 3) To discuss the recent technological innovations in MR female pelvis imaging.

RC229E Top 5 MRI Artifacts (with Solutions)

Participants
Mustafa R. Bashir, MD, Cary, NC (*Presenter*) Research Grant, Siemens AG; Research Grant, NGM Biopharmaceuticals, Inc; Research Grant, Madrigal Pharmaceuticals, Inc; Research Grant, Metacrine, Inc; Research Grant, Pinnacle Clinical Research; Research Grant, ProSciento Inc; Research Grant, Carmot Therapeutics; Research Grant, 1Globe Health Institute; Research Consultant, ICON plc;

LEARNING OBJECTIVES

1) To describe common artifacts in body MRI and strategies to mitigate them.

ABSTRACT

Artifacts are unavoidable in abdominal MRI. As pressure mounts to use shorter, more time-efficient protocols, fewer redundant sequences are available in a typical MRI protocol, and the diagnostic impact of artifacts may be increased. This discussion will focus on common artifacts encountered in clinical practice and methods to minimize their effects on diagnostic interpretation.

Printed on: 05/05/21

RC232

Radiology Practice Under New Healthcare

HP LM

Participants
Alexander M. Norbash, MD, San Diego, CA (*Moderator*) Scientific Advisor, Penumbra, IncScientific Advisor, IBM CorporationScientific Advisor, General Electric CompanyScientific Advisor, Siemens AG Stockholder, Boston Imaging Core Lab, LLC
Reed A. Omary, MD, Nashville, TN (*Moderator*) Nothing to Disclose
Alexander M. Norbash, MD, San Diego, CA (*DPS Upload*) Scientific Advisor, Penumbra, IncScientific Advisor, IBM CorporationScientific Advisor, General Electric CompanyScientific Advisor, Siemens AG Stockholder, Boston Imaging Core Lab, LLC

LEARNING OBJECTIVES

1) Appreciate that the cost of healthcare in the United States is among the highest in the world, yet the quality of our healthcare as judged by commonly used metrics is mediocre. 2) Understand that imaging is often considered one of the drivers of healthcare costs. 3) Learn that appropriate imaging may help reduce costs by getting to the appropriate diagnosis earlier, while the disease is easier to treat. 4) Discover approaches that third party payers are taking to reducing payments for medical imaging and image-guided therapy.

Sub-Events

RC232A Challenges of Academic Radiology Practice Under New Healthcare

Participants
N. Reed Dunnick, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appreciate the changes in healthcare reimbursement. 2) Understand that in order to maintain incomes, radiologists may have to work longer hours, which may lead to burnout. 3) Learn to reassess the mission, vision and goals of your group or organization. 4) Focus on activities that bring value to the organization and professional satisfaction to the radiologists.

RC232B Integration of Radiology Practice to Health System: Why and How?

Participants
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Presenter*) Consultant, Hamamatsu Photonics KKResearch Grant, Hitachi, LtdResearch Grant, Nihon Medi-Physics Co, Ltd

RC232C Expanding Radiology Practice to Large Geographic Area

Participants
Vijay M. Rao, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand challenges of expanding radiology practice on a fast track with a limited budget, disparate IT systems and different cultures. 2) Understand how structure, governance and leadership can influence success.

RC232D Radiology Practice Under Global Budget

Participants
Karen M. Horton, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand Maryland's all-payer global budget program for acute-care hospitals and its impact on Radiology.

RC253

Essentials of Machine Learning Study Design and Algorithm Validation: What Doctors Need to Know

Monday, Nov. 30 8:30AM - 9:30AM Room: Channel 3

AI IN

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Reza Forghani, MD,PhD, Cote Saint-Luc, QC (*Moderator*) Researcher, General Electric CompanyInstitutional research collaboration, General Electric CompanyConsultant, General Electric CompanySpeaker, General Electric Company Founder, 4intelligent IncStockholder, 4intelligent IncStockholder, Real-Time Medical, Inc

For information about this presentation, contact:

reza.forghani@mcgill.ca

LEARNING OBJECTIVES

1) Will become familiar with fundamentals of AI experiment design and nomenclatures used and their importance for generalizability and future algorithm certification and deployment. 2) Understand the rationale and importance of separation of datasets into training, validation, and test sets for generalizability. 3) Will become familiar with different internal cross validation techniques. 4) Will become familiar with different sources of bias and the importance of robust design for mitigating bias and enhancing generalizability. 5) Will be introduced to different examples illustrating impact of proportions, dataset size, and data variety for algorithm generalizability. 6) Develop a basic understanding of data harmonization strategies for improving generalizability. 7) Be introduced to advanced approaches such as scan pre-screening for identification of outlier for improving generalizability. 8) Understand the importance of validation for future certification and deployment. 9) Will be introduced to potential importance of well structured or auditable platforms and approaches for pre-certification. 10) Develop a basic understanding of potential deployment strategies and challenges for AI algorithms, contrasting with traditional CAD.

ABSTRACT

Optimal design of studies using artificial intelligence (AI) for image analysis and other medical or clinical decision support tools is fundamental for development of algorithms that are generalizable and have the potential for successful future deployment in the clinical setting. An experimental design that incorporates proper validation and independent testing is central to the development of robust algorithms, which is also likely to influence future generalizability and algorithm certification processes. In this session, fundamentals of AI experiment design, including nomenclatures used, will be discussed, reviewing both basic and advanced concepts and applications. This will be presented in the broader context of impact on future generalizability, algorithm certification, and deployment, including discussion of challenges unique to AI algorithm deployment, contrasting with traditional computer aided diagnosis systems.

Sub-Events

RC253A Overview of Machine Learning Algorithm Validation Techniques

Participants
Samuel Kadoury, PhD, Montreal, QC (*Presenter*) Research grants from Elekta Ltd

LEARNING OBJECTIVES

1) Review the challenges and principles of validation techniques in AI. 2) Understand the main validation techniques for machine learning. 3) Understand the main validation techniques for deep learning. 4) Evaluate strategies for setting up validation studies in machine/deep learning. 5) Learn what open source libraries and toolkits can be used for validating AI methods in radiology.

RC253B Optimal Study Design and Advanced Techniques for Machine Learning Algorithm Generalizability

Participants
Reza Forghani, MD,PhD, Cote Saint-Luc, QC (*Presenter*) Researcher, General Electric CompanyInstitutional research collaboration, General Electric CompanyConsultant, General Electric CompanySpeaker, General Electric Company Founder, 4intelligent IncStockholder, 4intelligent IncStockholder, Real-Time Medical, Inc

For information about this presentation, contact:

reza.forghani@mcgill.ca

LEARNING OBJECTIVES

1) Will become familiar with fundamentals of AI experiment design and nomenclatures used and their importance for generalizability and future algorithm certification and deployment. 2) Understand the rationale and importance of separation of datasets into training, validation, and test sets for generalizability. 3) Will become familiar with different sources of bias and the importance of robust design for mitigating bias and enhancing generalizability. 4) Will be introduced to different examples illustrating impact of proportions, dataset size, and data variety for algorithm generalizability. 5) Develop a basic understanding of potential deployment strategies and challenges for AI algorithms, contrasting with traditional CAD. 6) Develop a basic understanding of data harmonization strategies for improving generalizability. 7) Be introduced to advanced approaches such as scan pre-screening for

identification of outlier for improving generalizability.

ABSTRACT

Optimal design of studies using artificial intelligence (AI) for image analysis and other medical or clinical decision support tools is fundamental for development of algorithms that are generalizable and have the potential for successful future deployment in the clinical setting. An experimental design that incorporates proper validation and independent testing is central to the development of robust algorithms, which is also likely to influence future algorithm certification processes. In this presentation, fundamentals of AI experiment design, including nomenclatures used, and design features such as separation of data sets into training, validation, and test sets will be discussed. Potential sources of bias will be reviewed with presentation of different scenarios, including impact of dataset size and data variety, on algorithm performance and generalizability. The lecture will conclude with a discussion of more advanced approaches for construction of generalizable algorithms, including data harmonization strategies and scan pre-screening for outliers. The approaches discussed will be put into a broader context of challenges unique to AI algorithm deployment, contrasting with traditional computer aided diagnosis systems, and their relevance to future algorithm certification.

RC253C Implications of Robust Experimental Design for Certification and Deployment

Participants
Curtis P. Langlotz, MD,PhD, Menlo Park, CA (*Presenter*) Stockholder, Nines.aiAdvisory Board, Nines.aiStockholder, whiterabbit.aiAdvisory Board, whiterabbit.aiStockholder, Galileo CDS, IncAdvisory Board, Galileo CDS, IncStockholder, Bunker Hill, IncBoard of Directors, Bunker Hill, IncResearch Grant, General Electric CompanyResearch Grant, Siemens AGResearch Grant, Koninklijke Philips NVResearch Grant, Alphabet Inc

For information about this presentation, contact:

langlotz@stanford.edu

LEARNING OBJECTIVES

1) Describe key attributes of experimental design to facilitate publication of results. 2) Review US regulatory process for the certification of algorithms and how they influence experimental design. 3) Describe systems necessary for the design and deployment of AI/machine learning models.

Printed on: 05/05/21

RC254

Artificial Intelligence: Beyond Interpretive Considerations

Sunday, Nov. 29 10:00AM - 11:00AM Room: Channel 5

AI IN

AMA PRA Category 1 Credit ™: .75

Participants
Saurabh Jha, MD, Philadelphia, PA (*Moderator*) Nothing to Disclose

Sub-Events

RC254A Are Prediction Machines Useful?

Participants
Saurabh Jha, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Saurabh.jha@pennmedicine.upenn.edu

LEARNING OBJECTIVES

1. Understand concepts underlying overfitting 2. Why does overfitting occur? 3. Bias vs. Variance 4. Reproducibility vs generalizability

ABSTRACT

Understand fundamentals of models using non technical, non mathematical language

RC254B Mergers, Acquisitions and Disappearances: What Happened to AI Companies in 2020

Participants
Hugh Harvey, MBBS, London, United Kingdom (*Presenter*) Advisor, Smart ReportingAdvisor, Segmed.aiAdvisor, AlgoMedica, IncAdvisor, Everlight RadiologyManaging Director, Hardian Health

For information about this presentation, contact:

hugh@hardianhealth.com

LEARNING OBJECTIVES

Corrective statement: In the talk entitled "Mergers, acquisitions and disappearances in AI" Dr Harvey mentioned six companies who may have 'disappeared'. While it is always difficult to ascertain the true disappearance of a company unless a public announcement is made, the conclusions in the talk were based on several search criteria: Non attendance at RSNA2020, no press releases in 2020, no social media posts in 2020, no apparent company website updates in 2020. Feedback received after the talk has revealed that three of these companies (GalileoCDS, Mindshare Medical and QuantX) are in fact alive and well, albeit silent in terms of the 'vital signs' criteria used. In particular Dr Harvey would like to clarify that QuantX rebranded to Qlarity Imaging in June 2019 (and therefore 'QuantX' was absent from his search results for 2020). Qlarity Imaging continue business successfully with their FDA cleared breast algorithm which underwent a standard FDA reclassification order. Sincere apologies go out to the three companies. 1) Understand global and local market dynamics in a saturated early-phase industry sector. 2) Understand key M&A activity in 2020. 3) Understand factors that contribute to comapny failure.

ABSTRACT

An independent, no-holds barred, market analysis of the AI radiology start-up sector, covering 2020's notable company announcements, lofty fund-raises, friendly / competitive acquisitions and mergers, CEO sell-outs, and maybe even some disappearances...

RC254C A Brief History of GANs

Participants
Stephen M. Borstelmann, MD, Boca Raton, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sborstelmannmd@gmail.com

LEARNING OBJECTIVES

1.) To explain Generative Adversarial Networks and Autoencoders 2). To chronologue relevant AI GAN algorithms with examples to present date. 3). To demonstrate GANs potential for Synthetic Data creation in Radiology. 4).To present and review use cases from the imaging and AI/ML/DL literature.

ABSTRACT

A historical approach explains fundamentals of the Generative Adversarial Network (GAN) - an AI algorithm able to 'create' new

data. We'll explore different varieties & uses, metrics, and use cases for medical imaging, including superresolution, denoising, modality transformation, and synthetic data creation, with relevant radiology and AI literature examples. The presentation is suitable for a wide audience, from general radiologist casually interested in AI, to the deep learning developer.

RC254D Who'll Get Sued if AI Screws Up?

Participants
H. Benjamin Harvey, MD, JD, Nahant, MA (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

RC302

TRaD Talks

ED

AMA PRA Category 1 Credits ™: 1.25

Participants
Jonathan O. Swanson, MD, Madison, WI (*Moderator*) Nothing to Disclose

Sub-Events

RC302A Handling the Double-edged Sword of AI When Training Radiologists

Participants
Jonathan O. Swanson, MD, Madison, WI (*Presenter*) Nothing to Disclose

RC302B Parental Leave in Radiology Education: How Can We Do It Better?

Participants
Sarah J. Menashe, MD, Seattle, WA (*Presenter*) Nothing to Disclose

RC302C Give Me Your Best Shot: Helping Residents and Faculty Receive Feedback

Participants
Jason W. Stephenson, MD, Madison, WI (*Presenter*) Nothing to Disclose

RC302D Get in the Zone: Teaching at the Workstation Using the Zone of Proximal Development

Participants
Eric M. Goodman, MD, Mineola, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

egoodman2@northwell.edu

LEARNING OBJECTIVES

1) Define 'Zone of Proximal Development'. 2) Describe ways which teachers may assist learners by 'scaffolding' their learning. 3) Demonstrate a method for using the zone of proximal development at the workstation.

RC302E Managing Expectations in a Residency Program

Participants
Matthew T. Heller, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To summarize common expectations of a radiology residency program and discuss strategies for managing these expectations.

RC302F Turning ZZZ's to Buzz: Improving the Medical Student Radiology Rotation

Participants
Tabassum A. Kennedy, MD, Madison, WI (*Presenter*) Nothing to Disclose

RC303

Cardiovascular Imaging in Disease Prevention

CA

FDA Discussions may include off-label uses.

Participants
Karen G. Ordovas, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Damini Dey, PhD, Los Angeles, CA (*Moderator*) Nothing to Disclose
Suhny Abbara, MD, Dallas, TX (*Moderator*) Royalties, Reed Elsevier; ;
Kate Hanneman, MD, FRCPC, Toronto, ON (*Moderator*) Medical Advisory Board, sanofi-aventis Group
Kate Hanneman, MD, FRCPC, Toronto, ON (*DPS Upload*) Medical Advisory Board, sanofi-aventis Group

Sub-Events

RC303A Appropriate Use of Coronary Calcium Scoring in Clinical Practice

Participants
Suhny Abbara, MD, Dallas, TX (*Presenter*) Royalties, Reed Elsevier; ;

RC303B Non-invasive Imaging of Coronary Plaque: What Can We See and What Does it Mean?

Participants
Cristina Fuss, MD, Portland, OR (*Presenter*) Spouse, Officer, ViewRay, Inc

RC303C Gender Differences in Coronary Atherosclerosis

Participants
Eric E. Williamson, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RC303D Artificial Intelligence and Machine Learning: Can Algorithms Help Us Predict Cardiac Risk?

Participants
Damini Dey, PhD, Los Angeles, CA (*Presenter*) Nothing to Disclose

RC303E MRI of Myocardial Infarction

Participants
Karen G. Ordovas, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To list cardiac MR techniques for assessment of myocardial infarction. 2) To identify CMR imaging findings of acute and chronic myocardial infarction. 3) To describe the main role of CMR for risk stratification after myocardial infarction.

RC303F Imaging Applications in Cardio-oncology

Participants
Kate Hanneman, MD, FRCPC, Toronto, ON (*Presenter*) Medical Advisory Board, sanofi-aventis Group

RC304

Ultrasound

MK US

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC304A Shoulder Ultrasound (Technique)

Participants
Viviane Khoury, MD, Montreal, QC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Outline the standardized approach used in the ultrasound (US) evaluation of the shoulder. 2) Learn the US anatomy of shoulder structures evaluated in a routine shoulder examination. 3) Demonstrate the dynamic maneuvers used for scanning common shoulder pathology.

RC304B Wrist Ultrasound (Demonstration)

Participants
Marnix T. Van Holsbeeck, MD, Northville, MI (*Presenter*) Stockholder, Koninklijke Philips NVStockholder, General Electric CompanyStockholder, MedEd3DAdvisory Board, Canon Medical Systems Corporation

RC304C Hip Ultrasound (Demonstration)

Participants
Kenneth S. Lee, MD, Madison, WI (*Presenter*) Grant, General Electric CompanyGrant, Johnson & JohnsonResearch support, SuperSonic ImagineRoyalties, Reed Elsevier

RC304D Ankle Ultrasound (Demonstration)

Participants
Jon A. Jacobson, MD, Ann Arbor, MI (*Presenter*) Research Consultant, BioClinica, Inc; Advisory Board, Koninklijke Philips NV; Royalties, Reed Elsevier

RC305

Molecular Neuroimaging

Tuesday, Dec. 1 8:30AM - 9:30AM Room: Channel 3

MI NR

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Satoshi Minoshima, MD, PhD, Salt Lake City, UT (*Moderator*) Consultant, Hamamatsu Photonics KKResearch Grant, Hitachi, LtdResearch Grant, Nihon Medi-Physics Co, Ltd
Martin G. Pomper, MD, PhD, Baltimore, MD (*Moderator*) Research Grant, Progenics Pharmaceuticals, Inc; Royalties, Progenics Pharmaceuticals, Inc

Sub-Events

RC305A Molecular Neuroimaging: Neuro-oncology

Participants
Jana Ivanidze, MD, PhD, New York, NY (*Presenter*) Research Grant, Novartis AGSpouse, Consultant, F. Hoffmann-La Roche LtdSpouse, Advisory Board, F. Hoffmann-La Roche Ltd

RC305B Molecular Neuroimaging: Cerebrovascular Disease

Participants
Greg Zaharchuk, MD, PhD, Stanford, CA (*Presenter*) Research Grant, General Electric CompanyResearch Grant, Bayer AGStockholder, Subtle Medical

RC305C Molecular Neuroimaging: Evaluating Dementia

Participants
Gil Rabinovici, MD, San Francisco, CA (*Presenter*) Scientific Advisory Board, Eisai Co, LtdCommittee member, Johnson & JohnsonResearch Grant, Eli Lilly and CompanyResearch Grant, General Electric CompanyResearch Grant, Life Molecular Imaging

RC305D Molecular Neuroimaging: Evaluating Epilepsy

Participants
Timothy M. Shepherd, MD, PhD, New York, NY (*Presenter*) Co-founder, MICroStructure Imaging

For information about this presentation, contact:

Timothy.shepherd@nyumc.org

LEARNING OBJECTIVES

1) Understand the limitations of MRI for diagnosis and clinical management in epilepsy patients. 2) Describe the advantages and limitations to using FDG PET routinely for epilepsy patients. 3) Describe alternative PET tracers for epilepsy and their potential applications.

ABSTRACT

Epilepsy is a complex, diverse collection of underlying disorders that do not share unifying MRI findings. In fact, many MRIs for epilepsy appear normal. This presentation will review the accepted indications for FDG PET in epilepsy patients. The impact and advantages of FDG PET for clinical decision making will be reviewed in a case-based manner. Finally, the presentation will review the potential for alternative PET tracers to improve clinical diagnosis and management in epilepsy patients.

RC306

A Symptom-based Approach to Head and Neck Pathology

Tuesday, Dec. 1 10:00AM - 11:00AM Room: Channel 3

HN NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Tabassum A. Kennedy, MD, Madison, WI (*Moderator*) Nothing to Disclose
Nicholas A. Koontz, MD, Fishers, IN (*Moderator*) Nothing to Disclose

Sub-Events

RC306A Vocal Cord Paralysis

Participants
Christine M. Glastonbury, MBBS, San Francisco, CA (*Presenter*) Author with royalties, Reed Elsevier

For information about this presentation, contact:

CHRISTINE.GLASTONBURY@UCSF.EDU

LEARNING OBJECTIVES

1) To understand the normal course of the vagus and recurrent laryngeal nerves through the neck, and useful anatomic landmarks and therefore the areas requiring scrutiny for patients with vocal cord paralysis (VCP). 2) To recognize the clinical difference between upper and lower vagal neuropathies and how this might affect imaging technique and modality recommendations. 3) To review common and unusual causes of VCP with an emphasis on CT and MR imaging.

ABSTRACT

The recurrent laryngeal nerve is a branch of the vagus nerve [CN10] and provides motor innervation to the endolaryngeal muscles of the vocal cords. The recurrent laryngeal nerve also provides sensory innervation to the subglottis and proximal cervical esophagus. The right recurrent laryngeal nerve arises from the vagus nerve at the level of the subclavian artery and loops around the artery before ascending in the tracheoesophageal groove. The left recurrent laryngeal nerve arises from the vagus anterior to the aortic arch and loops through the aortopulmonary window before ascending in the tracheoesophageal groove. Neuropathies are clinically divided into those arising below the hyoid, that is, those affecting only the recurrent laryngeal branch and therefore with preserved soft palate and constrictor muscle function and intact gag reflex. And those above the hyoid, which are frequently associated with neuropathies of CN9, CN11, and CN12. We will review this anatomy, how to detect vocal cord paralysis (VCP) on imaging and how to review scans for causes of VCP.

RC306B Horner's Syndrome

Participants
Deborah L. Reede, MD, Brooklyn, NY (*Presenter*) Nothing to Disclose

RC306C Thoracic Outlet Syndrome

Participants
Anthony Kuner, MD, Middleton, WI (*Presenter*) Research Consultant, AveXis

RC306D Primary Hyperparathyroidism

Participants
Paul M. Bunch, MD, Winston Salem, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pbunch@wakehealth.edu

LEARNING OBJECTIVES

1) To review the role and rationale of imaging in primary hyperparathyroidism. 2) To summarize the relative strengths and weaknesses of the most commonly used preoperative imaging localization techniques. 3) To understand the key information the surgeon requires from preoperative imaging to develop and execute the best possible operative plan for each patient.

ABSTRACT

Primary hyperparathyroidism refers to an intrinsic parathyroid gland abnormality causing excess parathyroid hormone, which acts to increase serum calcium. Primary hyperparathyroidism is most commonly caused by a single parathyroid adenoma but can also result from multiglandular hyperplasia, double parathyroid adenoma, and parathyroid carcinoma. Surgical removal of the abnormal parathyroid tissue is the only definitive cure. Primary hyperparathyroidism is diagnosed with biochemical testing rather than imaging. The role of imaging is localization of the abnormal parathyroid tissue, which facilitates operative cure. Ultrasound, nuclear medicine, and multiphase (so-called '4D') CT are the most commonly performed imaging modalities for preoperative localization. Although each imaging technique has relative strengths and weaknesses, each technique is also capable of providing useful and accurate localization information for operative planning. Not uncommonly, more than one preoperative imaging study is performed in an

attempt to maximize localization confidence via concordant imaging results. Regardless of the preoperative imaging technique(s) used, the key information the surgeon desires for operative planning includes: number, size, and location of candidate parathyroid lesions with respect to relevant surgical landmarks; the radiologist's opinion and confidence level regarding what each candidate lesion represents; and the presence or absence of ectopic or supernumerary parathyroid tissue, concurrent thyroid pathology, and arterial anomalies associated with a nonrecurrent laryngeal nerve.

Printed on: 05/05/21

RC307

Ovarian Cancer Imaging: Radiologists as Partners in Cancer Care

Saturday, Dec. 5 10:00AM - 11:00AM Room: Channel 1

GU OI

AMA PRA Category 1 Credit ™: 1.00

Participants
Katherine E. Maturen, MD, Ann Arbor, MI (*Moderator*) Royalties, Reed ElsevierRoyalties, Wolters Kluwer nv
Caroline Reinhold, MD, MSc, Westmount, QC (*Moderator*) Nothing to Disclose

Sub-Events

RC307A Introduction

Participants
Katherine E. Maturen, MD, Ann Arbor, MI (*Presenter*) Royalties, Reed ElsevierRoyalties, Wolters Kluwer nv
Caroline Reinhold, MD, MSc, Westmount, QC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kmaturen@umich.edu

RC307B Ovarian Cancer: Contemporary Treatment Paradigms

Participants
Shitanshu Uppal, MBBS, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Brief discussion of incidence, biology and lethality of ovarian cancerAn overview of principles of treatment of newly diagnosed ovarian cancerThe role radiologists play in treatment decisions

RC307C Ovarian Cancer Staging: Pre-treatment Imaging Evaluation

Participants
Andrea G. Rockall, FRCR,MRCP, London, United Kingdom (*Presenter*) Speaker, Guerbet SA

LEARNING OBJECTIVES

1) To be familiar with the pre-treatment appearances of ovarian cancer on CT. 2) To be aware of the challenges and pitfalls on CT. 3) To be familiar with the pre-treatment appearances of ovarian cancer on MRI. 4) The be aware of the appropriate MR protocol for staging ovarian cancer.

ABSTRACT

Prior to initial treatment, women with ovarian cancer are usually staged with CT. The CT scan appearances can assist in determining whether the patient should initially be treated with up-front surgery or should have neoadjuvant chemotherapy. The detection of peritoneal disease and its distribution is critical for making this decision. This lecture will review the appearance of disseminated ovarian cancer on CT, demonstrate the "difficult to operate" areas and review the challenges and pitfalls on CT. MR is emerging as a tool that may help to better demonstrate the extent of peritoneal disease. The best protocol for this will be discussed and the appearances will be reviewed.

RC307D Ovarian Cancer Lexicon for Staging and Treatment Planning

Participants
Atul B. Shinagare, MD, Boston, MA (*Presenter*) Consultant, Arog Pharmaceuticals, IncConsultant, VirtualScopics, Inc

RC307E Patterns of Recurrence in Gynecologic Oncology

Participants
Stephanie Nougaret, MD, Montpellier, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To be familiar with the normal post-surgical appearances. 2) To recognize the appearances of disease relapse. 3) To learn potential pitfalls. 4) To learn the critical anatomy for surgical planning.

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

RC308

Current Imaging of the Acute Abdomen

ER GI

AMA PRA Category 1 Credit ™: 1.00

Participants
Douglas S. Katz, MD, Mineola, NY (*Moderator*) Nothing to Disclose
Mariam Moshiri, MD, Bellevue, WA (*Moderator*) Nothing to Disclose

Sub-Events

RC308A CT Angiography of Acute GI Bleeding

Participants
Christina A. LeBedis, MD, Newton, MA (*Presenter*) Nothing to Disclose

RC308B CT of Small Bowel Obstruction and Ischemia

Participants
Vincent M. Mellnick, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

RC308C Non-obstetrical Non-appendiceal Acute Abdominal Conditions in Pregnancy

Participants
Douglas S. Katz, MD, Mineola, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

douglasscottkatzmd@gmail.com

LEARNING OBJECTIVES

1) To review the current clinical and imaging presentations of several acute non-obstetrical non-appendiceal conditions in the abdomen and pelvis in pregnancy. 2) To explain the roles of ultrasound and magnetic resonance imaging, as well as other imaging modalities, in the diagnosis of these conditions. 3) To review the current literature on the imaging and management of these conditions, as well as current controversies.

RC308D US of Non-obstetrical Pelvic Emergencies

Participants
John S. Pellerito, MD, Manhasset, NY (*Presenter*) Research Grant, General Electric Company

RC309

Artificial Intelligence for Abdominal Imagers

Tuesday, Dec. 1 2:00PM - 3:00PM Room: Channel 2

AI GI

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC309A Data Challenges for Abdominal AI

Participants
Ronald M. Summers, MD,PhD, Bethesda, MD (*Presenter*) Royalties, iCAD, IncRoyalties, Koninklijke Philips NVRoyalties, ScanMed, LLCResearch support, NVIDIA Corporation

RC309B Ethical Issues: ML Fairness Below the Diaphragm

Participants
George L. Shih, MD, New York, NY (*Presenter*) Consultant, MD.ai, IncStockholder, MD.ai, Inc

RC309C Abdominal AI in the Developing World

Participants
Judy W. Gichoya, MBChB,MS, Atlanta, GA (*Presenter*) Nothing to Disclose

RC309D Global AI Efforts

Participants
Meng Law, MBBS, Melbourne, Australia (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

meng.law@alfred.org.au

RC309E Commercial AI: Why Aren't Companies Focused Below the Diaphragm?

Participants
Marc D. Kohli, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe unique anatomic considerations that are present in the abdomen and pelvis but absent in other body regions. 2) Explain the importance of mulit-modality integration across abdominal and pelvic imaging.

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
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RC310

2nd and 3rd Trimester Ultrasound 2020

OB US

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC310A Placental Pearls of Wisdom

Participants
Vickie A. Feldstein, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

RC310B Mistakes to Avoid in the 2nd and 3rd Trimester

Participants
Carol B. Benson, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC310C A Systematic Approach to the 4-Chamber and Outflow Tract Views

Participants
Anne M. Kennedy, MD, Salt Lake City, UT (*Presenter*) Author with royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Use a simple anatomic check list to determine if the fetal 4-chamber view is normal or not. 2) Recognize fetal outflow tract anatomy based on comparison to CT and MR studies. 3) Recognize the components of the 3 vessel and 3 vessel trachea views.

ABSTRACT

Evaluation of the 4 chamber and outflow tracts is a required component of the standard second trimester anatomy scan. The three vessel and three vessel trachea views are required for the complex obstetric scan and will quite likely be added to the required views for the standard scan in the future. Prenatal detection of congenital heart disease is important for pregnancy management and delivery planning but remains poor. Utilizing a simple check list approach allows detection of cases with abnormal findings. Those patients can then be referred on for more detailed assessment.

RC311

Pediatric Nuclear Medicine

NM PD

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Susan E. Sharp, MD, Cincinnati, OH (*Moderator*) Nothing to Disclose

Sub-Events

RC311A Gastrointestinal

Participants
Frederick D. Grant, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Use recently published findings to interpret solid and liqud gastric emptying studies in children.2) Choose appropriate food option for a pediatric gastric emptying study3) Identify patients in whom a radionuclide salivagram may be useful for identifying tracheobronchial aspiration.

RC311B Genitourinary

Participants
Neha S. Kwatra, MBBS, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

neha.kwatra@childrens.harvard.edu

LEARNING OBJECTIVES

1) Know the current pediatric-specific imaging considerations in renal scinitgraphy. 2) Learn the complementary role of scintigraphy and other imaging modalities in various pediatric renal diseases. 3) Understand the pitfalls and challenges in intepretation, contoversies and future directions.

RC311C Musculoskeletal

Participants
Susan E. Sharp, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

RC311D Image Gently

Participants
Frederic H. Fahey, DSc, Boston, MA (*Presenter*) Nothing to Disclose

RC311E Panel Discussion

RC312

Diseases of the Thoraco-abdominal Aorta

CH VA

FDA Discussions may include off-label uses.

Participants
Iain D. Kirkpatrick, MD, Winnipeg, MB (*Moderator*) Speaker, Siemens AG
Terri J. Vrtiska, MD, Rochester, MN (*Moderator*) Nothing to Disclose
Kate Hanneman, MD, FRCPC, Toronto, ON (*DPS Upload*) Medical Advisory Board, sanofi-aventis Group

For information about this presentation, contact:

vrtiska.terri@mayo.edu

LEARNING OBJECTIVES

1) Discuss the epidemiology of aortic dissections. 2) Review multi-modality imaging findings in patients with acute and chronic dissections. 3) Describe protocols for imaging and techniques for accurately measuring aortic aneurysms. 4) Indicate key measurements and observations relevant to the clinician when interpreting aortic aneurysms. 5) Discuss important secondary findings that may indicate increased risk of aneurysm rupture or influence management decisions. 6) Understand the typical imaging features of large vessel vasculitis and its complications. 7) Discuss challenging cases with insights from pathologic correlation. 8) Understand the role of imaging in diagnosis and management of these disorders. 9) Identify the significance of early versus delayed endograft complications. 10) Describe types of endoleaks including fenestrated aortic grafts. 11) Present treatment of endoleaks and follow-up imaging.

Sub-Events

RC312A Imaging of Aortic Dissection

Participants
Kate Hanneman, MD, FRCPC, Toronto, ON (*Presenter*) Medical Advisory Board, sanofi-aventis Group

LEARNING OBJECTIVES

1) Discuss the epidemiology of aortic dissections. 2) Review multi-modality imaging findings in patients with acute and chronic dissections.

RC312B Imaging of Aortic Aneurysm

Participants
Iain D. Kirkpatrick, MD, Winnipeg, MB (*Presenter*) Speaker, Siemens AG

LEARNING OBJECTIVES

1) Describe protocols for imaging and techniques for accurately measuring aortic aneurysms. 2) Indicate key measurements and observations relevant to the clinician when interpreting aortic aneurysms. 3) Discuss important secondary findings that may indicate increased risk of aneurysm rupture or influence management decisions, including the findings of impending aneurysm rupture.

ABSTRACT

Aortic aneurysms are a frequent finding on thoracoabdominal CT, and in an era of minimally invasive treatment it is increasingly important to be able to accurately image, measure and characterize them. This session will discuss how to optimize your scanning protocols for assessing aortic aneurysms as well as how to most accurately measure them. Key measurements and observations useful for clinicians will be reviewed. Signs of impending rupture or which suggest an infectious/inflammatory aneurysm will be discussed, as well as risk assessment for rupture.

RC312C Imaging of Vasculitis

Participants
Phillip M. Young, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the typical imaging features of large vessel vasculitis and its complications. 2) Discuss challenging cases with insights from pathologic correlation. 3) Understand the role of imaging in diagnosis and management of these disorders.

RC312D Aortic Repair Complications: CT Imaging Findings You Need to Know

Participants
Terri J. Vrtiska, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the significance of early versus delayed endograft complications. 2) Describe types of endoleaks including fenestrated

1) Identify the significance of early versus delayed endograft complications. 2) Describe types of endoleaks including fenestrated aortic grafts. 3) Present treatment of endoleaks and follow-up imaging.

Printed on: 05/05/21

RC313

Pediatric Musculoskeletal Imaging

MK PD

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC313A Neonatal Glenohumeral Dysplasia Imaging

Participants
Sarah J. Menashe, MD, Seattle, WA (*Presenter*) Nothing to Disclose

RC313B Pediatric Pelvic Fractures

Participants
Matthew R. Hammer, MD, Dallas, TX (*Presenter*) Nothing to Disclose

RC313C Pediatric Sports Injuries: Physeal Injury of the Growing Skeleton

Participants
Andrew J. Degnan, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe common patterns of physeal injury encountered in childhood and adolescent sports injuries. 2) Provide guidance on optimal imaging strategies to assess sports-related injuries in children.

RC313D Pediatric Sacroiliac Joint Imaging

Participants
Nancy A. Chauvin, MD, Hershey, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the MR appearance of normal maturation of the sacroiliac joints in children. 2) Review the causes and MR appearance of inflammatory sacroiliitis. 3) Discuss the optimal imaging approach to evaluate children with suspected sacroiliitis. 4) Evaluate imaging pitfalls in children that may be mistaken for pathology. 5) Explore other pathology that may affect the sacroiliac joint in children.

RC314

Renal and Lung Cancer Interventions

CH GU IR

AMA PRA Category 1 Credit ™: 1.00

Participants
Nadine Abi-Jaoudeh, MD, Orange, CA (*Moderator*) Research collaboration, Koninklijke Philips NVResearch collaboration, Teclison Limited Research support, SillaJen, IncIntellectual property, Bruin Biosciences IncOwner, Bruin Biosciences IncResearch collaboration, Sirtex Medical LtdResearch collaboration, Guerbet SAAdvisory Board, F. Hoffmann-La Roche Ltd
Nima Kokabi, MD, Atlanta, GA (*Moderator*) Nothing to Disclose

Sub-Events

RC314A Diagnosis and Staging of Renal Cell Carcinoma

Participants
Nadine Abi-Jaoudeh, MD, Orange, CA (*Presenter*) Research collaboration, Koninklijke Philips NVResearch collaboration, Teclison Limited Research support, SillaJen, IncIntellectual property, Bruin Biosciences IncOwner, Bruin Biosciences IncResearch collaboration, Sirtex Medical LtdResearch collaboration, Guerbet SAAdvisory Board, F. Hoffmann-La Roche Ltd

RC314B Ablation of Renal Cancer: Techniques

Participants
Khashayar Farsad, MD, PhD, Portland, OR (*Presenter*) Co-founder, Auxetics, Inc; Stockholder, Auxetics, Inc; Consulant, Cook Group Incorporated; Consultant, BTG International Ltd; Research Grant, Guerbet SA; Advisory Board, F. Hoffmann-La Roche Ltd; Educator, NeuWave Medical, Inc

For information about this presentation, contact:

farsad@ohsu.edu

LEARNING OBJECTIVES

1) To review current technology for renal ablation. 2) To understand lesion characteristics pertinent for ablation planning. 3) To introduce concepts addressing challenging ablations.

RC314C Ablation versus Surgery for T1 Renal Cell Carcinoma

Participants
Nima Kokabi, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Risk factors and epidemiologyReview of relevant guidelinesReview of contemporary literatureOpportunities and challenges for IR

RC314D Diagnosis and Staging of Lung Cancer

Participants
Karen L. Xie, DO, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the important imaging characteristics of lung cancer. 2) Summarize some of the different features of various histologic spectrum of lung cancer. 3) Familiar with the tumor (T), lymph node (N), and metastasis (M) descriptors and stage groups in the current TNM staging system. 4) Understand the role of different diagnostic imaging modality in the pre-treatment clinical TNM staging of lung cancer.

RC314E Ablation versus XRT for Lung Cancer

Participants
Kelvin K. Hong, MD, Baltimore, MD (*Presenter*) Scientific Advisory Board, Boston Scientific CorporationScientific Advisory Board, BTG International LtdResearch support, BTG International Ltd

RC314F Future Directions of Lung Cancer Interventions

Participants
Stephen B. Solomon, MD, New York, NY (*Presenter*) Consultant, BTG International Ltd ; Consultant, Johnson & Johnson; Consultant, XACT Robotics Ltd; Consultant, MEDX Xelerator; Consultant, Varian Medical Systems, Inc; Consultant, Hughes & Company; Stockholder, Hughes & Company; Researcher, General Electric Company; Stockholder, Johnson & Johnson; Researcher, Johnson & Johnson; Researcher, AngioDynamics, Inc; Researcher, El.en.; Stockholder, Aspire Bariatrics; Stockholder, Immunomedics, Inc; Stockholder, Progenics Pharmaceuticals, Inc; Stockholder, Innoblative Designs, Inc; Stockholder, Surefire Medical, Inc

RC315

AI in Breast Imaging

Thursday, Dec. 3 2:00PM - 3:00PM Room: Channel 2

AI BR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Sub-Events

RC315A Workflow Improvements with AI

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NVResearcher, Koninklijke Philips NVAdvisory Board, Bayer AGAdvisory Board, Aidoc LtdAdvisory Board, Inference Analytics, IncAdvisory Board, Subtle Medical

RC315B How to Assess the Algorithms

Participants
Robert M. Nishikawa, PhD, Pittsburgh, PA (*Presenter*) Royalties, Hologic, IncResearch Grant, Hologic, IncResearch Consultant, iCAD, IncResearch Grant, Koios MedicalResearch Grant, General Electric Company

For information about this presentation, contact:

nishikawarm@upmc.edu

LEARNING OBJECTIVES

1) To understand evaluation of AI at different points on the path towards wide-spread clinical use. 2) To understand different evaluation methods for different AI tools.

RC315C AI for Screening

Participants
Emily F. Conant, MD, Philadelphia, PA (*Presenter*) Grant, Hologic, Inc; Consultant, Hologic, Inc; Grant, iCAD, Inc; Consultant, iCAD, Inc; Advisory Panel, iCAD, Inc; Speaker, iiCME

For information about this presentation, contact:

emily.conant@pennmedicine.upenn.edu

LEARNING OBJECTIVES

1) Review how AI algorithms may improve accuracy in breast cancer screening. 2) Discuss how AI algorithms may improve efficiency in breast cancer screening.

RC315D AI to Improve Risk Evaluation

Participants
Constance D. Lehman, MD,PhD, Boston, MA (*Presenter*) Institutional Research Grant, General Electric Company

For information about this presentation, contact:

clehman@mgh.harvard.edu

LEARNING OBJECTIVES

1. Review comparative performance of AI-based vs traditional risk assessment models 2. Discuss how AI risk assessment models may be used to support risk-based screening.

RC316

Salary Equity in Radiology: Is It Real or Perception? How to Measure and Address (Sponsored by the RSNA Committee on Diversity, Equity & Inclusion)

HP

AMA PRA Category 1 Credit ™: .75

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose
Carolyn C. Meltzer, MD, Atlanta, GA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

cmeltze@emory.edu

LEARNING OBJECTIVES

1) The understand the status of salary gap between genders and race in medicine. 2) The methodology to adjust for part-time, call duty, clinical productivity, and scholarly work - what are the standard process. 3) The salary inequality in radiology between genders as compared with other medical professions. 4) AAMC Salary equity initiatives - what we learn from them.

ABSTRACT

Gender inequity discussion can encompass various resource allocation and promotion. One of the most delicate issues is salary equity. The problems have been a lack of detailed data and methodological analysis to adjust the difference in clinical productivity (part-time, full time, on-call duty) and scholarly work. In this educational session, we have experts in this field to discuss the current status of salary equality research, initiatives to address the salary equality in academic institution, as well as AAMC leadership perspectives to share the higher-level discussion in salary equality in medicine and radiology.

Sub-Events

RC316A How to Make Sense of Gender Differences in Compensation When There Are Gender Differences in Other Variables

Participants
Reshma Jagsi, MD, DPhil, Ann Arbor, MI (*Presenter*) Grant, Amgen Inc; Grant, Vizient Inc; Stock options, Equity Quotient; Advisory Board, Equity Quotient; Researcher, F. Hoffmann-La Roche Ltd; ; ;

RC316B Salary Equity for Clinical and Research Faculty in Academic Institutions: Challenges and Opportunities

Participants
Miriam A. Bredella, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mbredella@mgh.harvard.edu

LEARNING OBJECTIVES

To identify challenges and opportunities in implementing equitable compensation models for clinical and research faculty in radiology.

RC316C Salary Equity: What AAMC GWIMS Has Done

Participants
Carolyn C. Meltzer, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

RC316D Panel Discussion

RC318

Artificial Intelligence (AI) in Oncology (Supported in part by an Unrestricted Educational Grant from Siemens Healthineers)

Wednesday, Dec. 2 5:00PM - 6:00PM Room: Channel 5

AI OI

AMA PRA Category 1 Credit ™: .75

Participants
Evis Sala, MD, PhD, Cambridge, United Kingdom (*Moderator*) Co-founder, Cambridge AI HealthSpeakers Bureau, GlaxoSmithKline plc

For information about this presentation, contact:

es220@cam.ac.uk

Sub-Events

RC318A Clinical Challenges for AI in Oncological Imaging

Participants
Nathaniel Swinburne, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

swinburn@mskcc.org

RC318B AI for Tumor Segmentation and Quantification of Heterogeneity

Participants
Lucian Beer, MD,PhD, Vienna, Austria (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To name the advantages of AI for Tumor Segmentation and Quantification of Heterogeneity. 2) To understand the challenges of AI for Tumor Segmentation. 3) To review the currently available solutions of AI for Tumor Segmentation and Quantification of Heterogeneity. 4) To learn the clinical application of AI for Tumor Segmentation and Quantification of Heterogeneity.

RC318C Using AI for Data Integration: What Comes Next?

Participants
Mireia Crispin Ortuzar, Cambridge, United Kingdom (*Presenter*) Research Grant, Eli Lilly and Company

RC321

Practical Aspects of MR (Supported in part by an Unrestricted Educational Grant from Bayer)

Wednesday, Dec. 2 2:00PM - 3:00PM Room: Channel 3

MR PH

AMA PRA Category 1 Credit ™: 1.00

Participants
Matthew A. Bernstein, PhD, Rochester, MN (*Moderator*) Former Employee, General Electric Company; Intellectual property, General Electric Company

LEARNING OBJECTIVES

1) Understand basic aspects of MR Safety in the clinical environment, including how to avoid projectile incidents and manage patients with implanted devices. Understand the differences between MR Safe, MR Conditional, and MR Unsafe. 2) Understand the origin of MR artifacts that commonly occur in clinical practice. Acquire techniques to reduce or eliminate these artifacts. 3) Understand the basics of MR Siting and Acceptance testing. Review environmental factors such as vibration and moving metal. Review tests that can be performed after the MRI system is installed to verify its proper operation.

Sub-Events

RC321A MR Safety

Participants
Robert E. Watson JR, MD, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Provide a general framework about essential elements of MR safety, to include a) risks associated with the main magnetic field, radiofrequency field, and time varying gradient fields; b) MRI zones I, II, III, IV; c) MRI safe, MRI conditional, and MRI unsafe device labeling; d) Quenches; e) Patient screening and ferromagnetic detection; and f) management of patients with implanted devices.

RC321B MR Artifacts and How to Solve Them

Participants
Xiaohong J. Zhou, PhD, Chicago, IL (*Presenter*) Owner, Horizon Medical Physics Services; Consultant, Horizon Medical Physics Services; Consultant, General Electric Company; Royalties, Reed Elsevier

For information about this presentation, contact:

xjzhou@uic.edu

LEARNING OBJECTIVES

1) Recognize common artifacts in MR images. 2) Understand the root cause of the artifacts. 3) Describe the strategies to reduce or remove the artifacts.

ABSTRACT

In this lecture, we will focus on MRI artifacts caused by system imperfections. Artifacts related to image reconstruction, tissue properties, physiology, and subject motion will also be briefly described. For each artifact, we will discuss the appearance, characteristics, root cause, and remedies. With plenty of examples of phantom and human images, our goal is to help physicists, radiologists, and technologists recognize and manage the artifacts frequently encountered in clinical MRI practice.

RC321C MR Site Planning and Acceptance Testing

Participants
Lisa C. Lemen, PhD, Cincinnati, OH (*Presenter*) Consultant, General Electric CompanyConsultant, Johnson & Johnson

For information about this presentation, contact:

lemenll@uc.edu

LEARNING OBJECTIVES

1) Describe environmental factors which may impact the site selection or planning, including potential sources of vibration and moving metal. 2) Review a preliminary site layout for potential problems, including necessary support areas and access routes. 3) List environmental and system tests that can be performed after the MRI system is installed to verify its proper operation.

RC322

Machine Learning for Radiotherapy Applications

AI PH RO

FDA Discussions may include off-label uses.

Participants
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Moderator*) Research support, General Electric CompanyResearch support, F. Hoffmann-La Roche Ltd
Jonas Teuwen, MSc,PhD, Amsterdam, Netherlands (*DPS Upload*) Nothing to Disclose

Sub-Events

RC322A Deep Learning for Image Segmentation, Analysis and Reconstruction

Participants
Jonas Teuwen, MSc,PhD, Amsterdam, Netherlands (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about the types of clinical problems which are best suited for deep learning solutions. 2) Learn about the current state-of-the-art deep learning technology in the analysis and segmentation of medical images, and learn about the advantages of reconstructing images using deep learning technology. 3) Being able to critically estimate the impact and assess the applicability of newly developed deep learning technology.

ABSTRACT

Deep learning has recently attracted much interest from the medical community, mainly due the successful application to problems which were previously considered to be purely within the human realm. The availability of an ever growing amount of medical images, and the increasing availability of affordable computation resources allows to apply deep learning technologies to many different problems. However, the scope of problems for which deep learning currently performs on par or outperforms humans is rather narrow. The required human and financial effort makes it important to be able to determine clinical problems where deep learning could bring an advantage. After this refresher course, you will be aware of the state-of-the-art in deep learning for image segmentation, analysis and reconstruction. You will be able to critically assess the impact and applicability of deep learning technology in radiation oncology and be able to find future clinical opportunities.

RC322B Machine Learning Tumor Classification

Participants
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Presenter*) Research support, General Electric CompanyResearch support, F. Hoffmann-La Roche Ltd

LEARNING OBJECTIVES

1) Learn about applications of machine learning including radiomics and deep learning in classifying tumor sub-types. 2) Learn about risk stratification using machine learning of MR and CT images. 3) Understand the challenges when applying machine learning to tumor analysis. 4) Review best practices for applying machine learning in cancer imaging.

ABSTRACT

Machine learning has shown great potential for a range of applications in oncology from diagnosis to therapy planning and response assessment. Large repositories of clinical and imaging data typicially available at most institutions can be be used to train and validate models. We will discuss the use of machine learning including radiomics and deep learning for the analysis of CT and MR imaging in a variety of cancer types for risk stratification, radiogenomics and response assessment..

RC322C Machine Learning for Automated Treatment Planning

Participants
Carlos E. Cardenas, PhD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learning about treatment planning problems which are suited to machine learning solutions. 2) Learn how deep learning approaches are being used to automated treatment planning. 3) Be able to discuss how machine learning tools can be safely introduced into clinical practice.

ABSTRACT

Automated radiotherapy treatment planning is an attractive solution to improve consistency in the quality of plans and to increase efficiency in clinical workflows. In addition, automation could play a significant role globally by enabling treatment planning in resource limited clinics increasing the access of high-quality radiotherapy to patients around the world. In this talk, we will discuss how machine learning is currently being used to automate several aspects of the radiotherapy treatment planning workflow.

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RC323

Making Patients and Staff Safer in Interventional Procedures

IR PH SQ

Participants
William F. Sensakovic, PhD, Phoenix, AZ (*Moderator*) Founder, Telerad Physics Teaching, LLC
Thaddeus A. Wilson, PhD, Memphis, TN (*Moderator*) Nothing to Disclose
Stephen Balter, PhD, New York, NY (*DPS Upload*) Speakers Bureau, MAVIG, GmbH; Consultant, ControlRad Systems, Inc

LEARNING OBJECTIVES

1) Describe cataract and cancer risks associated with typical interventional radiology procedures and workload. 2) Develop and assess institutional policies for implementing radiation dose tracking and auditing in the interventional setting.

Sub-Events

RC323A Patient Doses (in lab) and Patient Dose Management

Participants
Stephen Balter, PhD, New York, NY (*Presenter*) Speakers Bureau, MAVIG, GmbH; Consultant, ControlRad Systems, Inc

LEARNING OBJECTIVES

1) Understand how in-lab radiation displays and post-procedure radiation use data can be used to optimize patient safety.

RC323B Staff Protection: Cataract and Potential Cancers

Participants
Madan M. Rehani, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain the results from the studies among interventionalists and support staff on eye lens opacities and comprehend the risks. 2) Identify the evidence or lack thereof of cancer risk among interventionalists. 3) Identify the protective measures for staff in interventional suites.

RC323C Dose Tracking and Audits: Institution-wide Program

Participants
Pei-Jan P. Lin, PhD, Richmond, VA (*Presenter*) Nothing to Disclose
Shelia Regan, MEd, Richmond, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

pei-jan.lin@vcuhealth.org

shelia.regan@vcuhealth.org

LEARNING OBJECTIVES

1) Learn how the 'event-by-event' RDSR data exported from the patient radiation dose monitoring and tracking (PRDMT) systems may be employed to better estimate the peak skin dose (PSD) from fluoroscopy equipment. 2) The estimated PSD is then classified into three 'alert level' which leads to a better patient care through a follow up process which will be described in detail at the presentation. 3) Identify establishment of a Clinical Radiation Safety Office (CRSO) to handle the technical aspect of PRDMT and administrative processes of 'documentation' and 'patient follow up' is the key to a successful patient care. 4) It is necessary to establish CRSO as an enterprise wide office to govern the entire process and functions provided by the CRSO. It is essential to learn that successful PRDMT requires both the 'organization' must be setup and it must be properly staffed with qualified 'personnel'.

ABSTRACT

The internal organization structure is described in detail including the 'alert Levels' and what comes next upon receiving the alerts. The Clinical Radiation Safety Office (CRSO) established at VCU Medical Center plays major key rolls in (1) the patient radiation dose monitoring and tracking (PRDMT) and (2) follow up of patients who receved 'confirmed' peak skin dose that is required by the Hospital Policy to follow post fluoroscopy examinations as part of VCU's patient care. The key is to establish a Clinical Radiation Safety Office which manage the technical aspect of PRDMT and follow up of patients process. In other words, an institutinal, enterprise wide organization must be created to handle the total patient care for patients who received high dose radiation which could result in deterministic injury.

RC324

Best Cases from the AIRP (In Conjunction with the American Institute for Radiologic Pathology)

BR CA MK NR PD VA

AMA PRA Category 1 Credit ™: .75

Participants
Mark D. Murphey, MD, Silver Spring, MD (*Moderator*) Nothing to Disclose

Sub-Events

RC324A Introduction

Participants
Mark D. Murphey, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

RC324B Pediatrics

Participants
Ellen M. Chung, MD, Columbus, OH (*Presenter*) Nothing to Disclose

RC324C Breast

Participants
Jennifer A. Harvey, MD, Rochester, NY (*Presenter*) Stockholder, Volpara Health Technologies Limited;

RC324D Cardiovascular

Participants
Aletta Ann Frazier, MD, Kensington, MD (*Presenter*) Nothing to Disclose

RC324E Closing

Participants
Mark D. Murphey, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

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RC327

Beyond the Podium: Tips for Better Teaching and Testing from Trainees through CME

ED HP

Participants
David J. Disantis, MD, Jacksonville, FL (*Moderator*) Nothing to Disclose
Andres R. Ayoob, MD, Lexington, KY (*DPS Upload*) Nothing to Disclose

For information about this presentation, contact:

djdisantis@gmail.com

Sub-Events

RC327A Keep it Brain-friendly: Creating Presentations That Stick

Participants
Andres R. Ayoob, MD, Lexington, KY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain the components of cognitive load. 2) Apply evidence-based principles to reduce cognitive load in multimedia presentations. 3) Employ evidence-based presentation techniques that foster learning.

RC327B Keep it Practical: Educational Exhibits and Journal CME That They'll Appreciate

Participants
Meghan G. Lubner, MD, Madison, WI (*Presenter*) Grant, Koninklijke Philips NVGrant, Johnson & JohnsonSpouse, Consultant, Farcast Biosciences

LEARNING OBJECTIVES

1) Review a step-by-step approach to creating an educational exhibit. 2) Discuss a few tips for creating meaningful content and visual appeal. 3) Review the process for parlaying an educational exhibit into a manuscript with CME.

RC327C Keep it Honest: Writing Good Questions Doesn't Have to Be Hard

Participants
David J. Disantis, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

djdisantis@gmail.com

LEARNING OBJECTIVES

1) Describe the components of a properly constructed question. 2) Recognize the most common errors in question writing, and understand how to avoid them.

ABSTRACT

Question writing flaws remain common in radiology's leading pubilcatons. This presentation presents the 'anatomy' of a good test question, with tips for avoiding the most common mistakes.

RC329

Non-contrast MRI Techniques

MR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Sub-Events

RC329A GBCA Use: What are the Risks?

Participants
Matthew S. Davenport, MD, Ann Arbor, MI (*Presenter*) Royalties, Wolters Kluwer nv

For information about this presentation, contact:

matdaven@med.umich.edu

LEARNING OBJECTIVES

1) Review hypersensitivty and physiologic reaction risks with GBCM. 2) Review risk of gadolinium retention with GBCM. 3) Review risk of NSF with GBCM. 4) Learn how to image patients with kidney disease.

RC329B Arterial Spin Labeling

Participants
David C. Alsop, PhD, Boston, MA (*Presenter*) Research support, General Electric CompanyRoyalties, General Electric CompanyRoyalties, Koninklijke Philips NVRoyalties, Siemens AGRoyalties, Hitachi, Ltd

For information about this presentation, contact:

dalsop@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Describe the basic principles and methods of Arterial Spin Labeling (ASL) imaging. 2) Identify patients and protocols that might benefit from the addition of ASL imaging. 3) Detect artifacts that can confuse the interpretation of ASL images.

RC329C 4D Flow Imaging

Participants
Scott B. Reeder, MD,PhD, Madison, WI (*Presenter*) Nothing to Disclose

RC329D C13 Imaging

Participants
Zhen J. Wang, MD, San Francisco, CA (*Presenter*) Stockholder, NEXTRAST, INC; Consultant, General Electric Company

For information about this presentation, contact:

Zhen.wang@ucsf.edu

LEARNING OBJECTIVES

1) Learn the principles of hyperpolarized 13C MRI. 2) Become familiar with the current state-of-the-art and future applications of hyperpolarized 13C MRI.

RC329E Q/A

RC332

Medical Imaging and Population Health

Monday, Nov. 30 8:30AM - 9:30AM Room: Channel 5

LM

AMA PRA Category 1 Credit ™: .75

Participants
Annette J. Johnson, MD, Augusta, GA (*Moderator*) Nothing to Disclose
Yoshimi Anzai, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose

Sub-Events

RC332A How Radiology Can Contribute to Population Health Management

Participants
James V. Rawson, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC332B Imaging Screening: Cancer and Beyond

Participants
Ella A. Kazerooni, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ellakaz@umich.edu

RC332C How to Scale High-value Practice to Improve Population Health

Participants
Pamela T. Johnson, MD, Baltimore, MD (*Presenter*) Intellectual property, Medical Imaging and Population HealthIntellectual property, Decision Support and Implications for Federal Regulations (PAMA): What You Need to Know and Do

For information about this presentation, contact:

PamelaJohnson@jhmi.edu

RC332D How AI Can Help Population Health

Participants
Daniel L. Rubin, MD, Palo Alto, CA (*Presenter*) Consultant, F. Hoffmann-La Roche Ltd

For information about this presentation, contact:

daniel.l.rubin@stanford.edu

Printed on: 05/05/21

RC353

Using Imaging Informatics to Enable Patient Experience Improvements in Radiology

IN LM

Participants
Ramin Khorasani, MD, Roxbury Crossing, MA (*Moderator*) Nothing to Disclose
Ramin Khorasani, MD, Roxbury Crossing, MA (*DPS Upload*) Nothing to Disclose

Sub-Events

RC353A Patient Experience in Radiology: The Case for Urgent Action

Participants
Ramin Khorasani, MD, Roxbury Crossing, MA (*Presenter*) Nothing to Disclose

RC353B Patient-centered Imaging Informatics Innovations

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss how imaging informatics can be used to design innovations that help patients to better understand their radiology reports as well as to more effectively connect directly with the radiologists caring for them or their family members. 2) Identify challenges that patients face in navigating their care in radiology that could be addressed by informatics solutions.

RC353C Using Patient Experience Survey Results to Motivate Change

Participants
Neena Kapoor, MD, Wellesley, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn how IT tools can help analyze patient experience comments to identify targets for improvement initiatives.

RC353D Patient Experience: Numbers, Culture, or ?

Participants
Keith D. Hentel, MD, MS, Briarcliff, NY (*Presenter*) Nothing to Disclose

RC353E Patient Challenges and Wish List for Imaging Informatics

Participants
Andrea K. Borondy Kitts, MPH,MS, Jupiter, FL (*Presenter*) Stockholder, Abbott LaboratoriesStockholder, AbbVie IncStockholder, Johnson & JohnsonOfficer, Prosumer HealthInvestor, Prosumer HealthFaculty, Medtronic plcConsultant, AstraZeneca PLC

For information about this presentation, contact:

borondy@msn.com

LEARNING OBJECTIVES

1) Help radiologists assess the challenges and barriers faced by patients in finding information about imaging tests and procedures on-line, in accessing and understanding radiologist reports on patient portals, and in understanding, arranging for, and committing to, appropriate follow-up. 2) Provide suggestions for interventions for radiologists and radiology practices to use to help patients find and understand information on appropriate imaging tests for their health/medical situation, find and understand their radiologist report, and understand and arrange for appropriate follow-up.

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RC354

Getting Stuff Done: A Mindful Approach to Personal Productivity

IN

Participants
Puneet Bhargava, MD, Seattle, WA (*Moderator*) Editor, Reed Elsevier
Matthew B. Morgan, MD, Sandy, UT (*Presenter*) Consultant, Reed Elsevier
Puneet Bhargava, MD, Seattle, WA (*Presenter*) Editor, Reed Elsevier
Puneet Bhargava, MD, Seattle, WA (*DPS Upload*) Editor, Reed Elsevier

LEARNING OBJECTIVES

1) Introduce the concept of 'Getting Things Done.' Learn the concepts of Inbox Zero and other email management techniques. 2) Using tools such as note-taking applications, citation and password managers. 3) Using self-inquiry techniques, review how to make meaningful and powerful changes in how we engage with technology.

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RC401

Inhalational Lung Disease

CH

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC401A E-cigarette and Vaping Associated Lung Injury (EVALI)

Participants
Travis S. Henry, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

RC401B Hypersensitivity Pneumonitis: Is There Anything New?

Participants
Justus E. Roos, MD, Luzern, Switzerland (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

justus.roos@luks.ch

RC401C Under-recognized Lung Disease Related to Metals

Participants
Cristopher A. Meyer, MD, Middleton, WI (*Presenter*) Investor, Elucent Medical; Reader, Johnson & Johnson

RC401D New Epidemics in Inhalational Lung Disease

Participants
Lara Walkoff, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Become familiar with recent trends and newer exposures resulting in inhalational lung disease. 2) Describe the radiologic manifestations of these inhalational exposures.

RC401E Mining Lung Diseases in the Current Era

Participants
Stephen Hobbs, MD, Lexington, KY (*Presenter*) Author with royalties, Wolters Kluwer nvAuthor with royalties, Reed Elsevier

For information about this presentation, contact:

stephen.hobbs@uky.edu

LEARNING OBJECTIVES

1) Describe the key radiologic patterns that should prompt consideration of mining related pneumoconiosis. 2) Explain the limitations of imaging in diagnosing mining related lung injury.

RC403

Rapid Fire: 80 Cardiac Cases in 60 Minutes

Wednesday, Dec. 2 8:30AM - 9:30AM Room: Channel 3

CA

AMA PRA Category 1 Credit ™: 1.00

Participants
Jeremy D. Collins, MD, Rochester, MN (*Moderator*) Consultant, Guerbet SAGrant, Siemens AGGrant, C. R. Bard, Inc

Sub-Events

RC403A Structural Heart Disease: 20 Cases

Participants
Jeremy D. Collins, MD, Rochester, MN (*Presenter*) Consultant, Guerbet SAGrant, Siemens AGGrant, C. R. Bard, Inc

RC403B Cardiothoracic Oncology: 20 Cases

Participants
Jordi Broncano, MD, Cordoba, Spain (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

j.broncano.c@htime.org

RC403C Pericardium: 20 Cases

Participants
Daniel Vargas, MD, Denver, CO (*Presenter*) Nothing to Disclose

RC403D Coronary Arteries and Myocardium: 20 Cases

Participants
Amar B. Shah, MD, New York, NY (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

RC404

Articular Discs, Menisci, and Labra: Structure, Function, and Dysfunction Using MRI with Emphasis on the Knee Meniscus, Triangular Fibrocartilage, and Glenoid and Acetabular Labrum

MR MK

AMA PRA Category 1 Credit ™: 1.00

Participants
Donald L. Resnick, MD, San Diego, CA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) To detail the anatomy, composition, and function of several intraarticular structures including the menisci of the knee, the triangular fibrocartilage of the wrist, and the labra of the hip and glenohumeral joint. 2) To correlate the anatomic framework of these structures with their patterns of failure, emphasizing MR imaging. 3) To detail the morphology of the human knee meniscus with particular emphasis on its collagen composition. 4) To illustrate the basic patterns of meniscal failure as displayed on MR imaging. 5) To correlate these patterns of failure with an understanding of meniscal morphology. 6) Compare and contrast the normal anatomy and function of the labrum in two main main-ball-socket joints, the hip and shoulder. 7) Identify common labral disorders in the shoulder and hip and recognize imaging findings that distinguish them from normal variants.

Sub-Events

RC404A Meniscus of the Knee

Participants
Donald L. Resnick, MD, San Diego, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To detail the morphology of the human knee meniscus with particular emphasis on its collagen composition. 2) To illustrate the basic patterns of meniscal failure as displayed on MR imaging. 3) To correlate these patterns of failure with an understanding of meniscal morphology.

ABSTRACT

The morphology of the knee meniscus will be explored, particularly its collagen framework, in an effort to elucidate the basic patterns of meniscal failure as viewed in MR images and during arthroscopy. Particular attention will be given to those structures that influence meniscal function and dysfunction, structures that include the meniscal root ligaments, the popliteomeniscal ligaments, and the capsular ligaments.

RC404B Triangular Fibrocartilage Complex (TFCC) of the Wrist

Participants
Christine B. Chung, MD, Solana Beach, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cbchung@ucsd.edu

RC404C Labrum of the Glenohumeral Joint and of the Hip

Participants
David A. Rubin, MD, Saint Louis, MO (*Presenter*) Scientific Advisory Board, ImageBiopsy Lab

LEARNING OBJECTIVES

1) Compare and contrast the normal anatomy, function, and injury patterns of the labra in the relatively mobile shoulder and constrained hip joints. 2) Identify common labral disorders in the shoulder and hip and recognize imaging findings that distinguish them from normal variants.

RC405

What's in the Pipeline for Neuroradiology?

Wednesday, Dec. 2 10:00AM - 11:00AM Room: Channel 3

MR NR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Christopher P. Hess, MD, PhD, San Francisco, CA (*Moderator*) Research, Siemens AG; Consultant, General Electric Company; Yvonne W. Lui, MD, New York, NY (*Moderator*) Research collaboration, Siemens AGAdvisor, Bold Brain Ventures

LEARNING OBJECTIVES

1) To survey of cutting-edge areas in Neuroradiology including: a) MR-guided focused ultrasound applications in brain imaging. b) Clinical high-field MR neuroimaging c) Machine learning image reconstruction, and d) Advances in CT imaging: photon counting.

Sub-Events

RC405A Introduction

Participants
Yvonne W. Lui, MD, New York, NY (*Presenter*) Research collaboration, Siemens AGAdvisor, Bold Brain Ventures

RC405B MR-guided Focused Ultrasound Brain Applications

Participants
J. Levi Chazen, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jlc2008@med.cornell.edu

LEARNING OBJECTIVES

1) Review current and future intracranial applications of MR-guided focused ultrasound.

RC405C Clinical 7 Tesla MRI: Successes and Challenges

Participants
Kirk M. Welker, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Desribe both advantages and limitations of clinical brain imaging with 7T MRI. 2) List valid indications for 7T patient referral. 3) Screen patients for potential contraindications to 7T MRI. 4) Discuss strategies for mitigating B1 artifacts encountered in ultrahigh field imaging.

RC405D Machine Learning Reconstruction: Coming Soon to a Scanner Near You

Participants
Christopher G. Filippi, MD, Boston, MA (*Presenter*) Research Consultant, Syntactx, LLCStockholde, InnovacomAuthor, Wolters Kluwer nv

For information about this presentation, contact:

cfilippi@northwell.edu

RC405E Spectral and Photon-counting CT: What's on the Horizon?

Participants
David A. Bluemke, MD,PhD, Madison, WI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dbluemke@wisc.edu

LEARNING OBJECTIVES

1) Define photon CT scanners and how they compare to traditional CT scanners. 2) Describe the potential uses of photon CT for neuroradiology applications.

ABSTRACT

All current CT scanners use so-called energy integrating detectors (EIDs) to capture incident photons after they pass through the body. The electric current produced by the EID is digitized, and used to reconstruct the digital image from CT. A newer type of

detector uses digital technology: the photon counting detector (PCD). As implied by the name, the PCD tracks the individual number of incident photons in addition to the energy of the incident photon. There are two inherent advantages to PCD for human imaging: 1) the potential for lowered radiation dose due to greater efficiency of the PCD, and 2) improved spectral CT imaging. These characteristics further translate to specific advantages for CT of the neurologic imaging. In particular, photon counting CT has been demonstrated to have less beam hardening artifact around the spine and areas of the brain with extensive bone as well as improved gray-white matter differentiation. This results in more accurate quantitative imaging. In addition, PCDs have 2 to 4-fold greater spatial resolution than conventional CT x-ray detectors. The purpose of this review will be to provide background on PCD technology for CT as well as potential advantages or CT imaging of the brain and spine.

Printed on: 05/05/21

RC406

Temporal Bone

HN NR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC406A Temporal Bone Anatomy

Participants
Caroline D. Robson, MBChB, Boston, MA (*Presenter*) Author with royalties, Reed Elsevier

LEARNING OBJECTIVES

1. Become familiar with temporal bone anatomy.2. Recognize key landmarks of surgical importance.3. Provide some tips to easily recognize normal ossicular and inner ear morphology.

RC406B Temporal Bone Trauma

Participants
Hillary R. Kelly, MD, Cambridge, MA (*Presenter*) Investigator, Bayer AGInstitutional research agreement, Bayer AGSpouse, Stockholder, Adaptive BiotechnologiesSpouse, Investo, Adaptive BiotechnologiesSpouse, Stockholder, Octant BioSpouse, Board Member, Octant BioSpouse, Founder and CEO, Ginkgo BioworksSpouse, Owner, Ginkgo BioworksSpouse, Stockholder, Ginkgo Bioworks

LEARNING OBJECTIVES

1) Explain the role of multidetector CT in recognizing and classifying temporal bone fractures. 2) Identify the imaging signs of injury to critical structures in the temporal bone with attention to the information most relevant to referring physicians.3) Detect the imaging features of the complications and sequelae of temporal bone trauma.

RC406C An Anatomic Approach to Temporal Bone Tumors and Inflammation

Participants
Hugh D. Curtin, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Hugh_Curtin@meei.harvard.edu

LEARNING OBJECTIVES

1. The participant will be able to describe the major anatomic regions of the temporal bone.2. The participant will be able to organize potential diagnoses based on anatomic landmarks within the temporal bone.3. The participant will be able to explain potential complications of treatment based on the extension of the tumor.

ABSTRACT

The temporal bone is one of the most complex structures in the human body. This complexity can be an advantage in attempting to determine the identity of a tumor in the temporal bone. Certain tissues give rise to certain types of neoplasms and so an anatomic approach allows better determination of category of tumor. Location also helps predict potential complications of therapy. This talk separates the temporal bone into regions and discusses an approach to tumor found in those areas.

RC406D Post-operative Temporal Bone

Participants
Gul Moonis, MD, South Orange, NJ (*Presenter*) Nothing to Disclose

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RC407

A Case-based Audience Participation Session (Genitourinary)

GU

Participants
Peter S. Liu, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Tristan Barrett, MBBS, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose
Erica B. Stein, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Erica B. Stein, MD, Ann Arbor, MI (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) To be introduced to a series of Genitourinary case studies via an interactive team game approach designed to encourage 'active' consumption of educational content. 2) To be able to use their mobile wireless device (tablet, phone, laptop) to electronically respond to various Genitourinary case challenges; participants will be able to monitor their individual and team performance in real time. 3) To receive a personalized self-assessment report via email that will review the case material presented during the session along with individual and team performance.

ABSTRACT

The extremely popular audience participation educational experience is back! GU Diagnosis Live is an expert-moderated session featuring a series of interactive Genitourinary case studies that will challenge radiologists' diagnostic skills and knowledge. Building on last year's successful Diagnosis Live premiere, GU Diagnosis Live is a lively, fast-paced game format: participants will be automatically assigned to teams who will then use their personal mobile devices to test their knowledge of GU radiology in a fast-paced session that will be both educational and entertaining. After the session, attendees will receive a personalized self-assessment report via email that will review the case material presented durinig the session, along with individual and team performance.

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RC408

Imaging of Musculoskeletal Emergencies

ER MK

AMA PRA Category 1 Credit ™: 1.00

Participants
Manickam Kumaravel, MD, FRCR, Houston, TX (*Moderator*) Nothing to Disclose

Sub-Events

RC408A Hip

Participants
Bharti Khurana, MD, Brookline, MA (*Presenter*) Research Consultant, General Electric CompanyEditor, Wolters Kluwer nvAuthor, Cambridge University Press

RC408B Knee

Participants
Jonathan A. Flug, MD, MBA, Phoenix, AZ (*Presenter*) Nothing to Disclose

RC408C Shoulder

Participants
Manickam Kumaravel, MD, FRCR, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

manickam.kumaravel@uth.tmc.edu

LEARNING OBJECTIVES

1) Recognize subtle injuries of the glenohumeral joint, acromioclavicular joint complex, coracoid, scapula and other less recognized injuries around the shoulder. 2) Understand the pathophysiology of shoulder injuries. 3) Learn to use cross-sectional imaging to better evaluate for clinically pertinent injuries. 4) Identify postoperative hardware in treated shoulder injuries. 5) Correlate the clinical significance of various types of injuries around the shoulder, so as to produce reports which will be relevant to the referring clinician.

ABSTRACT

Shoulder injuries are a common occurrence in any Emergency Room. Identification of subtle injuries is an important role for radiologists, as these injuries can result in significant comorbidities and delay return to activity.Knowledge of the pathophysiology of shoulder injuries will help the learner appreciate the occurrence of associated injuries and their identification.The interactive session will help the learner understand and improve their ability to identify subtle shoulder injuries and enhance their capability of not missing clinically significant injuries.Starting with radiographs, then moving on to cross-sectional imaging - CT (Computer Tomography) and MRI (Magnetic Resonance Imaging), various examples of injuries will be demonstrated. Post operative imaging will also be demonstrated so that the listener will be able to identify hardware used in shoulder trauma treatment. The lecture will enrich the learners' clinical understanding of these injuries.

RC408D Elbow

Participants
Claire K. Sandstrom, MD, Seattle, WA (*Presenter*) Spouse, Advisory Board, Boston Scientific Corporation;

LEARNING OBJECTIVES

1) Describe normal elbow anatomy. 2) Identify subtle and catastrophic injury patterns to elbow. 3) Recommend CT or MR when appropriate.

RC410

ED Sonography: When is it Enough?

ER US

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC410A Sonography of Gynecologic Emergencies: Pearls and Pitfalls

Participants
Roya Sohaey, MD, Portland, OR (*Presenter*) Author, Reed Elsevier

LEARNING OBJECTIVES

Develop strategies for accurate diagnosis of causes for pelvic pain and vaginal bleeding presenting as gynecologic emergencies, stressing attention to subtle ultrasound findings.

ABSTRACT

We will take a case based symptom approach to gynecologic emergencies stressing that while other imaging may be necessary, ultrasound is the first 'go to' modality and often suffices to make an accurate diagnosis. Scenarios covered will inclute acute pain, bleeding, iatrogenic causes of symptoms, post-delivery complications, and advanced gynecologic malignancies presenting with acute symptoms. Complex diagnoses will be discussed.

RC410B Sonography of the Patient with Acute RUQ Pain: When, How, By Who?

Participants
Anthony E. Hanbidge, MBBCh, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Anthony.hanbidge@uhn.ca

LEARNING OBJECTIVES

1) Discuss the value of ultrasound in assessing acute right upper quadrant pain. 2) Identify the imaging features of acute cholecystitis and its complications. 3) Describe additional pathologic conditions that can mimic the presentation of acute cholecystitis.

ABSTRACT

Acute cholecystitis is the most common cause of acute pain in the right upper quadrant (RUQ), and urgent surgical removal of the gallbladder is the treatment of choice for uncomplicated disease. However, cross-sectional imaging is essential because more than one-third of patients with acute RUQ pain do not have acute cholecystitis. In addition, patients with complications of acute cholecystitis, such as perforation, are often best treated with supportive measures initially and elective cholecystectomy later. Patients presenting to emergency with acute RUQ pain should be imaged in a timely fashion. Ultrasound (US) is the primary imaging modality for assessment of these patients; US is both sensitive and specific in demonstrating gallstones, biliary dilatation, and features that suggest acute inflammatory disease. Occasionally, additional imaging modalities are indicated. Computed tomography is valuable, especially for confirming the nature and extent of the complications of acute cholecystitis. Successful imaging of these patients requires familiarity with both the characteristic and the unusual features of a wide variety of pathologic conditions and is best performed by the medical imaging department. Potential pitfalls must be recognized and avoided.

RC410C Appendiceal Ultrasound: Update and Controversies

Participants
Eric W. Olcott, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand current sonographic tools that are useful in the sonographic diagnosis of appendicitis, procedures that improve visualization of the appendix on ultrasound, and current considerations regarding nonoperative versus surgical management of appendicitis.

ABSTRACT

Ultrasound can play a key role in the diagnosis of appendicitis, a disorder with a considerable lifetime incidence. The traditional maximum outer diameter is useful but has important limitations. Accordingly, other tools are essential and include the appearance of periappendiceal fat, color Doppler flow patterns, spectral Doppler point peak systolic velocity and spectral Doppler point resistive index. Nonoperative vs operative management of appendicitis will be discussed as well as the potential for selecting patients with uncomplicated appendicitis using ultrasound.

RC410D ED Vascular Ultrasound: DVT and Other

Participants
Leslie M. Scoutt, MD, Essex, CT (*Presenter*) Speaker, Koninklijke Philips NV; Speaker, Shenzhen Mindray Bio-Medical Electronics Co,

Ltd;

For information about this presentation, contact:

leslie.scoutt@yale.edu

LEARNING OBJECTIVES

1) Discuss the diagnostic US criteria for deep venous thrombosis and other causes of leg pain and swelling. 2) Discuss the role of US in the evaluation of patients with suspected acute aortic pathology.

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RC411

Prostate Cancer Imaging & Management Update 2020

MI NM

FDA Discussions may include off-label uses.

Participants
Terence Z. Wong, MD, PhD, Durham, NC (*Moderator*) Nothing to Disclose
Baris Turkbey, MD, Rockville, MD (*Moderator*) Research support, Koninklijke Philips NVRoyalties, Koninklijke Philips NVInvestigator, NVIDIA Corporation
Peter L. Choyke, MD, Bethesda, MD (*DPS Upload*) License agreement, Koninklijke Philips NVResearcher, Koninklijke Philips NVLicense agreement, ScanMedLicense agreement, Rakuten MedicalResearcher, Rakuten MedicalResearcher, General Electric CompanyResearcher, Progenics Pharmaceuticals, IncResearcher, Novartis AG

For information about this presentation, contact:

turkbeyi@mail.nih.gov

LEARNING OBJECTIVES

1. To familiarize participants with advances in prostate cancer imaging2. To understand developments in artificial intelligence of MR of the prostate3. To understand the role of novel PET ligands in the diagnosis and therapy of prostate cancer4. To provide a background for understanding the important contributions of hyperpolarized C13 pyruvate MRI

ABSTRACT

In Refresher Course RC411 we review advances in prostate cancer imaging with a panel of experts. The course is separated into multiple linked parts. Dr. Peter Choyke (NIH) begins by introducing imaging in the context of the disease in its various states of evolution. Dr. Baris Turkbey (NIH) describes advances in artificial intelligence (AI) in prostate cancer MRI and how it will aid Radiologists. Dr. Martin Pomper (Johns Hopkins) will review the discovery of PSMA and its various applications in prostate cancer including current and future imaging applications. Dr. Tuba Kendi (Mayo Clinic) will describe her experience with Lu-PSMA therapy including highly practical tips about running a radionuclide therapy clinic. Dr. Dan Vigneron (UCSF) will describe exciting advances in hyperpolarized C13 pyruvate MR spectroscopy in prostate cancer including both localized and metastatic disease. Dr. Terrence Wong (Duke) concludes the course by describes the Duke experience with imaging and theranostics in prostate cancer.

Sub-Events

RC411A Introduction to Imaging in Prostate Cancer

Participants
Peter L. Choyke, MD, Bethesda, MD (*Presenter*) License agreement, Koninklijke Philips NVResearcher, Koninklijke Philips NVLicense agreement, ScanMedLicense agreement, Rakuten MedicalResearcher, Rakuten MedicalResearcher, General Electric CompanyResearcher, Progenics Pharmaceuticals, IncResearcher, Novartis AG

RC411B Next Generation Prostate MRI

Participants
Baris Turkbey, MD, Rockville, MD (*Presenter*) Research support, Koninklijke Philips NVRoyalties, Koninklijke Philips NVInvestigator, NVIDIA Corporation

For information about this presentation, contact:

turkbeyi@mail.nih.gov

LEARNING OBJECTIVES

1) To outline current challenges and limitations of prostate MRI. 2) To present potential solutions to adress limitations of prostate MRI. 3) To discuss use of artificial intelligence to assist prostate MRI.

RC411C Molecular Prostate Imaging: Chemistry to Clinic

Participants
Martin G. Pomper, MD, PhD, Baltimore, MD (*Presenter*) Research Grant, Progenics Pharmaceuticals, Inc; Royalties, Progenics Pharmaceuticals, Inc

RC411D Hyperpolarized C-13 MR

Participants
Daniel B. Vigneron, PhD, San Francisco, CA (*Presenter*) Research Grant, General Electric Company

For information about this presentation, contact:

Dan.Vigneron@UCSF.edu

RC411E Prostate Cancer Therapy or 177Lu-PSMA Therapy

Participants
Ayse T. Karagulle Kendi, MD, Rochester, MN (*Presenter*) Investigator, Endocyte, Inc

For information about this presentation, contact:

kendi.ayse@mayo.edu

LEARNING OBJECTIVES

1) Discuss basic principle of Lu-PSMA therapy (Peptide Radioligand Therapy, PRLT). 2) Describe therapy methods, side effects. 3) Describe clinical impact and outcomes of Lu-PSMA therapy. 4) Discuss/introduce current clinical trials.

RC411F Overview and Top Tips

Participants
Terence Z. Wong, MD, PhD, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

terence.wong@duke.edu

LEARNING OBJECTIVES

Summary and take-home points for novel imaging and radiolabeled therapy of the prostate.

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RC412

Body Imaging Expert Panel: CTA or MRA?

CT MR VA

FDA Discussions may include off-label uses.

Participants

Martin R. Prince, MD,PhD, New York, NY (*Moderator*) Patent agreement, General Electric Company
Geoffrey D. Rubin, MD, Tucson, AZ (*Moderator*) Consultant, Fovia, IncAdvisor, HeartFlow, IncAdvisor, Boehringer Ingelheim GmbHAdvisor, Nano-X Imaging
Elliot K. Fishman, MD, Owings Mills, MD (*DPS Upload*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company

LEARNING OBJECTIVES

1) Understand differences between MRA and CTA for Thoracic Aorta, Pulmonary Artery and Abdominal vascular Diseases2) Learn about optimal MRA and CTA methods3) Review various advantages/disadvantages of MRA and CTA in various clinical scenarios

Sub-Events

RC412A MRA

Participants
J. Paul Finn, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Scott B. Reeder, MD,PhD, Madison, WI (*Presenter*) Nothing to Disclose
Pamela J. Lombardi, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss CTA and MRA methods and techniques for optimized vascular imaging in clinical practice. 2) Debate the advantages and disadvantages of CTA and MRA in clinical practice. 3) Recommend the application of CTA or MRA for common challenging clinical scenarios.

RC412B CTA

Participants
Elliot K. Fishman, MD, Owings Mills, MD (*Presenter*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company
Jill E. Jacobs, MD, New York, NY (*Presenter*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Presenter*) Advisory Panel, Siemens AGAdvisory Panel, Bayer AGSpeakers Bureau, Siemens AGSpeakers Bureau, Bayer AG

LEARNING OBJECTIVES

1) Discuss CTA and MRA methods and techniques for optimised vascular imaging in clinical practice. 2) Debate the advantages and disadvantages of CTA and MRA in clinical practice. 3) Recommend the application of CTA or MRA for common challenging clinical scenarios.

RC413

Pediatric Gastrointestinal/Genitourinary

GI GU PD

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC413A Imaging of Pediatric Cystic Renal Disease

Participants
Maddy Artunduaga, MD, Dallas, TX (*Presenter*) Nothing to Disclose

RC413B Imaging of Pediatric Splenic Masses

Participants
Michael J. Callahan, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC413C Neuroblastoma and IDRFs

Participants
Meryle J. Eklund, MD, Charleston, SC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify common imaging characteristics of neuroblastoma. 2) Compare differences between INSS and INRGSS staging systems for neuroblastoma. 3) Define several image-defined risk factors (IDRFs) used in INRGSS and explain how IDRF-positive disease affects staging.

RC413D Hepatocyte Specific Contrast Agents in Children: Pearls and Pitfalls

Participants
Rama S. Ayyala, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the different hepatocyte specific contrast agents utilized in pediatric imaging, and their similarities and differences. 2) Describe typical MRI imaging findings utilizing hepatocyte specific contrast agents of common pediatric hepatic lesions. 3) Recognize potential clinical scenarios that can impose pitfalls in the typical imaging findings with hepatocyte specific contrast agents.

RC414

Cancer 101/Tools and Technologies

IR

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Baljendra S. Kapoor, MBBS, Cleveland, OH (*Moderator*) Nothing to Disclose

Sub-Events

RC414A Biology of Cancer

Participants
Lawrence B. Schook, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

RC414B Immunotherapy for Cancer

Participants
Kyle M. Schachtschneider, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kschach2@uic.edu

LEARNING OBJECTIVES

1) Improve understanding of rationale for the use of immunotherapy for cancer treatment. 2) Comprehend challenges associated with employing immunotherapies in clinical practice. 3) Understand the potential for combining immunotherapy with IR LRT approaches.

RC414C Navigation Devices Used for Oncologic Interventions

Participants
Baljendra S. Kapoor, MBBS, Cleveland, OH (*Presenter*) Nothing to Disclose

RC414D Thermal Technologies: What is the Difference?

Participants
Todd Schlachter, MD, New Haven, CT (*Presenter*) Research Grant, Guerbet SA

LEARNING OBJECTIVES

1) List the different sources thermal ablation technologies (7). 2) Describe the different mechanisms of cell death. 3) Describe limitations of heat versus cool.

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RC415

Contrast-enhanced Mammography

BR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Maxine S. Jochelson, MD, New York, NY (*Moderator*) Speaker, General Electric CompanyConsultant, Bayer AG

Sub-Events

RC415A Introduction

Participants
Maxine S. Jochelson, MD, New York, NY (*Presenter*) Speaker, General Electric CompanyConsultant, Bayer AG

RC415B Use in Diagnostics

Participants
Bhavika K. Patel, MD, Phoenix, AZ (*Presenter*) Speaker, Hologic, Inc; Research support, GRAIL, Inc

RC415C Use in Screening

Participants
Maxine S. Jochelson, MD, New York, NY (*Presenter*) Speaker, General Electric CompanyConsultant, Bayer AG

RC415D How to Start Your Program

Participants
Uzma Waheed, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

waheedu2@upmc.edu

LEARNING OBJECTIVES

1. Understand the equipment, staffing, and scheduling requirements for optimal performance of CEM.2. Understand the additional radiation dose exposure and FDA guidelines. 3. How to plan, prepare and train fo the low risk of contrast reactions.4. Review guidelines for interpretation and reporting CEM examinations.5. Recognize common artifacts and interpretation pitfalls.

RC416

Taking Action to Promote Gender Inclusion in Radiology: A Roadmap for Progress (Sponsored by the RSNA Professionalism Committee)

Monday, Nov. 30 5:00PM - 6:00PM Room: Channel 2

HP LM

AMA PRA Category 1 Credit ™: 1.00

Participants
Anastasia L. Hryhorczuk, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose
Kate Hanneman, MD, FRCPC, Toronto, ON (*Moderator*) Medical Advisory Board, sanofi-aventis Group

For information about this presentation, contact:

kate.hanneman@uhn.ca

LEARNING OBJECTIVES

1) Implement strategies to address unconscious bias and improve gender disparity in radiology. 2) Demonstrate the ability to identify and address sexual misconduct and discrimination. 3) Discuss strategies that can be used to promote engagement and retention of radiologists with young families. 4) Describe professional development programs that can be utilized to support, mentor, and sponsor women in radiology and in leadership roles.

Sub-Events

RC416A Unconscious Bias in Recruiting Female Radiologists

Participants
Katarzyna J. Macura, MD,PhD, Baltimore, MD (*Presenter*) Author with royalties, Reed ElsevierResearch Grant, Profound Medical IncResearch Grant, Siemens AG

For information about this presentation, contact:

kmacura@jhmi.edu

RC416B Sexual Misconduct in Radiology

Participants
Anastasia L. Hryhorczuk, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

RC416C Work Life Balance for Radiologists with Young Families

Participants
Kate Hanneman, MD, FRCPC, Toronto, ON (*Presenter*) Medical Advisory Board, sanofi-aventis Group

For information about this presentation, contact:

kate.hanneman@uhn.ca

RC416D Informal Programs for Mentoring Women in Radiology

Participants
Leah K. Sieck, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lsieck@gmail.com

LEARNING OBJECTIVES

1) Increase the pipeline to radiology by early introduction of radiology as a profession even prior to medical school. 2) Develop appropriate mentoring interactions for each age group. 3) Build support within your department and create a local support group, such as a women in radiology group, which can be a source of mentors. 4) Leverage local, state and national radiology and female MD leadership organizations and conferences for additional professional development events and mentoring opportunities.

RC416E Sponsoring Female Leaders in Radiology

Participants
Lucy B. Spalluto, MD,MPH, Nashville, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lucy.b.spalluto@vumc.org

LEARNING OBJECTIVES

1) Discuss importance of diversity and inclusion in radiology. 2) Review meaning of sponsorship and how it differs from mentorship.

3) Describe professional development programs and other opportunities to sponsor women in radiology and in leadership roles.

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RC418

Metabolic Tumor Imaging: Current and Beyond

MR NM OI

Participants

Marius E. Mayerhoefer, MD,PhD, New York, NY (*Moderator*) Speaker, Siemens AGResearch support, Siemens AGSpeaker, Bristol-Myers Squibb Company

Jason S. Lewis, PhD, New York, NY (*DPS Upload*) Research support, MabVax Therapeutics, Inc; Research support, Eli Lilly and Company; Research support, Sapience Therapeutics, Inc; Research support, SibTech, Inc; Research support, ImaginAb, Inc; Advisory Board, Telix Pharmaceuticals Ltd ; Advisory Board, Fuzionaire, Inc; Advisory Board, Trace-Ability, Inc; Stockholder, Telix Pharmaceuticals Ltd ; Stockholder, Fuzionaire, Inc; Stockholder, Trace-Ability, Inc; Advisory Board, Clarity Pharmaceuticals; Advisory Board, Varian Medical Systems, Inc; Advisory Board, Evergreen Theragnostics, Inc; Stockholder, Evergreen Theragnostics, Inc; Consulting, TPG Capital, LP

LEARNING OBJECTIVES

1) Learn about he new PET tracers and they new potential clinical applications. 2) Review the added value of PET/MRI in oncology. 3) Learn about the current and future applications of hyperpolarised MRI.

Sub-Events

RC418A PET Tracers: Which Ones Will Be Next to Make it to Clinical Practice?

Participants

Jason S. Lewis, PhD, New York, NY (*Presenter*) Research support, MabVax Therapeutics, Inc; Research support, Eli Lilly and Company; Research support, Sapience Therapeutics, Inc; Research support, SibTech, Inc; Research support, ImaginAb, Inc; Advisory Board, Telix Pharmaceuticals Ltd ; Advisory Board, Fuzionaire, Inc; Advisory Board, Trace-Ability, Inc; Stockholder, Telix Pharmaceuticals Ltd ; Stockholder, Fuzionaire, Inc; Stockholder, Trace-Ability, Inc; Advisory Board, Clarity Pharmaceuticals; Advisory Board, Varian Medical Systems, Inc; Advisory Board, Evergreen Theragnostics, Inc; Stockholder, Evergreen Theragnostics, Inc; Consulting, TPG Capital, LP

LEARNING OBJECTIVES

1) To have an appreciation for some of the latest PET tracers in clinical research in oncology. 2) Understand the PET and radiotherapy agents currently FDA approved and those undergoing the approval process. 3) Understand the next generation of PET tracers and molecular imaging agents that could be the next standard-of-care imaging probes.

RC418B PET/MRI: The Added Value in Oncology

Participants

Hebert Alberto Vargas, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the concept of value in imaging and how it relates to PET/MR technology. 2) To discuss the need for research specifically geared toward assessing the value of PET/MRI in oncology.

RC418C Hyperpolarized MRI: Current and Future Applications

Participants

Ferdia A. Gallagher, PhD, FRCR, Cambridge, United Kingdom (*Presenter*) Research support, General Electric CompanyResearch support, GlaxoSmithKline plc

LEARNING OBJECTIVES

1) To explore the role of metabolism in cancer development. 2) To understand how these changes in metabolism can be exploited using hyperpolarized 13C-pyruvate. 3) To review the current evidence for hyperpolarized carbon-13 imaging in oncology. 4) To understand potential clinical applications for hyperpolarized carbon-13 imaging. 5) To consider the role of new hyperpolarized molecules in oncology.

ABSTRACT

There is increasing evidence to support a role for metabolism in tumor development; for example, deregulation of cellular energetics is now considered to be one of the key hallmarks of cancer. Changes in tumor metabolism over time are now known to be early biomarkers of successful response to chemotherapy and radiotherapy. There are a number of imaging methods that have been used to probe cancer metabolism: the most widely available is 18F-fluorodeoxyglucose (FDG), an analogue of glucose, used in PET. Hyperpolarized carbon-13 MRI (13C-MRI) is an emerging molecular imaging technique for studying cellular metabolism, particularly in the field of oncology. This method allows non-invasive measurements of tissue metabolism in real-time. To date, the most promising probe used in conjunction with hyperpolarized MRI has been 13C-labelled pyruvate: pyruvate is metabolized into lactate in normal tissue in the absence of oxygen, but in tumors this occurs very rapidly even in the presence of oxygen. Results from many animal models have shown that there is a reduction in the metabolism of pyruvate following successful treatment with chemotherapy. Tumor lactate labelling has also been shown to correlate with the grade of some tumor types. There are now a small number of sites performing human hyperpolarized carbon-13 MRI imaging. This talk will discuss the progress that has been made in this field within the area of oncology and potential clinical applications.

RC421

Innovations in Dual- and Multi-energy CT

Sunday, Nov. 29 5:00PM - 6:00PM Room: Channel 3

CT PH

AMA PRA Category 1 Credit ™: 1.00

Participants
Lifeng Yu, PhD, Rochester, MN (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review dual-energy CT systems that are commercially available and multi-energy CT systems that are currently under development. 2) Review basic data processing and material decomposition techniques for dual-energy and multi-energy CT data. 3) Review current and potential clinical applications of dual-energy and multi-energy CT.

ABSTRACT

This session will provide an overview of CT systems, data processing, and clinical applications of dual-energy and multi-energy CT.

Sub-Events

RC421A Dual- and Multi-energy CT Systems

Participants
Taly Gilat Schmidt, PhD, Milwaukee, WI (*Presenter*) Research grant, GE Healthcare

LEARNING OBJECTIVES

1) Describe and compare the different approaches for acquiring multi-energy CT data. 2) Identify the important features of multi-energy CT systems and how they impact the acquired multi-energy data.

RC421B Dual- and Multi-energy Data Processing

Participants
Katsuyuki Taguchi, PhD, Baltimore, MD (*Presenter*) Research Grant, Siemens AGResearch Grant, Canon Medical Systems Corporation

For information about this presentation, contact:

ktaguchi@jhmi.edu

LEARNING OBJECTIVES

1) Better understanding of spectral processing schemes. 2) Using more dual-energy protocols in clinical routines.

RC421C Clinical Applications of Dual- and Multi-energy CT

Participants
Joel G. Fletcher, MD, Rochester, MN (*Presenter*) Grant, Siemens AGConsultant, Medtronic plcConsultant, Takeda Pharmaceutical Company LimitedGrant, Takeda Pharmaceutical Company Limited

LEARNING OBJECTIVES

1) Review different types of standard dual energy images (e.g., linearly blended mixed kV, virtual monoenergetic images, virtual non-contrast, virtual non-calcium, iodine maps) and understand how they can be reconstructed and utilized in an efficient, protocol-driven, heterogeneous radiology practice. 2) Understand multiple clinical scenarios where clinical benefit is obtained by using the ability of dual energy to enhance iodine signal or quantify iodine content. 3) Illustrate how to use dual energy information quickly in exam interpretation.

RC422

Functional MR Imaging for Tumor Targeting in Radiotherapy

MR PH RO

Participants
Kristy K. Brock, PhD, Houston, TX (*Moderator*) Grant, RaySearch Laboratories AB; License agreement, RaySearch Laboratories AB; Research support, Mirada Medical Ltd
R. Jason Stafford, PhD, Houston, TX (*DPS Upload*) Nothing to Disclose

Sub-Events

RC422A State of the Art in Functional MR Imaging for Tumor Targeting

Participants
R. Jason Stafford, PhD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify some advanced and emerging MRI techniques which inform on tumor physiology and metabolism. 2) Explain the relevance of functional MR observations to basic underlying tumor physiology and biology. 3) Understand key limitations and tradeoffs of functional MR techniques for tumor assessment.

RC422B Clinical Need for Functional MR Imaging for Tumor Targeting in Radiation Therapy

Participants
Michelle M. Kim, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the major limitations of anatomic imaging for tumor target delineation in radiation therapy. 2) Identify key advanced MRI techniques of value in radiation treatment planning. 3) Explain emerging concepts and trials of radiation treatment-individualization using advanced MRI techniques before and during radiation therapy. 4) Discuss the application of advanced MRI techniques for radiation treatment planning.

RC422C Technical Challenges in the Integration of Functional MR Imaging for Tumor Targeting into Radiotherapy

Participants
Ning Wen, PHD, Detroit, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the technical challenges to integrate the functional MR Imaging into radiotherapy including the following aspects: a) tumor characterization among different imaging modalities; b) reproducibility of functional imaging across different institutions/scanners/protocols; c) interpretation of imaging features extracted in the deep machine learning algorithms; d) precision to identify the boundary of the targets; e) reliable imaging biomarkers to predict treatment response.

RC423

ACR Accreditation Updates I

PH

Participants
James M. Kofler JR, PhD, Jacksonville, FL (*Moderator*) Nothing to Disclose
Heidi A. Edmonson, PhD, Rochester, MN (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn new and updated information for the ACR breast x-ray imaging accreditation program. 2) Become familiar with the requirements for the ACR ultrasound accreditation program, including data acquisition methods and common deficiencies. 3) Understand how to prepare for an ACR site visit.

Sub-Events

RC423A ACR Breast X-Ray Imaging Accreditation Update

Participants
Thomas Ruckdeschel, MS, Alpharetta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the ACR Mammography accreditation program requirements. 2) Understand the 2D and DBT recent changes. 3) Review frequently asked questions on the program. 4) Present resources for personnel and facilities undergoing accreditation.

RC423B ACR US Accreditation Update

Participants
Zheng Feng Lu, PhD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand ACR ultrasound accreditation requirements. 2) Describe the methods and tools for ultrasound QA/QC with an explanation of common deficiencies. 3) List key resources for ACR ultrasound accreditation.

RC423C ACR Accreditation: Preparing for a Site Visit

Participants
Heidi A. Edmonson, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify key elements of an ACR Accreditation Program. 2) Understand what data to prepare for an ACR Site Visit. 3) Improve departmental organization for continual accreditation readiness.

RC424

Radiology Update: Review Current Evidence in the Literature

Friday, Dec. 4 3:30PM - 4:30PM Room: Channel 3

BR CH GI IR NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Pina C. Sanelli, MD,MPH, Manhasset, NY (*Moderator*) Research funding
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Moderator*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

rcarlos@med.umich.edu

LEARNING OBJECTIVES

1) Provide a concise summary of the current evidence in the radiology literature for 'hot topics' in imaging. 2) Discuss the strengths and limitations of the current evidence. 3) Review recommendations for implementation in practice.

Sub-Events

RC424A Introduction to Radiology Update

Participants
Pina C. Sanelli, MD,MPH, Manhasset, NY (*Presenter*) Research funding

LEARNING OBJECTIVES

1) Provide a concise summary of the current evidence in the radiology literature for 'hot topics' in imaging. 2) Discuss the strengths and limitations of the current evidence. 3) Review recommendations for implementation in practice.

RC424B Neuroradiology Update: Carotid Artery Imaging

Participants
Hediyeh Baradaran, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hediyeh.baradaran@hsc.utah.edu

RC424C Abdominal Imaging Update: Abbreviated MRI for Hepatocellular Carcinoma Screening and Surveillance

Participants
William Masch, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

RC424D Breast Imaging Update: Abbreviated MRI for Breast Cancer Screening

Participants
Linda Moy, MD, New York, NY (*Presenter*) Grant, Siemens AG ; Advisory Board, Lunit Inc; Advisory Board, iCad, Inc

For information about this presentation, contact:

linda.moy@nyumc.org

RC424E Chest Imaging Update: Imaging Pulmonary Embolism in Pregnancy

Participants
Stuart L. Cohen, MD, Manhasset, NY (*Presenter*) Consultant, InfervisionResearch support, Siemens AG

For information about this presentation, contact:

slcohen@northwell.edu

RC424F Interventional Radiology Update: Immuno-oncology Treatment

Participants
Premal S. Trivedi, MD, Denver, CO (*Presenter*) Nothing to Disclose

RC424G Concluding Remarks

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

rcarlos@med.umich.edu

LEARNING OBJECTIVES

1) Summarize value of systematic reviews in clinical practice.

Printed on: 05/05/21

RC427

Engaging Patients: Opportunities and Challenges for Radiology

HP SQ

Participants
Ramin Khorasani, MD, Roxbury Crossing, MA (*Moderator*) Nothing to Disclose
Ramin Khorasani, MD, Roxbury Crossing, MA (*DPS Upload*) Nothing to Disclose

Sub-Events

RC427A Price Transparency

Participants
Gelareh Sadigh, MD, Atlanta, GA (*Presenter*) Research funded, TailorMed Medical Inc

LEARNING OBJECTIVES

1) Define health-related financial toxicity and healthcare price transparency. 2) Differentiate cost vs charges vs paid price. 3) Assess impact of financial burden from cost of treatment on patient-reported outcomes. 4) Assess impact of healthcare price transparency tools on patients' spending. 5) Apply knowledge gained from this session in their encounter with patients.

RC427B Patient-reported Data and Its Impact on Quality and Safety

Participants
Keith D. Hentel, MD, MS, Briarcliff, NY (*Presenter*) Nothing to Disclose

RC427C Patient Portals to Access Results: Opportunities and Challenges

Participants
Teresa Martin-Carreras, MD , Philadelphia, PA (*Presenter*) Nothing to Disclose

RC427D Eliminating Ordered but Not Performed Imaging in Your Practice: What Are the Safety Risks and Solutions?

Participants
Ronilda Lacson, MD, PhD, Brookline, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To quantify the incidence of diagnostic imaging that are ordered but not performed in clinical practice. 2) To identify factors that affect failure in scheduling and performance of diagnostic imaging orders. 3) To learn potential solutions for eliminating unperformed diagnostic imaging orders in practice.

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November 29 to December 5

RC428

Town Hall with American Board of Radiology Leadership

ED

AMA PRA Category 1 Credit ™: .75

Participants
Vincent P. Mathews, MD, Milwaukee, WI (*Presenter*) Nothing to Disclose
Robert M. Barr, MD, Charlotte, NC (*Presenter*) Nothing to Disclose
Brent J. Wagner, MD, Wernersville, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

brentwagner99@gmail.com

LEARNING OBJECTIVES

1) Describe the ways that board certification fits into a broader obligation of the radiology profession as it relates to the public trust. 2) Define the relationship among the elements that combine to form board certification. 3) Describe the benefits of a process that combines both an assessment of selected aspects of competence with an opportunity for correction of identified knowledge gaps.

ABSTRACT

The mission of the American Board of Radiology combines the public desire for high quality standards with the long term interests of the radiology profession. The board certification process allows practitioners to distinguish themselves by their training, experience, and dedication to lifelong learning. The ABR strives to refine both initial certification and the continuous certification processes to improve the experience, relevance, and financial burden for our diplomates. As part of these efforts, we welcome the opportunity for dialogue to explain the rationale for our board certification programs and, more importantly, to gather suggestions for improvement.

RC429

MRI 2030

MR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Sub-Events

RC429A Advances in MRI Hardware Design

Participants
Andrew Webb, DPHIL, Leiden, Netherlands (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

a.webb@lumc.nl

LEARNING OBJECTIVES

1) Understand the basic functioning of each component of the MR system: main magnet, gradients, shims, and transmit and receive RF coils. 2) Understand the design criteria and specifications for each of these components. 3) Learn about the current state-of-the-art for each component. 4) Learn about future improvements and new developments in each of these components, and how they integrate with one another.

ABSTRACT

In this lecture we will cover the basics of how one designs a magnet, gradient coils, shims and RF coils. The current state-of-the-art of each of these components will be explained. Finally, future developments in magnets (compact, low helium, very high field, very low field), gradients (high strength, localized), and RF coils (very large arrays, integrated shims, wireless) will be discussed.

RC429B Fast Imaging

Participants
Anthony Christodoulou, Los Angeles, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Anthony.Christodoulou@cshs.org

LEARNING OBJECTIVES

1) Understand the current speed and efficiency limitations of magnetic resonance imaging (MRI) sequences and clinical protocols. 2) Understand recent research into simultaneous multiparameter and multidimensional MRI sequences and protocols. 3) Understand the potential impact of these recent approaches to simplify and accelerate clinical workflow in the next decade, especially for neurological, cardiovascular, and oncological applications.

ABSTRACT

MRI is uniquely sensitive to a wide range of tissue contrasts, physical phenomena, and physiological properties. This multivariate sensitivity provides a powerful opportunity for tissue characterization via multiparameter mapping, i.e., quantifying multiple complementary contrast mechanisms, properties, and phenomena in a single imaging session or scan. However, serial acquisition of multiple contrasts and measurements leads to long exam times and difficult workflows, especially in moving organs. New developments in multiparameter and multidimensional imaging offer an avenue for simultaneous acquisition of multiple contrasts and measurements; these developments have the potential to enable single-scan quantitative multiparametric exams for neurological, cardiovascular, and oncological applications within the next decade.

RC429C MR Fingerprinting

Participants
Nicole Seiberlich, PhD, Ann Arbor, MI (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

nse@med.umich.edu

LEARNING OBJECTIVES

To understand the basic concepts of Magnetic Resonance Fingerprinting (MRF)To describe how MRF is currently deployedTo understand how features of MRF may be useful in improving MRI exams in terms of speed, cost, repeatability, and ease of use.

RC429D AI for MRI Acquisition and Reconstruction

Participants
Greg Zaharchuk, MD, PhD, Stanford, CA (*Presenter*) Research Grant, General Electric CompanyResearch Grant, Bayer AGStockholder, Subtle Medical

Printed on: 05/05/21

RSNA 2020
HUMAN INSIGHT/VISIONARY MEDICINE
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November 29 to December 5

RC432

Medical Malpractice in Radiology: How to Avoid and Deal with It

LM

AMA PRA Category 1 Credit ™: .75

Participants

H. Benjamin Harvey, MD, JD, Nahant, MA (*Presenter*) Nothing to Disclose

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RC453

Cybersecurity of Medical Images

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Ross W. Filice, MD, Washington, DC (*Moderator*) Co-founder, DexNote LLCResearch Grant, NVIDIA CorporationAdvisor, BunkerHill Health, Inc

For information about this presentation, contact:

ross.w.filice@gunet.georgetown.edu

LEARNING OBJECTIVES

1) Describe the current vulnerabilities of DICOM images, networks and PACS. 2) Describe the existing and potential attacks on DICOM images, networks and PACS. 3) Describe the bad cybersecurity practices found in radiology departments. 4) · Describe what procedural and technical means are available to mitigate those bad practices. 5) Describe what radiologists, technicians, and administrators could do in their own practices or at their own institutions to put those procedural and technical means into practice.

Sub-Events

RC453A DICOM Images Have Been Hacked: Now What?

Participants
Benoit Desjardins, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe relevant DICOM concepts. 2) Describe how hackers have hacked or can hack DICOM, networks and PACS. 3) Describe general security concepts to protect confidentiality, integrity and availability.

ABSTRACT

Abstract for parts A,B,C:

As health care moves into a new era of increasing information vulnerability, radiologists should understand that confidentiality of their medical data can be violated by hackers, or that they may be using systems exposed to altered data or data that contain malicious elements. This session explains the vulnerabilities of DICOM images, radiology networks, and PACS systems and discusses requirements to properly secure them from cyberattacks.

This refresher course will be presented by radiologists, top cybersecurity experts, and DICOM security leaders. Parts A,B,C are an extension of the material covered in our April 2020 AJR paper. The information technology issues will be addressed at a technical level appropriate for the radiology community at large, so this community is made aware of this new and growing era of digital warfare and its implications for their daily practice.

In part A, we cover basic elements of DICOM images and elements required for security. We also describe recent breaches and attacks on the confidentiality, integrity and availability of DICOM images, networks and PACS.

In part B, we cover defenses included in the DICOM standard, defenses for networks recommended by the National Security Agency (NSA) and defenses for PACS recommended by the National Institute of Standards and Technology (NIST).

In part C, we describe the bad cybersecurity practices found in radiology departments, and provide practical, actionable suggestions that radiologists and PACS administrators can use to secure medical images, networks and PACS.

RC453B DICOM, Network and PACS Security

Participants
Lawrence R. Tarbox, PhD, Little Rock, AR (*Presenter*) Nothing to Disclose

RC453C Securing a Radiology Practice

Participants
Steven C. Horii, MD, Philadelphia, PA (*Presenter*) Stockholder, Apple IncExpert Witness, Agrian, Inc

RC453D Highest Yield Cybersecurity Tips for Imaging Leaders

Participants
Christopher J. Roth, MD, Durham, NC (*Presenter*) Nothing to Disclose

RC501

Current Issues in Pulmonary Vascular Imaging

Friday, Dec. 4 3:30PM - 4:30PM Room: Channel 5

CH VA

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Sub-Events

RC501A Overutilization of CT for PE?

Participants
Stephanie Tan, MD, Brossard, QC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Compare clinical decision tools and guidelines for the use of CT pulmonary angiography. 2) Assess use of CT pulmonary angiography in a clinical setting. 3) Identify factors leading to overutilization of CT pulmonary angiography.

RC501B Overdiagnosis of PE by CTPA?

Participants
Linda B. Haramati, MD, MS, New Rochelle, NY (*Presenter*) Nothing to Disclose

RC501C Misdiagnosis of PE by CTPA?

Participants
Seth J. Kligerman, MD, La Jolla, CA (*Presenter*) Speakers Bureau, Boehringer Ingelheim GmbHAuthor, Reed ElsevierConsultant, IBM Corporation

RC501D Is MR for PE Equivalent to CTPA?

Participants
Christopher J. Francois, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Francois.Christopher@Mayo.edu

LEARNING OBJECTIVES

1. Discuss how to perform rapid pulmonary MRA protocol for pulmonary embolism.2. Determine when to perform pulmonary MRA for pulmonary embolism.3. Review appearance of pulmonary embolism on MRA.4. Identify other diagnoses on pulmonary MRA.

RC501E Is Dual Energy/Spectral CT Additive in Acute PE?

Participants
Mannudeep K. Kalra, MD, Lexington, MA (*Presenter*) Research Grant, Siemens AGResearch Grant, Riverain Technologies, LLCConsultant, Globus Medical, Inc

RC503

Infections and Inflammatory Cardiac Disorders

CA

AMA PRA Category 1 Credit ™: 1.00

Participants
Diana Litmanovich, MD, Boston, MA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the imaging features and pathophysiology of cardiac infectious and inflammatory processes to include endocarditis, pericarditis, and myocarditis.

Sub-Events

RC503A Endocarditis (Including Loefflers)

Participants
Harold Goerne, MD, Guadalajara, Mexico (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To identify the imaging features of endocarditis. 2) To apply diagnostic algorithm using different imaging modalities. 3) To illustrate the appearance of endocarditis and its complications. 4) To recognize several differential diagnosis.

RC503B Pericarditis

Participants
Diana Litmanovich, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To identify the imaging features of pericarditis. 2) To apply diagnostic algorithm using different imaging modalities. 3) To illustrate the appearance of pericarditis and its complications. 4) To be familiar with differential diagnosis of pericarditis.

RC503C Myocarditis

Participants
Jens Bremerich, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand pathophysiology of myocarditis. 2) To review the impact of imaging on clinical decision making. 3) To enhance knowledge of technical aspects of imaging.

ABSTRACT

Purpose: The term myocarditis summarises a variety of conditions with the common feature of myocardial inflammation. The purpose of this presentation is to review pathophysiology and diagnostic tools to identify, localize and characterize myocarditis.Methods and Results: Various conditions such as infection or immune response directed against myocardium may result in myocarditis. Before cardiac MRI became available the diagnosis of myocarditis was based on exclusion of other diseases in the context of myocardial injury of unknown cause. Whilst Nuclear Imaging is hampered by poor spatial resolution, Late Gadolinium enhanced MRI (LGE-MRI) was the first technique for imaging myocarditis with high spatial resolution. The advent of T2-mapping enabled distinction of acute myocarditis from scar post myocarditis. Today with T1-mapping before and after contrast administration and Extracellular Volume (ECV)-mapping we have an array of tools in our hands to define disease severity and activity and thus to predict outcome and to guide therapy. Calculation of ECV, however, requires blood sampling for hematocrit. Techniques for ECV-mapping without blood sampling are currently being explored. Today cardiac MRI enables distinction of chronic from healed myocarditis and also dilated cardiomyopathy from chronic myocarditis.Conclusion: Myocarditis can have multiple causes, MRI is modality of choice to identify and characterize myocarditis as well as to predict outcome and guide therapy.

RC504

Shoulder Imaging in Athletes

Sunday, Nov. 29 8:30AM - 9:30AM Room: Channel 1

MK MR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC504A Rotator Cuff Injuries

Participants
Soterios Gyftopoulos, MD, Scarsdale, NY (*Presenter*) Nothing to Disclose

RC504B Labral Injuries

Participants
Jenny T. Bencardino, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jenny.bencardino@pennmedicine.upenn.edu

LEARNING OBJECTIVES

1) To describe the MR anatomy of the labral ligamentous complex along with biomechanical implications. 2) To review the characteritic features of SLAP injuries and microinstability. 3) To review the imaging findings in anterior shoulder dislocation with treatment implications.

RC504C Acromioclavicular Joint Injuries

Participants
Hilary R. Umans, MD, Ardsley, NY (*Presenter*) Nothing to Disclose

RC504D Post-operative Shoulder

Participants
William E. Palmer, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss treatment principles. 2) Identify intact repairs. 3) Identify failed repairs.

RC504E Shoulder MRI Pitfalls

Participants
Michael J. Tuite, MD, Verona, WI (*Presenter*) Author with royalties, Reed Elsevier

For information about this presentation, contact:

mtuite@uwhealth.org

LEARNING OBJECTIVES

1) Identify MR pitfalls that are normal in athletes. 2) Discuss MR pitfalls that prevent identification of MR abnormalities in athletes.

RC505

Brain Tumors

NR

AMA PRA Category 1 Credit ™: .75

Participants
Raymond Y. Huang, MD, PhD, Boston, MA (*Moderator*) Nothing to Disclose
Javier Villanueva-Meyer, MD, San Francisco, CA (*Moderator*) Nothing to Disclose

Sub-Events

RC505A Surgical Planning (Imaging Guidance and Extent of Resection) and Surgical Alternatives (LITT) for Managing Brain Tumor

Participants
Veronica Chiang, MD, New Haven, CT (*Presenter*) Consultant, Monteris Medical Inc; Consultant, MRI Interventions, Inc; Speaker, BrainLAB AG

RC505B Roles of Imaging in Refining Prognosis and Directing Management in Molecularly-defined Brain Tumors

Participants
Marion Smits, MD, PhD, Rotterdam, Netherlands (*Presenter*) Reviewer, PAREXEL International Corporation; Speaker, GE Healthcare;

LEARNING OBJECTIVES

1) To understand the difference between histopathologically and molecularly defined classification of primary brain tumors and its impact on predicting prognosis. 2) To know the impact of the recent changes in the classification of primary brain tumors on diagnosis and clinical management. 3) To use imaging features to identify certain primary brain tumor molecular subtypes. 4) To be able to apply advanced imaging acquisition and analysis for predicting prognosis and guiding clinical management in the context of primary brain tumors.

RC505C Defining Treatment Response in Neuro-oncology: From Clinical Trials to the Clinic

Participants
Raymond Y. Huang, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1.Antiangiogenic therapy for treatment of glioblastoma: what we learned from clinical trials.2. Evaluate treatment response using imaging.

RC505D Evaluation of Pseudoprogression and Radiation Necrosis: Current Evidence-based Practice, Challenges and Future Directions

Participants
Ramon F. Barajas JR, MD, Portland, OR (*Presenter*) Nothing to Disclose

RC506

Horse or Zebra: Case-based Review of Common Mimics in the Head and Neck

Thursday, Dec. 3 8:30AM - 9:30AM Room: Channel 3

HN NR

AMA PRA Category 1 Credit ™: 1.00

Participants

Hillary R. Kelly, MD, Cambridge, MA (*Moderator*) Investigator, Bayer AGInstitutional research agreement, Bayer AGSpouse, Stockholder, Adaptive BiotechnologiesSpouse, Investo, Adaptive BiotechnologiesSpouse, Stockholder, Octant BioSpouse, Board Member, Octant BioSpouse, Founder and CEO, Ginkgo BioworksSpouse, Owner, Ginkgo BioworksSpouse, Stockholder, Ginkgo Bioworks

Tabassum A. Kennedy, MD, Madison, WI (*Moderator*) Nothing to Disclose

Sub-Events

RC506A Is it a Lymph Node?

Participants

Bronwyn E. Hamilton, MD, Portland, OR (*Presenter*) Editor, Reed Elsevier

LEARNING OBJECTIVES

1) To be able to distinguish between lymph nodes and neck mass mimics.

RC506B Is it a Schwannoma?

Participants

Richard H. Wiggins III, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Richard.Wiggins@hsc.utah.edu

RC506C Is it a Vascular Malformation?

Participants

Deborah R. Shatzkes, MD, New York, NY (*Presenter*) Nothing to Disclose

RC506D Is it Infection?

Participants

Philip R. Chapman, MD, Durham, NC (*Presenter*) Nothing to Disclose

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

RC507

PI-RADS Hands-on Workshop

GU MR

Participants
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (*Moderator*) Nothing to Disclose
Baris Turkbey, MD, Rockville, MD (*Presenter*) Research support, Koninklijke Philips NVRoyalties, Koninklijke Philips NVInvestigator, NVIDIA Corporation
Antonio C. Westphalen, MD, Medina, WA (*Presenter*) Nothing to Disclose
Daniel J. Margolis, MD, New York, NY (*Presenter*) Consultant, Blue Earth Diagnostics LtdIn-kind support, Siemens AG
Geert M. Villeirs, MD, PhD, Gent, Belgium (*Presenter*) Nothing to Disclose
Joseph J. Busch, MD, Alpharetta, GA (*Presenter*) Nothing to Disclose
Prasad R. Shankar, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Leonardo K. Bittencourt, MD, PhD, Rio de Janeiro, Brazil (*Presenter*) Nothing to Disclose
Vibeke B. Logager, MD, Herlev, Denmark (*Presenter*) Nothing to Disclose
Silvia D. Chang, MD, Vancouver, BC (*Presenter*) Nothing to Disclose
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand and how to use the PI-RADS v2.1 Category Assessment to detect and localize significant prostate cancer for both peripheral and transitional zone. 2) Recognize benign pathology like prostatitis and BPH and to differentiate these from significant prostate cancers.

ABSTRACT

You need to bring your own laptops or tablets, as in this 'Hands-on Workshop' you will review multi-parametric MRI cases with various prostatic pathology using your own laptop or tablet. Though a Cloud-connection (RadPix) your device will serve as a dedicated prostate-MRI workstation through which you can analyse 20 cases. This activity is best done on a laptop or tablet. Although phones and small tablets will work, their small size limits optimal image viewing.Focus will be on the overall assessment of PI-RADS v2.1 category. You will be interactively teached how to score the probability of the presence of a significant prostate in patients with elevated PSA or other suspicion to have prostate cancer. All 20 cases are from daily practice, and have various levels of difficulty. They include easy and difficult significant cancers, inflammation, BPH, and most common pitfalls. Internationally renowned teachers will guide you during your PI-RADS v2.1 scoring process. You will be able to ask them all question you have on prostate mp-MRI, from acquisition to diagnosis to MR-biopsy. Prior to this course you need to download a digital course book at http://bit.ly/prostate2019. This digital pdf-course book includes all the cases and will guide you during the course through the various cases.

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RC508

Contemporary Topics in Imaging of Trauma

ER

AMA PRA Category 1 Credit ™: 1.00

Participants
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Moderator*) Royalties, Springer Nature
Felipe Munera, MD, Key Biscayne, FL (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

patlas@hhsc.ca

Sub-Events

RC508A Retroperitoneal Injuries

Participants
Felipe Munera, MD, Key Biscayne, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

fmunera@med.miami.edu

RC508B Penetrating Abdominal Trauma

Participants
Michael N. Patlas, MD,FRCPC, Hamilton, ON (*Presenter*) Royalties, Springer Nature

For information about this presentation, contact:

patlas@hhsc.ca

LEARNING OBJECTIVES

1) To review the radiological and surgical literature of the potential pitfalls in diagnosis of penetrating abdominal injuries. 2) To describe imaging findings in penetrating bowel injuries. 3) To highlight factors affecting detection of penetrating injuries in additional abdominal organs.

RC508C Penetrating Chest Trauma

Participants
Krystal Archer-Arroyo, MD, Decatur, GA (*Presenter*) Nothing to Disclose

RC508D Dual-phase MDCT Protocol in Blunt Trauma

Participants
Mariano Scaglione, MD, Castel Volturno, Italy (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the value of dual-phase MDCT to address the correct diagnosis and management of traumatic injuries after blunt trauma. 2) To provide a full understading about the differences between contained and actively bleeding lesions. 3) To demontrate the pivotal role of emergency radiologists in the Trauma Team.

ABSTRACT

Acute vascular injuries are the second most common cause of fatalities in patients with multiple traumatic injuries; thus, prompt identification and management is essential for patient survival. Dual-phase MDCT scanning protocol has become the imaging modality of choice in high-energy deceleration traumas. The objective of this lecture is to review the role of dual-phase MDCT in the identification and management of acute vascular injuries, particularly in the chest and abdomen following multiple traumatic injuries. In addition, this lecture will provide examples of MDCT features of acute vascular injuries with correlative surgical and interventional findings.

RC509

Useful Applications of Gastrointestinal Tract Imaging

CT GI MR

Participants
Judy Yee, MD, New York, NY (*DPS Upload*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company

Sub-Events

RC509A The Esophagus: We Still Need 2020 Vision

Participants
David J. Disantis, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

djdisantis@gmail.com

LEARNING OBJECTIVES

1) Be able to perform a dual phase esophagram. 2) Recognize the types of pathology that can be diagnosed with esophagography.

ABSTRACT

Swallowing studies and esophagrams remain the most frequently performed gastrointestinal fluoroscopic studies. This presentation offers a step-by-step guide for performing a high quality dual phase esophagram, with examples of the types of pathology that can be detected using these techniques.

RC509B Imaging Following Bariatric Surgery: Normal Anatomy and Complications

Participants
Laura R. Carucci, MD, Midlothian, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

laura.carucci@vcuhealth.org

LEARNING OBJECTIVES

1) Recognize the expected postoperative radiologic appearance following commonly performed bariatric surgical procedures for morbid obesity, in particular the Roux-en-Y gastric bypass, gastric band and gastric sleeve. 2) Describe and recognize common complications and potential pitfalls on imaging studies following these bariatric procedures.

RC509C Role of MRI in Crohn's Disease

Participants
Neeraj Lalwani, MD, Richmond, VA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

neeraj.lalwani@vcuhealth.org

LEARNING OBJECTIVES

Introduction of Crohn's Disease; MRI Protocol; Current Role of MRI; MRE Biomarkers; MRE Indices of Disease Activity; Emerging MRE Biomarkers; Extraintestinal Complications; Reporting Template; Conclusion

ABSTRACT

MRE is a unique and noninvasive investigation to assess distribution and activity of CD along with its extraluminal distribution and extraintestinal complications. MRE is a robust and routine implementation investigation that can provide both structural and functional information without the use of ionizing radiation.Disease activity assessed by serial MREs can guide treatment planning and decisions regarding surgical intervention. MRE-based disease activity indices have been developed and can help with assessment of clinical trails and novel therapeutic agents.

RC509D CT Colonography: Pearls and Pitfalls

Participants
Judy Yee, MD, New York, NY (*Presenter*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company

LEARNING OBJECTIVES

1) Compare CT colonography to other colorectal cancer screening tests. 2) Understand the latest techniques for performing low radiation dose CT colonography. 3) Identify methods for time-efficient interpretation. 4) Describe the current status of CT

colonography for colorectal cancer screening and diagnosis.

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RC510

Contrast-enhanced Ultrasound: How, Why, When?

US

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Sub-Events

RC510A Microbubbles: What Are They and How Do I Use Them?

Participants
Michelle L. Robbin, MD, Birmingham, AL (*Presenter*) Consultant, Koninklijke Philips NV

For information about this presentation, contact:

mrobbin@uabmc.edu

RC510B Liver Contrast Enhanced Ultrasound: Pearls and Pitfalls

Participants
David T. Fetzer, MD, Dallas, TX (*Presenter*) Research support, Philips HealthcareResearch support, Siemens Healthineers

For information about this presentation, contact:

David.Fetzer@UTSouthwestern.edu

LEARNING OBJECTIVES

1) Discuss common uses of CEUS in liver imaging, including lesion characterization and vascular imaging; Highlight applications of CEUS in liver intervention. 2) Provide hints for overcoming challenges and avoiding common pitfalls.

RC510C GU Contrast Enhanced Ultrasound: Tricks of the Trade

Participants
Stefanie Weinstein, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

RC510D CEUS: Prospects for the Future

Participants
J. Brian Fowlkes, PhD, Ann Arbor, MI (*Presenter*) Research Grant, Koninklijke Philips NVEquipment support, General Electric Company

LEARNING OBJECTIVES

1) Increase the participant's general knowledge of the advances being made in contrast enhanced ultrasound (CEUS). 2.) Understand the potential mechanisms for drug delivery using microbubbles and ultrasound. 3) Understand how microbubbles and other particles can be functionalized for target-specific ultrasound imaging.

RC511

Theragnosis & Molecularly Targeted Therapies Update 2020

Wednesday, Dec. 2 3:30PM - 4:30PM Room: Channel 3

MI NM

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Rathan M. Subramaniam, MD,PhD, Dunedin, New Zealand (*Moderator*) Nothing to Disclose

Sub-Events

RC511A 131I Therapy for Thyroid Cancer

Participants
Don C. Yoo, MD, Lexington, MA (*Presenter*) Consultant, inviCRO, LLC

RC511B 177Lu-DOTATATE Therapy for Neuroendocrine Tumors

Participants
Rathan M. Subramaniam, MD,PhD, Dunedin, New Zealand (*Presenter*) Nothing to Disclose

RC511C 131-I MIBG Therapy for Pheochromocytomas & Paragangliomas

Participants
Lilja B. Solnes, MD, Baltimore, MD (*Presenter*) Advisory Board, Progenics Pharmaceuticals, Inc

LEARNING OBJECTIVES

1) Background Pheochromocytomas and Paragangliomas (PGL). 2) Review of Theranostics. 3) Safety and Efficacy of I131 MIBG Therapy. 4) Practical Considerations for therapy. 5) potential future applications. 6) Other theranostic agents for the treatment of PGL and Pheochromocytomas.

RC512

CT Angiography-New Techniques and Their Application

CT VA

AMA PRA Category 1 Credit ™: .75

Participants
W. Dennis Foley, MD, Milwaukee, WI (*Moderator*) Nothing to Disclose
Dominique C. DaBreo, BMedSc,FRCPC, Kingston, ON (*Moderator*) Nothing to Disclose

Sub-Events

RC512B CT-Perfusion Evaluation of Renal Tumors

Participants
Steven S. Raman, MD, Santa Monica, CA (*Presenter*) Consultant, Johnson & JohnsonConsultant, Bayer AGConsultant, Merck & Co, IncConsultant, Amgen IncConsultant, Profound Medical Inc

RC512C CTA Artifacts and Post-Processing

Participants
Elliot K. Fishman, MD, Owings Mills, MD (*Presenter*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company

RC512D Roles for CTA in Interventional Radiology

Participants
Jonathan J. Keung, MD, Bethesda, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Identify the uses of CT angiography in interventional radiologyDescribe pertinent CT angiographic findings associated with pre-procedural planning for interventionCompare pre-procedural CT angiographic findings with intraprocedural angiographic findings

RC513

Pediatric Radiology

PD VA

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC513A Imaging of Vascular Malformations

Participants
Arnold C. Merrow JR, MD, Cincinnati, OH (*Presenter*) Consultant, Reed ElsevierAuthor with royalties, Reed Elsevier

For information about this presentation, contact:

carl.merrow@cchmc.org

LEARNING OBJECTIVES

1) Adopt appropriate nomenclature for pediatric vascular anomalies. 2) Incorporate up to date strategies for imaging common vascular malformations and neoplasms. 3) Optimize value-added reporting by addressing specific and relevant clinical issues.

RC513B Management of Slow-flow Vascular Malformations

Participants
C. Matthew Hawkins, MD, Decatur, GA (*Presenter*) Nothing to Disclose

RC513C Neonatal Brain Hemorrhage

Participants
Shelly I. Shiran, MD, Ramat Hasharon, Israel (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the different patterns of intracranial hemorrhage in term and preterm neonates. 2) To correlate the imaging characteristics of intracranial hemorrhage between neonatal brain US and MRI.

RC513D Umbilical Lines and Complications

Participants
Erin K. Romberg, MD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

erin.romberg@seattlechildrens.org

LEARNING OBJECTIVES

1) Identify appropriately and inappropriately positioned umbilical lines. 2) Predict the location of aberrantly coursing umbilical lines. 3) List common complications of umbilical lines and how to assess for these complications.

RC514

Arterial and Venous Disease

Wednesday, Dec. 2 8:30AM - 9:30AM Room: Channel 5

IR VA

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Sara E. Zhao, MD, Boston, MA (*Moderator*) Nothing to Disclose
Osmanuddin Ahmed, MD, Northbrook, IL (*Moderator*) Speaker, Canon Medical Systems CorporationSpeaker, Cardiva Medical IncSpeaker, Penumbra, IncAdvisory Board, Boston Scientific Corporation

LEARNING OBJECTIVES

1) Review syndromes caused by arterial compression. 2) Discuss the role of Interventional Radiologists in diagnosis and interventions.

Sub-Events

RC514A Iliofemoral Arterial Interventions

Participants
Alexander H. Lam, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand how to identify patients with iliofemoral disease most appropriate for endovascular intervention. 2) Recognize aspects of preprocedural planning including options for access, location of disease, quality of distal circulation, and lesion characteristics important to revascularization. 3) Identify the tools available for iliofemoral interventions and briefly review procedural techniques.

RC514B Below-the-Knee Interventions

Participants
Brian J. Schiro, MD, Miami, FL (*Presenter*) Speaker, Penumbra, IncSpeaker, Medtronic plcResearch Grant, Medtronic plc

For information about this presentation, contact:

briansc@baptisthealth.net

LEARNING OBJECTIVES

1) Understand indications for BTK interventions. 2) Describe treatment options in BTK interventions. 3) Discuss follow-up non-invasive findings after intervention.

RC514D DVT Lysis: An Update

Participants
Sara E. Zhao, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC514E Chronic Venous Recanalization

Participants
Osmanuddin Ahmed, MD, Northbrook, IL (*Presenter*) Speaker, Canon Medical Systems CorporationSpeaker, Cardiva Medical IncSpeaker, Penumbra, IncAdvisory Board, Boston Scientific Corporation

LEARNING OBJECTIVES

1) Understand indications for performing chronic venous recanalization. 2) Discuss relevant pre-procedure imaging for optimizing outcomes. 3) Review basic and advanced techniques used for performing chronic venous recanalizations. 4.) Overview the peri and post-procedural management of patients after chronic venous recanalization procedures.

RC514F PE Treatment Options and Pulmonary Embolism Response Team

Participants
Ketan Y. Shah, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kyshah@uic.edu

LEARNING OBJECTIVES

1) Review the pathophysiology of pulmonary arterial embolic disease. 2) Learn the different risk stratification schemes for PE 3)

Discuss the current literature for catheter-directed therapy in the setting of PE. 4) Understand the emerging role for pulmonary embolism response teams (PERT).

RC514G IVC Filters: Past, Present, and Future

Participants
Catherine T. Vu, MD, Sacramento, CA (*Presenter*) Nothing to Disclose

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RC515

The Post-Surgical Breast

BR MR US

AMA PRA Category 1 Credit ™: .75

Participants
Ana P. Lourenco, MD, Providence, RI (*Moderator*) Nothing to Disclose

Sub-Events

RC515A Mammography and US

Participants
Ana P. Lourenco, MD, Providence, RI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

At the conclusion of this activity, participants will be able to:1. Identify and describe expected post-operative changes in the breast on both mammography and ultrasound.2. Distinguish between expected post-operative changes and changes that warrant additional imaging and/or biopsy.3. Evaluate potential imaging pitfalls and summarize strategies to avoid them.

RC515B MRI

Participants
Vivian Y. Park, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

vivianpark0116@gmail.com

LEARNING OBJECTIVES

At the conclusion of this activity, participants will be able to: 1. Understand the performance of surveillance MRI in women with a personal history of breast cancer and current guideline recommendations. 2. Recognize the variable appearances of fat necrosis on MRI. 3. Understand the importance of knowledge regarding procedures related to breast reconstruction and the importance of paying attention to extramammary findings.

RC515C Implants-Rupture and ALCL

Participants
Elizabeth J. Sutton, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

suttone@mskcc.org

LEARNING OBJECTIVES

The learning objectives for this course are to:1. Comprehend the different types of breast implants used for cosmetic surgery and oncoplastic reconstruction.2. Comprehend that MRI is the most sensitive imaging modality for evaluating the integrity of a silicone implant as most ruptures are asymptomatic.3. Comprehend that peri-implant fluid collections and/or masses identified on implant protocol MRI are rarely seen 24 months after reconstructive surgery and radiologist should be aware that image guided fine-needle aspiration with flow cytometry may be warranted to evaluate for breast implant-associated anaplastic large cell lymphoma.

RC516

Medicine and Media in the Digital Age: Social Media's Impact on our Profession, Our Practice and Ourselves

PR

AMA PRA Category 1 Credit ™: 1.00

Participants
Anjali Malik, MD, Fairfax, VA (*Moderator*) Nothing to Disclose

Sub-Events

RC516A Introduction

Participants
Anjali Malik, MD, Fairfax, VA (*Presenter*) Nothing to Disclose

RC516B Social Media: Opportunities to Improve our Healthcare System

Participants
Richard Duszak JR, MD, Atlanta, GA (*Presenter*) Advisor, Ethos Medical, Inc; Shareholder, Ethos Medical, Inc

RC516C Using Social Media to Create Your Professional Brand

Participants
Geraldine B. McGinty, MD, MBA, New York, NY (*Presenter*) Nothing to Disclose

RC516D Advocacy in the Age of A Pandemic: Mobilizing Social Media Communities to Effect Change

Participants
Nisha Mehta, MD, Charlotte, NC (*Presenter*) Nothing to Disclose

RC516E Leveraging Social Media to Build Diversity and Inclusion in Medicine

Participants
Agnieszka O. Solberg, MD, Bismarck, ND (*Presenter*) Owner, RadCXSpeakers Bureau, Argon Medical Devices, IncOwner, SunMountain Medical Consulting LLCSpouse, Owner, SunMountain Medical Consulting LLC

For information about this presentation, contact:

solberg.a.o@gmail.com

RC516F Q&A

Participants
Anjali Malik, MD, Fairfax, VA (*Presenter*) Nothing to Disclose

RC518

An Integrated Approach to Tumor Heterogeneity Using Imaging

Thursday, Dec. 3 10:00AM - 11:00AM Room: Channel 1

OI

AMA PRA Category 1 Credit ™: .75

Participants
Evis Sala, MD, PhD, Cambridge, United Kingdom (*Moderator*) Co-founder, Cambridge AI HealthSpeakers Bureau, GlaxoSmithKline plc

For information about this presentation, contact:

es220@cam.ac.uk

LEARNING OBJECTIVES

1) Review the results of the massively parallel sequencing studies of human cancers. 2) Assess the inter- and intra-tumor genetic heterogeneity found in human cancers. 3) Define the implications of genetic heterogeneity on tumor evolution and treatment. 4) Identify potential multi-omics data sets in medicine 5) Identify and compare different integration strategies 3) identify challenges of multi-omics data integration. 6) Explain the basic concepts of Radiomics. 7) Describe methods, challenges, and solutions on small data sets. 8) Discuss early clinical results in Oncologic Imaging with a critical eye.

Sub-Events

RC518A Genetic Heterogeneity in Cancer: Overview and Implications

Participants
Britta Weigelt, New York, NY (*Presenter*) Spouse, Consultant, Paige.AISpouse, Consultant, Repare Therapeutics IncSpouse, Scientific Advisory Board, VolitionRxSpouse, Scientific Advisory Board, Page.AISpouse, Scientific Advisory Board, GrailSpouse, Scientific Advisory Board, F. Hoffmann-La Roche LtdSpouse, Scientific Advisory Board, inviCRO, LLC

LEARNING OBJECTIVES

1) Review the results of the massively parallel sequencing studies of human cancers. 2) Assess the inter- and intra-tumor genetic heterogeneity found in human cancers. 3) Define the implications of genetic heterogeneity on tumor evolution and treatment.

RC518B Integrating Multiomics: New Frontiers Ahead

Participants
Ramona Woitek, MD, Vienna, Austria (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify potential multi-omics data sets in medicine. 2) Identify and compare different integration strategies. 3) Identify challenges of multi-omics data integration.

RC518C Radiomics on Small Datasets: Techniques and Strategies to Enhance Performance

Participants
Nickolas Papanikolaou, PhD, Lisbon, Portugal (*Presenter*) Stockholder, MRIcons LTDStockholder, Advantis Medical Imaging

LEARNING OBJECTIVES

1) Explain the basic concepts of Radiomics. 2) Describe methods, challenges, and solutions on small data sets. 3) Focus on the critical appraisal of radiomics in Oncologic Imaging.

RC521

Status of the ABR Maintenance of Certification (MOC) Program for Medical Physicists

Thursday, Dec. 3 5:00PM - 6:00PM Room: Channel 3

ED PH

AMA PRA Category 1 Credit ™: .75

Participants
Matthew B. Podgorsak, PhD, Buffalo, NY (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Become familiar with the rationale for and history of the ABR Maintenance of Certification (MOC) Program for medical physicists. 2) Learn about the ABR's philosophy for the need of maintaining certification and the current status of the MOC program for medical physicists. 3) Obtain an overview of the first year's medical physics on-line longitudinal assessment (OLA) program.

Sub-Events

RC521A History of the Development of MOC Programs

Participants
J. Anthony Seibert, PhD, Sacramento, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jaseibert@ucdavis.edu

LEARNING OBJECTIVES

1) Describe the history of American Board of Medical Specialties (ABMS) Certification and evolution of Maintenance of Certification. 2) Discuss ABR efforts for implementation of time-limited and continuous certification for medical physicists. 3) Explain the importance of assuring the public that board-certified diplomates remain current in their specialties given the rapid pace of scientific knowledge and technical advances.

RC521B The Need for MOC and the Status of the Current ABR MOC Program

Participants
Robert A. Pooley, PhD, Jacksonville, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss why the ABR MOC program is needed for Medical Physicists. 2) Describe the status of the current ABR MOC program. 3) Identify best practices for complying with ABR MOC requirements.

RC521C The First Year Recap of the Medical Physics OLA Program

Participants
Kalpana M. Kanal, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kkanal@uw.edu

LEARNING OBJECTIVES

1) Be familiar with the requirement for ABR MP OLA. 2) Review the status of ABR-OLA for medical physicists. 3) Discuss any changes moving forward.

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RC523

MR Safety I

MR PH SQ

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Emanuel Kanal, MD, Pittsburgh, PA (*Moderator*) Nothing to Disclose

Sub-Events

RC523A The use of artificial intelligence to help standardize risk assessment

Participants
Emanuel Kanal, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ekanal@pitt.edu

LEARNING OBJECTIVES

1) Identify the main energies/fields used in the MR imaging process. 2) Associate the main potential risks associated with each energy/field used in the MR imaging process. 3) Define the spatial distributions of each energy/field used in the MR imaging process. 4) Describe steps that can be undertaken to systematically assess potential risks associated with MR imaging of any implant, device, or foreign body in any MR scanner.

ABSTRACT

As opposed to x-ray, CT, nuclear medicine, PET, MEG, ultrasound, or just about any other diagnostic imaging examination in clinical use today, MR imaging utilized numerous different and unique energies or fields to generate each MR image. The potential safety risks associated with each of these energies is unique/different those associated with each of the other fields. Further, the spatial distributions of these energies over the patient being examined is also unique to each field.The focus of this presentation is to help the attendee understand how these energies/fields may interact with an implant, device, or foreign body, as well as defining a standardized methodology for assessing the potential risks of scanning any device, implant, or foreign body in any MR scanner for any MR examination on any part of the body. The presentation will rely heavily on custom developed software to help standardize the graphic display, understanding, analysis, quantification, and reporting of the potential risks of implant/device/foreign body MR imaging in any of dozens of detailed modeled clinical MR scanners in use today.

RC524

Trends in the Modern Radiology Marketplace (Sponsored by the RSNA Professionalism Committee)

AI LM PR

AMA PRA Category 1 Credit ™: 1.00

Participants
Brandon P. Brown, MD, Indianapolis, IN (*Moderator*) Nothing to Disclose
Sonia Gupta, MD, Boston, MA (*Moderator*) Medical Director, Qure.ai North America; Consultant, IBM Corporation; Consultant, Sauzio; Consultant, General Electric Company; Consultant, Alphabet Inc; Speakers Bureau, Ambra Health ; Speaker, AIMed; Advisory Board, Guerbet SA; Editorial Advisory Board, Anderson Publishing, Ltd;

LEARNING OBJECTIVES

1) Understand the Impact of AI - how AI will fit into their future careers with basic overview of natural language processing, machine learning, and deep learning. 2) Understand the Impact of Corporatization - review the changing marketplace secondary to consolidations of practices and private equity. 3) Learn how to be an effective mentor to trainees in the current marketplace - discuss future career paths, working with AI companies, review the ACR Human Resources Workforce Survey. 4) Academic Impact of Grand Rounds - how you can utilize institutional Grand Rounds programs to improve trainee knowledge of the changing nature of radiology.

Sub-Events

RC524A AI Expert

Participants
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose

RC524B Impact of Corporatization

Participants
Richard E. Heller III, MD, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Richard.heller@radpartners.com

LEARNING OBJECTIVES

1) Identify the changes that are happening in the radiology marketplace. 2) Lst the factors that are driving these changes. 3) Understand the strengths and weaknesses of the various practice models.

RC524C How to Be an Effective Mentor

Participants
Sonia Gupta, MD, Boston, MA (*Presenter*) Medical Director, Qure.ai North America; Consultant, IBM Corporation; Consultant, Sauzio; Consultant, General Electric Company; Consultant, Alphabet Inc; Speakers Bureau, Ambra Health ; Speaker, AIMed; Advisory Board, Guerbet SA; Editorial Advisory Board, Anderson Publishing, Ltd;

RC524D How to Develop an Effective Grand Rounds Curriculum

Participants
Brandon P. Brown, MD, Indianapolis, IN (*Presenter*) Nothing to Disclose

RC527

Implementing Patient-centered Care

HP

AMA PRA Category 1 Credit ™: 1.00

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Moderator*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

rcarlos@med.umich.edu

LEARNING OBJECTIVES

1) Assess patient and practice outcomes evaluating implementation of practice and quality improvement interventions. 2) Understand the different approaches for evaluating implementation of practice and quality improvement interventions, using specific examples. 3) Differentiate between implementation and deimplementation interventions and the unique challenges of each.

Sub-Events

RC527A Principles of Patient-centered Care

Participants
Lucy B. Spalluto, MD,MPH, Nashville, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lucy.b.spalluto@vumc.org

LEARNING OBJECTIVES

1) Discuss importance of patient- and family-centered care. 2) Review principles of patient- and family-centered care. 3) Understand the relationship between patient- and family-centered care and implementation science.

RC527B Designing Implementation Studies

Participants
Wynne E. Norton, PhD, Rockville, MD (*Presenter*) Nothing to Disclose

RC527C Implementing Quality Care

Participants
Hanna M. Zafar, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Stella Kang, MD,MSc, New York, NY (*Presenter*) Royalties, Wolters Kluwer nv
Jean L. Wright, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

stella.kang@nyulangone.org

LEARNING OBJECTIVES

To understand how to select implementation strategies that can be applied to care of incidental lung nodules.

RC527D Issues in Implementation Research

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

rcarlos@med.umich.edu

LEARNING OBJECTIVES

1) Assess practice outcomes evaluating implementation of practice and quality improvement interventions.2) Understand the different approaches for evaluating implementation of practice and quality improvement interventions, using specific examples3) Differentiate between implementation and deimplementation interventions and the unique challenges of each.

RC527E Issues in Implementing Quality Improvement

Participants
Lane F. Donnelly, MD, Woodside, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand helpful tools to successfully implement quality improvement projects. 2) To understand the role that

1) To understand helpful tools to successfully implement quality improvement projects. 2) To understand the role that implementation science approaches can help with quality improvement projects.

ABSTRACT

There are many tools and approaches that may help improve the chance of having a long-term successful quality improvement project. These include items in the technical domain, that help the execution of tasks and processes. Examples include daily management systems, problem solving accountability, processes for recognition, and goal deployment. These also include items in the social domain. This includes ensuring that those doing the work have optimized relationships so that the work can be done efficiently and effectively.

Printed on: 05/05/21

RC529

Liver MRI Essentials

Sunday, Nov. 29 5:00PM - 6:00PM Room: Channel 5

GI MR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC529A HCC: Typical and Atypical Appearances

Participants
Kathryn J. Fowler, MD, San Diego, CA (*Presenter*) Consultant, 12 Sigma Technologies; Researcher, Nuance Communications, Inc

LEARNING OBJECTIVES

1) Review pathological sub-types of HCC. 2) Gain knowledge of the imaging appearance of atypical HCC. 3) Understand impact on management.

RC529B Intrahepatic Cholangiocarcinoma and HCC-Cholangiocarcinoma

Participants
Sara Lewis, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the risk factors and clinical features of intrahepatic cholangiocarcinoma (ICC). 2) Examine the cross-sectional typical and atypical imaging characteristics of ICC, with emphasis on CT and MRI. 3) Identify imaging and clinical features that aid in accurate diagnosis of ICC compared to other malignant and benign hepatic lesions.

RC529C Hilar and Extra-Hepatic Cholangiocarcinoma

Participants
Jeong Min Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Grant, Bayer AGSpeaker, Bayer AGGrant, Canon Medical Systems CorporationGrant, Koninklijke Philips NVGrant, General Electric CompanyGrant, Guerbet SASpeaker, Guerbet SAGrant, Samsung Electronics Co, LtdSpeaker, Samsung Electronics Co, LtdGrant, Bracco GroupSpeaker, Siemens AG

For information about this presentation, contact:

jmsh@snu.ac.kr

LEARNING OBJECTIVES

1) To learn about the epidemiology and pathology of biliary tract malignancies. 2) To understand the spectrum of their imaging features based on pathologic correlation. 3) To become familiar with both the advantages and limitations of imaging for diagnosis and staging.

ABSTRACT

Cholangiocarcinoma is a disease entity with a wide spectrum of imaging, histological, and clinical features as well as treatment options. At present, imaging studies play a critical role for the detection, characterization, staging, and resectability assessment of cholangiocarcinoma. This lecture will discuss the imaging features of perihilar and extrahepatic cholangiocarcinoma and the considerations for interpretation of these features. In addition, I will address the latest concepts regarding carcinogenesis process, premalignant lesions, and preoperative staging systems for cholangiocarcinoma.

RC529D FNH and Hepatocellular Adenomas

Participants
Maxime Ronot, MD, Clichy, France (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To be able to recognize and non-invasively diagnose typical forms of FNH. 2) To understand the pathomolecular classification of hepatic adenomas. 3) To know how to differentiate FNH from adenomas on imaging. 4) To understand the value and pitfalls of liver-specific contrast agents.

RC529E Liver Metastases

Participants
Frank H. Miller, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To be able to identify findings to identify and characterize liver lesions as metastases. 2) To use a variety of MR sequences to detect and distinguish metastases from other benign lesions such as hemangiomas.

RC532

Building an Inclusive Culture through Diversity

LM

AMA PRA Category 1 Credit ™: 1.00

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Moderator*) Nothing to Disclose
Nolan J. Kagetsu, MD, New York, NY (*Moderator*) Spouse, Employee, Pfizer Inc

For information about this presentation, contact:

nolan.kagetsu@mssm.edu

Sub-Events

RC532A Recruiting for Diversity

Participants
Cheri L. Canon, MD, Birmingham, AL (*Presenter*) Royalties, The McGraw-Hill Companies

For information about this presentation, contact:

ccanon@uabmc.edu

LEARNING OBJECTIVES

1) Implement programs to assure diverse recruting practices. 2) Incorporate implicit bias training. 3) Establish a culture of inclusivity.

RC532B Recruiting Diverse Workforce in Private Practice

Participants
Richard Strax, MD, Houston, TX (*Presenter*) Nothing to Disclose

RC532C Recruiting Diverse Radiology Residents: How I Do It

Participants
Carolynn M. DeBenedectis, MD, Natick, MA (*Presenter*) Nothing to Disclose

RC532D How Do We Support LGBTQ Community?

Participants
John M. Knudsen, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RC532E Q&A

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

RC553

Next Generation Reporting: Informatics to Improve the Value of Reporting

IN SQ

Participants
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Moderator*) Nothing to Disclose
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify unmet needs of current and future practices with regards to radiology reporting. 2) Apply existing and emerging informatics applications to improve report generation, including a focus on patient centered reporting. 3) Demonstrate an understanding of how best to apply emerging machine intelligence tools to create structured automated recommendations.

Sub-Events

RC553A The Actionable Patient Facing Report

Participants
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appreciate the current state of radiology reporting in the United States. 2) Identify areas for improvement in reporting. 3) Demonstrate an understanding of the potential of patient portals. 4) Understand how patient facing actionable reports can lead to better care through shared decision making

RC553B The Multimedia Report: Ready for Prime Time?

Participants
Cree M. Gaskin, MD, Keswick, VA (*Presenter*) Author with royalties, Oxford University PressAuthor with royalties, Thieme Medical Publishers, IncResearch Grant, Carestream Health, IncResearch Grant, Koninklijke Philips NVConsultant, IBM Corporation

For information about this presentation, contact:

cree@virginia.edu

LEARNING OBJECTIVES

1) Identify characteristics of an interactive multimedia radiology report. 2) Comprehend the value of improved communication that occurs with interactive multimedia reporting. 3) Describe barriers to overcome during the implementation of interactive multimedia reporting and integration of advanced reports into the electronic health record.

RC553C Interactive Reporting

Participants
Les R. Folio, MPH,DO, Bethesda, MD (*Presenter*) Institutional research agreement, Carestream Health, Inc

LEARNING OBJECTIVES

1) Comprehend the difference between plain text and interactive multimedia radiology reports. 2) Identify characteristics and components suitable for an interactive multimedia radiology report. 3) Demonstrate objective evidence of radiology report value using interactive reports now that we can analyze click through behaviours of hyperlinked text.

ABSTRACT

For the past several years, the NIH Clinical Center has been routinely producing multimedia-enhanced interactive reports (Folio L. Multimedia Reports. Radiographics. April/ May 2018) in which radiologist reports contain hyperlinked text, directing clinicians to the corresponding image annotation (most often two-diameter measurements). Our prior studies have also demonstrated notable time savings for oncologists (three times faster) when they use the hyperlinked target lesion measurements for their patients (Folio L. RSNA 2015) as they spend significantly less time "hunting" for measurements in the previous text-only reports.Bookmark tables within our PACS (VuePACS V12, Carestream Health, Rochester, NY) contain fields where "radiologist assistants" (RAs) can label target lesions. In one ongoing study (Toscano A. SCBT.MR 2018), RAs simulate an AI workflow where target lesions are measured before radiologists open the exam for interpretation. This improves target lesion selection and measurement concordance while saving radiologists time by not having to identify or measure these lesions. Once verified, radiologists import the active annotation as a link into our report by dictating the word "hyperlink," which minimizes the potential transcription error of three sets of numbers (measurement, series and image numbers) and other metadata (e.g. x,y image and z table space, comparison of current with prior measurements for RECIST calculations, lesion measurement creator).We have followed adoption of hyperlinks since we started the capability and showed a rapid rise of use and that body radiologists use the most hyperlinks (about 80% of all CT), followed by body MR, PET CT and nueroradiology. We also collect data on use of annotations, with two-diameter the most frequent, followed by linear, ovals then arrows (least frequent). Preliminary work indicates that two-diameter and ovals better guide bounding boxes for deep learning with the annotations directly associated with the the hyperlinked text.Lastly, we have been analyzing clinician click-through behaviors where we can objectively demonstrate report value as a function of number of clicks on linked text, thus verifying clinician interaction with radiologist reports. We can also analyze radiologists' clicks on prior report text and noted that

body radiologists (for example) frequently click on these reports while dictating their interpretations.

RC553D **Structured Automated Recommendations: Reporting in the Era of Artificial Intelligence**

Participants
Tarik K. Alkasab, MD,PhD, Boston, MA (*Presenter*) Consultant, Nuance Communications, Inc; Medical Advisory Board, Nuance Communications, Inc; Medical Advisory Board, Siemens AG; ;

Printed on: 05/05/21

RC554

Ethical Issues in Medical Imaging AI for Radiologists and Industry

Monday, Nov. 30 5:00PM - 6:00PM Room: Channel 3

AI IN PR

AMA PRA Category 1 Credit ™: 1.00

Participants
David B. Larson, MD, MBA, Portola Valley, CA (*Moderator*) Grant, Siemens AG Grant, Koninklijke Philips NV

Sub-Events

RC554A Introduction

Participants
David B. Larson, MD, MBA, Portola Valley, CA (*Presenter*) Grant, Siemens AG Grant, Koninklijke Philips NV

RC554B Ethics of Patient Privacy in Medical Imaging AI

Participants
Yvonne W. Lui, MD, New York, NY (*Presenter*) Research collaboration, Siemens AGAdvisor, Bold Brain Ventures

LEARNING OBJECTIVES

1) Understand current HIPAA and policy around PHI. 2) Understand the current challenges in deidentification of medical images. 3) Have knowledge regarding some approaches and resources for image deidentification.

RC554C Academic-industry Partnerships in AI: Why, When, and How?

Participants
Julius Chapiro, MD, New Haven, CT (*Presenter*) Research Grant, Guerbet SAConsultant, Guerbet SAResearch Grant, Koninklijke Philips NVConsultant, Koninklijke Philips NVResearch Grant, Boston Scientific Corporation

LEARNING OBJECTIVES

1) To learn how academic-Industrial partnerships (AIPs) deliver healthcare innovation across all branches of patient care, and may transform radiology in the coming age of artificial intelligence (AI). 2) To understand how AIPs may generate product solutions for complex clinical problems by forming alliances between academic institutions, medical industries, and other stakeholders to marshal key technologies, information, and resources in response to these clinical challenges. 3) To appreciate how designing a successful AIP requires understanding of the mutual goals, motivation and culture necessary for continuous and iterative communication among the contractual partners.

ABSTRACT

Academic-Industrial Partnerships (AIPs) deliver healthcare innovations across all branches of patient care, and it can be expected that these partnerships will transform radiology in the coming age of artificial intelligence (AI). Such partnerships can generate product solutions for complex clinical problems by forming alliances between academic institutions, medical industries, and other stakeholders to marshal key technologies, information, and resources in response to these clinical challenges. In radiology, AI can be used to manage the flood of data from digital imaging systems. AI's capacity to automate data assembly, processing, and presentation can allow radiologists to focus on what they like best: think, understand and deliver high performance disease management. However, AI advances in medical imaging explore mostly uncharted territory fraught with uncertainties. This lecture aims at helping interested parties understand features of the academic-industrial partnership approach, describes interplay among its participating clinicians, scientists, engineers, and other experts, and will chart possible pathways towards solving the performance, economic, cultural, ethical, legal, and regulatory considerations needed to transform AI ideas into clinically useful tools.

RC554D Ethics of Sharing Clinical Data in AI

Participants
David B. Larson, MD, MBA, Portola Valley, CA (*Presenter*) Grant, Siemens AG Grant, Koninklijke Philips NV

RC601

Imaging and Management of Patients with Lung Cancer

CH OI

FDA Discussions may include off-label uses.

Participants
Girish S. Shroff, MD, Houston, TX (*Moderator*) Nothing to Disclose
Girish S. Shroff, MD, Houston, TX (*DPS Upload*) Nothing to Disclose

Sub-Events

RC601A Lung Nodule Management

Participants
Jin Mo Goo, MD, PhD, Seoul, Korea, Republic Of (*Presenter*) Research Grant, INFINITT Healthcare Co, Ltd; Research Grant, DONGKOOK Pharmaceutical Co, Ltd;

LEARNING OBJECTIVES

1) List the major components in determining lung nodule management. 2) Compare the management guidelines for lung cancer screening and those for incidental nodules. 3) Describe how to measure lung nodules at CT.

RC601B Lung Cancer Staging: TNM 8th Edition

Participants
Girish S. Shroff, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gshroff@mdanderson.org

LEARNING OBJECTIVES

1) Review the TNM-8 classification for lung cancer.

RC601C Imaging of Precision Therapy in Lung Cancer: Recent Advances and Updates

Participants
Mizuki Nishino, MD, Boston, MA (*Presenter*) Institutional Research Grant, Merck & Co, Inc; Institutional Research Grant, Canon Medical Systems Corporation; Institutional Research Grant, AstraZeneca PLC; Consultant, DAIICHI SANKYO Group; Research Grant, DAIICHI SANKYO Group; Consultant, AstraZeneca PLC

For information about this presentation, contact:

mizuki_nishino@dfci.harvard.edu

LEARNING OBJECTIVES

1) Describe the recent advances of precision therapy for lung cancer based on genomic and molecular analyses. 2) Understand the conventional and emerging imaging strategies for monitoring of precision lung cancer therapy. 3) Function as a key member of multidisciplinary team with the up-to-date knowledge in the rapidly evolving world of lung cancer.

RC601D Radiomics in Lung Cancer: Opportunities and Challenges

Participants
Anastasia Oikonomou, MD,PhD, Toronto, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

anastasia.oikonomou@sunnybrook.ca

LEARNING OBJECTIVES

1) To understand the concept of radiomics and the steps of radiomics analysis based on medical images for lung cancer. 2) To learn about the most significant opportunities and challenges related to radiomics analysis. 3) To discuss the positive impact of these opportunities in the future and ways to overcome the challenges related to radiomics.

RC601E Lung Biopsy in the Era of Personalized Medicine

Participants
Joseph G. Mammarappallil, MD,PhD, Durham, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the imaging characteristics for pulmonary lesions that make them suspicious for neoplasm. 2) Evaluate the role of

percutaneous biopsy in the current era of thoracic oncologic treatment. 3) Determine safety and efficacy of percutaneous lung biopsy to obtain tissue for molecular diagnostics.

Printed on: 05/05/21

RC602

Social Media in Education

ED

AMA PRA Category 1 Credit ™: .75

Participants
Tara M. Catanzano, MD, Springfield, MA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

tara.catanzano@bhs.org

LEARNING OBJECTIVES

1) Understand the different types of social media platforms. 2) Discriminate between different social media platforms as vehicles for educational presentations. 3) Create a plan for personal use to incorporate social media into their teaching activities.

Sub-Events

RC602A Getting the Biggest Bang for Your Buck: What SoMe Platform Should You Use?

Participants
David S. Sarkany, MD, Staten Island, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dsarkany@northwell.edu

RC602B Novel Uses of SoMe Platforms: Virtual Multi-disciplinary Conferences

Participants
Lucy E. Modahl, MD, PhD, Northampton, MA (*Presenter*) Nothing to Disclose

RC602C YouTube: Nuts and Bolts of Creating an Educator's Channel

Participants
Tara M. Catanzano, MD, Springfield, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

tara.catanzano@bhs.org

LEARNING OBJECTIVES

1) Understand the different types of social media platforms. 2) Discriminate between different social media platforms as vehicles for educational presentations. 3) Create a plan for personal use to incorporate social media into their teaching activities.

RC602D Tweet Chats: Hot to Leverage Chats for Education and Collaboration

Participants
Tan-Lucien H. Mohammed, MD, Gainesville, FL (*Presenter*) Nothing to Disclose

RC602E LinkedIn: Not Just for Networking-Use Cases for Education

Participants
Richard J. Hicks, MD, Longmeadow, MA (*Presenter*) Nothing to Disclose

RC603

Cardiac Imaging in Private Practice: Lessons Learned

Friday, Dec. 4 5:00PM - 6:00PM Room: Channel 3

CA HP PR

AMA PRA Category 1 Credit ™: .75

Participants
Michael F. Morris, MD, Paradise Valley, AZ (*Moderator*) Speakers Bureau, Medtronic plcEducator, Medtronic plcConsultant, Edwards Lifesciences Corporation

Sub-Events

RC603A Building the Practice: Scanning Protocols & 3D Reformations

Participants
Richard L. Hallett II, MD, Carmel, IN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

xraydoc97@yahoo.com

LEARNING OBJECTIVES

1) Describe technical details that result in safe and efficacious cardiac and coronary CT. 2) Describe important contraindications to coronary and cardiac CT exams. 3) Describe how 3D processing of cardiovascular CT is important for optimal imaging quality.

RC603B Growing the Practice: Relationships & Referrals

Participants
Alastair Moore, MD, Dallas, TX (*Presenter*) Speaker, Boehringer Ingelheim GmbHConsultant, Boehringer Ingelheim GmbH

RC603C Protecting the Practice: Reimbursement Issues & Turf Battles

Participants
Michael F. Morris, MD, Paradise Valley, AZ (*Presenter*) Speakers Bureau, Medtronic plcEducator, Medtronic plcConsultant, Edwards Lifesciences Corporation

RC604

Bone and Soft Tissue Tumors

MK

AMA PRA Category 1 Credit ™: 1.00

Participants
Kambiz Motamedi, MD, Los Angeles, CA (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

kmotamedi@mednet.ucla.edu

Sub-Events

RC604A Update in Diagnostic Workup of Bone Tumors

Participants
Daniel E. Wessell, MD, PhD, Jacksonville, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Guide the diagnostic workup of bone tumors using updated evidence from the medical literature and, when such evidence is lacking or equicocal, concensus expert opinion.

RC604B Common Mimickers of Soft Tissue Sarcomas

Participants
Mark D. Murphey, MD, Silver Spring, MD (*Presenter*) Nothing to Disclose

RC604C Biopsy Planning for Bone and Soft Tissue Tumors

Participants
Kambiz Motamedi, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kmotamedi@mednet.ucla.edu

LEARNING OBJECTIVES

1) Identify the suitable imaging modality for guidance and equipment for biopsy. 2) Assess the value of the requested biopsy and potential necessity for further imaging for appropriate planning. 3) Determine the appropriate level of sedation, if any, for the procedure.

RC604D Post-treatment Surveillance of Sarcomas

Participants
Laura M. Fayad, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To discuss the most helpful MRI sequences for a comprehensive evaluation of patents who have undergone treatment for sarcoma. 2) To review the common and uncommon post-treatment complications of surgery. 3) To emphasize the role of MRI in distinguishing post-treatment fibrosis from recurrence following surgery.

RC604E Bone Tumors of the Spine

Participants
Hakan Ilaslan, MD, Cleveland, OH (*Presenter*) Nothing to Disclose

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RC605

Update on Imaging of Dementia and Neuropsychiatric Disease

NR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Jody L. Tanabe, MD, Aurora, CO (*Moderator*) Nothing to Disclose

Sub-Events

RC605A Introduction

Participants
Jody L. Tanabe, MD, Aurora, CO (*Presenter*) Nothing to Disclose

RC605B Depression and Imaging

Participants
Christine DeLorenzo, PhD, Stony Brook, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Christine.DeLorenzo@stonybrookmedicine.edu

LEARNING OBJECTIVES

Understand how fully quantitative Positron Emission Tomography (PET) can be used to improve diagnosis and treatment of major depressive disorder (MDD).Understand the differences between clinical and research PETLearn about ongoing imaging studies in major depressive disorder (MDD).

RC605C Addiction and Imaging

Participants
Rupa Radhakrishnan, MS,MBBS, Indianapolis, IN (*Presenter*) Nothing to Disclose

RC605D Dementia and Imaging

Participants
Ilya M. Nasrallah, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ilya.nasrallah@pennmedicine.upenn.edu

RC605E State of Imaging for Psychiatric Disorders

Participants
Martin P. Paulus, MD, Tulsa, OK (*Presenter*) Advisor, Spring Care, Inc; Royalties, Wolters Kluwer nv;

For information about this presentation, contact:

mpaulus@laureateinstitute.org

LEARNING OBJECTIVES

1) Identify the different imaging modalities that are currently being considered for clinical purposes in psychiatry. 2) Evaluate what the critical test characteristics are that are necessary for an imaging modality to be used as a clinical test. 3) Be able to judge the current state of predictive neuroimaging tools in psychiatry and their potential utility in the clinic. 4) Be able to understand what criteria to apply to judget the utility of clinical neuroimaging in psychiatry.

ABSTRACT

Neuroimaging techniques have provided a unique and unprecedented insight into the functioning human brain. The emergence of functional magnetic resonance imaging (fMRI) made a tool available that enabled psychiatric researchers to examine with great anatomical detail the relationship between psychological phenomena and brain physiology. Yet, almost thirty years later, it is important to take a step back and examine how this tool has helped to elucidate physiological and pathological anxiety related processes and to specifically address the challenges that lay ahead. Historically, there are currently no biological markers for psychiatric disorders even more than 50 years after the rise of biological psychiatry. Second, most studies that are currently presented are not aimed to examine whether neuroimaging can be used as a biological marker for a particular disorder. Instead, neuroimaging studies focus on the ability to show differences in neural activation due to specific processing of information across groups not within an individual. Third, the characteristics of fMRI, i.e. changing blood flow as a function of energetic demand in parts of the brain, and signal to noise characteristics of fMRI, i.e. the influence of thermal, physical, and physiological noise on the signal, may be such that fMRI may not be usable as a biological marker on an individual basis. In clinical practice it is essential to

know how a particular test result predicts the risk of a condition, i.e. does a particular person have the condition when he/she has a positive test result. Likelihood ratios are a unique approach to calculate the probability of the condition, while adapting for varying prior probabilities, i.e. the chance of having a condition at the outset. Positive Likelihood Ratio (PLR) is the ratio of the proportion of patients who have the target condition and test positive to the proportion of patients without the target condition who also test positive. Negative Likelihood Ratio (NLR) is the ratio of the proportion of patients who have the target condition who test negative to the proportion of patients without the target condition who also test negative. For example, a PLR > 10 may rule in diseases with a pre-test probability between 30% and 70%, i.e. when one is clinically uncertain. In comparison, a NLR of < 0.1 may rule out diseases with this pre-test probability. These test characteristics can be easily used in a graphical interface, e.g. the Fagan Nomogram, such that the clinician can calculate the approximate probability of an individual having a pathological condition with a positive / negative test result. Unfortunately, we still do not know answers to some basic questions that we may hope to address using fMRI in individuals with psychiatric disorders. First, there is no general account of what brain processing may causally contribute to the establishing of anxiety disorders. For example, is there a universal mechanism that results in the development of psychiatric disorders, or is there a minimal set of processes that when they occur together produce clinically significant psychiatric problems? Second, we do not know the discriminative ability of fMRI, i.e. the degree to which differences in neural activation pattern can be related to different types of psychiatric disorders. Third, it is a wide open question whether neuroimaging can function as a test for individuals with psychiatric disorders. Imaging techniques have not contributed so far to improve diagnoses or treatment of psychiatric disorders. This is clearly the charge and challenge for the next decades.

RC606

Upper Aerodigestive Tract Anatomy and Pathology

HN NR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC606A Nasopharynx

Participants
Nancy J. Fischbein, MD, Stanford, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

fischbein@stanford.edu

LEARNING OBJECTIVES

1) Be familiar with imaging anatomy of the nasopharynx. 2) Recognize commonly seen lesions of the nasopharynx, with an emphasis on nasopharyngeal carcinoma. 3) Know the pertinent positives and negatives to include in radiology reports that relate to staging of nasopharyngeal carcinoma. 4) Be aware of common pitfalls in imaging of the nasopharynx.

RC606B Oropharynx

Participants
Lawrence E. Ginsberg, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lginsberg@mdanderson.org

LEARNING OBJECTIVES

1. Understand the clinical setting for oropharyngeal cancer, including presenting signs and symptoms, demographics and relevance of Human Papilloma Virus. 2. Define the staging parameters and importance of staging and the radiologist's role. 3. Review the imaging strategies and findings in oropharyngeal malignancy.

RC606C Oral Cavity

Participants
Kristine M. Mosier, DMD, PhD, Indianapolis, IN (*Presenter*) Nothing to Disclose

RC606D Larynx/Hypopharynx

Participants
Amy F. Juliano, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be familiar with imaging anatomy of the larynx and hypopharynx. 2) Recognize the most-often seen lesions in the larynx and hypopharynx, including malignancies. 3) Know the pertinent positives and negatives to include in radiology reporting that provide the most important information for staging.

RC607

Management of Cystic Adnexal Masses: SRU and O-RADS/ACR Guidelines

Sunday, Nov. 29 8:30AM - 9:30AM Room: Channel 3

CT GU MR US

AMA PRA Category 1 Credit ™: .75

Participants
Mindy M. Horrow, MD, Philadelphia, PA (*Moderator*) Spouse, Employee, Bristol-Myers Squibb Company

For information about this presentation, contact:

Horrowm@einstein.edu

Sub-Events

RC607A Simple Adnexal Cysts: 2019 SRU Update

Participants
Deborah Levine, MD, Boston, MA (*Presenter*) Editor, Reed ElsevierEditor, Wolters Kluwer nv

For information about this presentation, contact:

Dlevine@bidmc.harvard.edu

LEARNING OBJECTIVES

1) Understand the benign nature of simple adnexal cysts. 2) Illustrate the thresholds to use for recommending follow-up so that fewer benign cysts need to be followed. 3) Discuss how thresholds differ before and after menopause as well as with the clarity of visualization of the adnexal cyst.

RC607B O-RADS US Risk Stratification and Management System: An ACR Consensus

Participants
Rochelle F. Andreotti, MD, Nashville, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rochelle.f.andreotti@vanderbilt.edu

LEARNING OBJECTIVES

1) To understand a new standard lexicon for ovarian/adnexal mass evaluation using ultrasound. 2) To apply the lexicon to the development of a risk stratification classification incorporating all levels of risk. 3) To be aware of management strategies for each risk category that can be reached based upon use of lexicon descriptors or the International Ovarian Tumor Analysis (IOTA) ADNEX mathematical model.

ABSTRACT

The goal of the 2019 published Ovarian-Adnexal Reporting and Data System (O-RADS) US risk stratification and management system is to provide consistent interpretations and decrease or eliminate ambiguity in US reports resulting in a higher probability of accuracy in assigning risk of malignancy to ovarian and other adnexal masses as well as provide a management recommendation for each risk category. Developed by an international multidisciplinary committee sponsored by the American College of Radiology, the system applies the standardized reporting tool for US based on the 2018 published lexicon of the O-RADS US working group. For risk stratification,the O-RADS US system consists of six categories (O-RADS 0-5), encompassing normal to high risk of malignancy. This unique system represents a collaboration between the pattern-based approach commonly used in North America and the widely used, European-based, International Ovarian Tumor Analysis (IOTA) Assessment of Different Neoplasias in the Adnexa (ADNEX) model, a mathematical risk prediction model that has undergone successful prospective and external validation. The pattern approach relies on a subgroup of the most predictive descriptors in the lexicon based on a retrospective review of evidence obtained in the IOTA phase 1-3 prospective studies and other supporting studies that assist in differentiating management schemes in a variety of almost certainly benign lesions. With the addition of O-RADS US working group consensus, guidelines for management in the different risk categories are proposed. Both systems have been stratified to reach the same risk categories and management strategies. At this time, O-RADS US is the only lexicon and classification system that includes all risk categories with their associated management schemes.

RC607C Management of Incidental Adnexal Findings on CT and MRI: An ACR Update

Participants
Maitray D. Patel, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

patel.maitray@mayo.edu

LEARNING OBJECTIVES

1. Use the term simple-appearing cyst as recommended by the ACR Committee on Incidental Findings for describing cysts on CT

and MR that are round or oval in shape, with homogeneous fluid attenuation or signal, with a thin or imperceptible wall and no solid component.2. Recognize the size thresholds for recommending further imaging of simple-appearing cysts on CT studies with contrast, CT studies without contrast, and fully-characterized MR studies.

ABSTRACT

Incidental adnexal findings on CT and MR examinations of the female pelvis are common; the ACR provides an algorithm to guide management of the incidental adnexal mass based on whether the mass is (1) a simple-appearing cyst; (2) has reasonably diagnostic imaging features; or (3) has an uncertain diagnosis. Simple appearing cysts on CT or MR have very low risk of malignancy. Imaging follow-up is justified only when the cyst is relatively large for the patient's menopausal status. The primary goals of imaging follow-up are to limit the risk of cyst mischaracterization and to understand the rate of growth, which may inform subsequent clinical decision-making. Recommendations regarding the optimal timing of sonographic follow-up for a large simple-appearing cyst balances the small potential risk of CT or MR mischaracterization against the desire to gain information about cyst growth using as few imaging studies as possible.

RC607D Clinical Challenges of Structured Ultrasound Reporting and Management of Adnexal Masses

Participants
Betty J. Suh-Burgmann, MD, Walnut Creek, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Betty.Suh-Burgmann@kp.org

LEARNING OBJECTIVES

1) Gain insight on the problem of adnexal mass management in community-based settings. 2) Better understand how ultrasound criteria inform management of adnexal masses relative to other clinical factors. 3) Identify potential challenges in implementation of standardized adnexal mass risk assessment and structured reporting in community-based settings.

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RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

RC608

Emergency Pediatric Abdominal and Pelvic Ultrasound

ER GI GU PD

AMA PRA Category 1 Credit ™: 1.00

Participants
Susan D. John, MD, Houston, TX (*Moderator*) Nothing to Disclose

Sub-Events

RC608A General Considerations

Participants
Susan D. John, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

susan.d.john@uth.tmc.edu

LEARNING OBJECTIVES

1) Recognize the utility of ultrasound for specific pediatric abdominal and pelvic emergencies.2) Plan effective strategies for use of ultrasound versus other imaging modalities.3) Optimize technical quality of abdominal ultrasound imaging in children.

RC608B Ultrasound of Appendicitis in Children and Its Mimics

Participants
Steven L. Blumer, MD, MBA, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sblumer@nemours.org

RC608C Ultrasound of Non-appendiceal Abdominal Emergencies

Participants
Margarita V. Revzin, MD, Wilton, CT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

margarita.revzin@yale.edu

LEARNING OBJECTIVES

1) Provide comprehensive review on up-to-date sonographic techniques and new US applications. 2) Discuss normal and variant sonographic anatomy of the bowel and main visceral organs in children. 3) Review characteristic sonographic features of common and uncommon abdominal emergencies affecting children and their management.

ABSTRACT

Acute abdominal pain is a common complaint in pediatric patient and is associated with a variety of non-appendiceal abdominal emergencies. With the continued improvement in gray-scale and color Doppler techniques and introduction of graded-compression and advanced sonographic applications, the use of ultrasonography has increased in the evaluation of children with acute abdominal pain with US becoming an invaluable imaging modality in the evaluation of pediatric abdominal emergencies. Ultrasound of the abdomen in children is typically a targeted exam; some of the emergent non-appendiceal indications include evaluation for pyloric stenosis, necrotizing enterocolitis, midgut volvulus, inflammatory bowel disease, and intussusception. Acquired conditions such as gallbladder pathology, splenomegaly, renal stones and pyelonephritis, bowel hematoma, abdominal infections and hernias can also be detected with ultrasound. Rare emergencies associated with abdominal neoplasms, vascular disorders and foreign bodies may first be detected with sonography.

RC608D Ultrasound of Genitourinary and Gynecologic Emergencies

Participants
Barbara K. Pawley, MD, Louisville, KY (*Presenter*) Nothing to Disclose

RC609

Crohn Disease Hands-on Workshop

GI

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC609A CTE and MRE: Essentials of a Great Exam

Participants
Michael S. Gee, MD, PhD, Boston, MA (*Presenter*) Research Grant, Takeda Pharmaceutical Company LimitedResearcher, General Electric Company Researcher, Siemens AG

For information about this presentation, contact:

msgee@mgh.harvard.edu

RC609B CD: Updates in Nomenclature and Reporting

Participants
Flavius F. Guglielmo, MD, Moorestown, NJ (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the key imaging findings of small bowel Crohn's disease in the bowel wall and adjacent mesentery and imaging findings of penetrating Crohn's disease at CT/MR enterography. 2) Implement the recommended standardized radiology report impression statements that summarize the imaging findings of small bowel Crohn's disease. 3) Discuss additional interpretation guidelines used when reporting small bowel Crohn's disease at CT/MR enterography.

RC609C Focused US in CD: When, How, and What to Look For

Participants
Jonathan R. Dillman, MD, MSc, Cincinnati, OH (*Presenter*) Research Grant, Siemens AG; Research Grant, Guerbet SA; Travel support, Koninklijke Philips NV; Research Grant, Canon Medical Systems Corporation; Research Grant, Bracco Group

LEARNING OBJECTIVES

1) To recognize the current need for bowel US and define the general indications for performing a focused ultrasound in patients with Crohn's disease (CD). 2) To demonstrate the grayscale and advanced techniques in performing a focused bowel US in CD patients. 3) To recognize the patterns of CD features on bowel US and state how this impacts patient management.

RC610

Advances in Gynecologic Ultrasound

GU US

FDA Discussions may include off-label uses.

Participants
Shuchi K. Rodgers, MD, Philadelphia, PA (*DPS Upload*) Nothing to Disclose

Sub-Events

RC610A Uterus and Endometrium: A Primer with Pearls to Perfect Your US Performance

Participants
Loretta M. Strachowski, MD, San Francisco, CA (*Presenter*) Royalties, Reed Elsevier; Speaker, World Class CME

LEARNING OBJECTIVES

1) Recognize the varied appearance of the endometrium throughout a woman's life. 2) Improve sonographic visualization of the endometrium utilizing technical tips and tricks. 3) Recite a basic differential diagnosis for uterine/cervical masses and endometrial thickening. 4) Apply appropriate terminology when describing abnormal bleeding. 5) Understand the controversies of endometrial thickness cutoffs in postmenopausal bleeding. 6) Appreciate the limitations of US in evaluating myomas, adenomyosis and Mullerian duct anomalies.

RC610B Sono HSG and 3D GYN US

Participants
Shuchi K. Rodgers, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rodgerss@einstein.edu

LEARNING OBJECTIVES

1) Recognize the varied imaging features of adnexal torsion including the limitations of Doppler for this diagnosis. 2) Understand the importance of 3D ultrasound and scanning technique in evaluating the patient with acute heavy bleeding. 3) Appreciate the limitations of ultrasound when evaluating complications from surgery and advanced oncologic disorders which may present with acute symptoms.

ABSTRACT

Ultrasound is often the first 'go to' modality when women present with acute gynecologic symptoms. A case-based symptoms approach will be used to discuss sonographic findings in women presenting with acute pain, heavy bleeding, and post-operative complications. In addition to classic diagnostic findings, atypical findings of common diagnoses will be shown(i.e. isolated fallopian tube torsion). Scanning techniques as well as imaging pearls and pitfalls will be stressed in order to help the participant make an accurate diagnosis using primarily ultrasound.

RC610C Ovarian Risk Stratification and Management Strategies: 2020

Participants
Phyllis Glanc, MD, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review updated recommendations for suggesting follow-up of adnexal cysts. 2) Improve knowledge of the malignant potential of various sonographic findings. 3) Integrate these findings into daily practice with goal of reducing recommendations for follow-up of benign adnexal cysts and reducing excess surgery for benign masses while improving triage to gynecology-oncology in women with suspicious adnexal masses.

RC610D Ultrasound for Deep Infiltrative Endometriosis

Participants
Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

luciana@chamie.com.br

LEARNING OBJECTIVES

1) Define clinical and epidemiological aspects of endometriosis. 2) Define the importance of imaging mapping for deeply infiltrative endometriosis before clinical counseling. 3) Apply the most appropriate technique to investigate endometriosis. 4) Describe the bowel preparation required for the transvaginal ultrasound to investigate endometriosis. 5) Apply the imaging algorithm to map deeply infiltrative endometriosis. 6) Assess the ultrasonographic findings of deeply infiltrative endometriosis in the most common

sites such as bladder, vesicouterine pouch, retrocervical space, vagina, ureters, appendix and rectosigmoid colon.

ABSTRACT

Endometriosis is a very common gynecological disease affecting millions of women in their reproductive life, often causing pelvic pain and infertility. Clinical history and physical examination may suggest endometriosis, but imaging mapping is necessary to identify the disease and mandatory for clinical couseling and surgical planning. Transvaginal ultrasound after bowel preparation is the best imaging modality as the first-line technique to evaluate patients suspected of endometriosis. The bowel preparation is relatively simple and includes the day before and the day of the examination. This method is highly accurate to identify intestinal endometriosis and to determine which layers of the bowel wall are affected. In addition, it provides better assessment of small peritoneal lesions of the retrocervical space, vagina and bladder. Pelvic adhesions can also be evaluated during the exam.

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RC611

PET/MRI Update 2020

MR NM

FDA Discussions may include off-label uses.

Participants
Rathan M. Subramaniam, MD,PhD, Dunedin, New Zealand (*Moderator*) Nothing to Disclose
Thomas A. Hope, MD, San Francisco, CA (*DPS Upload*) Research Grant, Koninklijke Philips NVAdvisory Board, Ipsen SAConsultant, CuriumResearcher, Advanced Accelerator Applications SA

Sub-Events

RC611A Pearls and Pitfalls

Participants
Geoffrey B. Johnson, MD,PhD, Rochester, MN (*Presenter*) Research Grant, General Electric CompanyResearch Grant, Pfizer Inc

RC611B Clinical Applications: Brain and Head and Neck

Participants
Alexander Drzezga, MD, Cologne, Germany (*Presenter*) Research support, Siemens AG; Consultant, Siemens AG; Speakers Bureau, Siemens AG; Stockholder, Siemens AG; Speakers Bureau, General Electric Company; Research support, General Electric Company; Consultant, General Electric Company; Research support, Life Molecular Imaging; Speakers Bureau, sanofi-aventis Group; Research support, Eli Lilly and Company;

RC611C Clinical Applications: Cardiac

Participants
Pamela K. Woodard, MD, Saint Louis, MO (*Presenter*) Research Grant, Siemens AGResearch Grant, F. Hoffmann-La Roche LtdConsultant, Medtronic plc

For information about this presentation, contact:

woodardp@wustl.edu

RC611D Clinical Applications: Body

Participants
Thomas A. Hope, MD, San Francisco, CA (*Presenter*) Research Grant, Koninklijke Philips NVAdvisory Board, Ipsen SAConsultant, CuriumResearcher, Advanced Accelerator Applications SA

For information about this presentation, contact:

thomas.hope@ucsf.edu

LEARNING OBJECTIVES

1) Review common current applications for abdominopelvic oncologic PET/MRI, including hepatic malignancies, rectal cancer, and cervical cancer. 2) Understand the role of novel tracers in prostate cancer (PSMA PET) and neuroendocrine tumors (somatostatin receptor PET). 3) Present the current limitations and future advances in PET/MRI that will help increase the clinical acceptance and applicability of body PET/MRI.

RC611E Clinical Applications: Pediatrics

Participants
Helen R. Nadel, MD, Palo Alto, CA (*Presenter*) Consultant, ICON plc

RC611F Physics & Technology

Participants
Georges El Fakhri, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

elfakhri@pet.mgh.harvard.edu

LEARNING OBJECTIVES

1) Understand current technology both in terms of instrumentation and imaging science as they pertain to PET/MR. 2) Understand the potential applications afforded by PET/MR technology developments (e.g., instrumentation, AI).

RC612

MR Angiography-New Techniques and Their Application

MR VA

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Thomas K. Foo, PhD, Niskayuna, NY (*Moderator*) Employee, General Electric Company
Michael D. Hope, MD, San Francisco, CA (*Moderator*) Nothing to Disclose

Sub-Events

RC612A 4D Flow MRA

Participants
Michael D. Hope, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review technical and clinical progress that has been made with 4D Flow MRA over the last 2 decades. 2) Discuss current and emerging clinical applications for 4D Flow.

RC612B PET-MR of Vascular Disease

Participants
Pamela K. Woodard, MD, Saint Louis, MO (*Presenter*) Research Grant, Siemens AGResearch Grant, F. Hoffmann-La Roche LtdConsultant, Medtronic plc

RC612C Phase Contrast MRA: Technology Advances and Impact of High Performance Gradients

Participants
Thomas K. Foo, PhD, Niskayuna, NY (*Presenter*) Employee, General Electric Company

For information about this presentation, contact:

thomas.foo@ge.com

RC612D Non-Contrast MRA

Participants
Robert R. Edelman, MD, Evanston, IL (*Presenter*) Research support, Siemens AG; Royalties, Siemens AG

RC613

Pediatric Safety, Quality, and AI

AI PD SQ

AMA PRA Category 1 Credit ™: .75

Sub-Events

RC613A Current State of AI Tools in Pediatric Radiology

Participants
Safwan Halabi, MD, Mountain View, CA (*Presenter*) Officer, InterfierceStockholder, DNAFeedAdvisor, Bunker Hill

RC613B Incorporating the Huddle in Your Daily Practice

Participants
Nadja Kadom, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

RC613C Learning Networks and Their Potential in the Setting of MR Safety

Participants
Ethan A. Smith, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the basic structure of a learning network. 2) To learn about the steps needed to start a learning network using a case example. 3) To understand some of the regulatory requirements and challenges of starting a learning network.

RC613D Navigating Ethical and Medicolegal Hazards in Your AI-powered Pediatric Safety and Quality Program

Participants
Nabile M. Safdar, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review existing frameworks and regulations which apply to AI in clinical practice, quality, and safety. 2) Understand basic questions surrounding privacy, confidentiality, epistemology, and inequities in AI. 3) Review patient attitudes towards AI and privacy issues.

RC614

Embolotherapy

IR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Bulent Arslan, MD, Oak Brook, IL (*Moderator*) Advisory Board, Medtronic plcAdvisory Board, Guerbet SASpeakers Bureau, Biocompatibles International plcSpeakers Bureau, C. R. Bard, IncAdvisory Board, Boston Scientific CorporationSpeakers Bureau, Boston Scientific CorporationSpeakers Bureau, Penumbra, IncSpeakers Bureau, Cook Group Incorporated
Theresa M. Caridi, MD, Birmingham, AL (*Moderator*) Consultant, Boston Scientific CorporationMedical Advisory Board, Boston Scientific CorporationResearch Grant, Embolx, IncShareholder, Embolx, IncSpeaker, Terumo CorporationMedical Advisory Board, Varian Medical Systems, Inc

Sub-Events

RC614A Endoleak Embolization

Participants
Brian J. Schiro, MD, Miami, FL (*Presenter*) Speaker, Penumbra, IncSpeaker, Medtronic plcResearch Grant, Medtronic plc

For information about this presentation, contact:

briansc@baptisthealth.net

LEARNING OBJECTIVES

1) Discuss endoleaks type and indications for treatment. 2) Understand treatment options for endoleak. 3) Review embolic agents used in treatment of type II endoleaks.

RC614B Pulmonary AVM Embolization

Participants
Bulent Arslan, MD, Oak Brook, IL (*Presenter*) Advisory Board, Medtronic plcAdvisory Board, Guerbet SASpeakers Bureau, Biocompatibles International plcSpeakers Bureau, C. R. Bard, IncAdvisory Board, Boston Scientific CorporationSpeakers Bureau, Boston Scientific CorporationSpeakers Bureau, Penumbra, IncSpeakers Bureau, Cook Group Incorporated

RC614C AVM Embolization

Participants
Anne Gill, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

RC614D Anatomy and Basic Technique for BRTO/BATO

Participants
Premal S. Trivedi, MD, Denver, CO (*Presenter*) Nothing to Disclose

RC614E Uterine Fibroid Embolization

Participants
Theresa M. Caridi, MD, Birmingham, AL (*Presenter*) Consultant, Boston Scientific CorporationMedical Advisory Board, Boston Scientific CorporationResearch Grant, Embolx, IncShareholder, Embolx, IncSpeaker, Terumo CorporationMedical Advisory Board, Varian Medical Systems, Inc

LEARNING OBJECTIVES

1) Evaluate patients for UAE and determine who is an appropriate candidate. 2) Provide appropriate summary of UAE risks, benefits, and alternatives. 3) Understand the limitations versus misperceptions regarding UAE. 4) Have the ability to discuss the major randomized comparative trials with regard to UAE versus other interventions. 5) Develop a strategy for patient and pain management post procedure.

RC614F Pelvic Congestion Syndrome: Embolization

Participants
Gloria M. Salazar, MD, Boston, MA (*Presenter*) Consultant, Medtronic plc

RC615

Breast MRI

BR MR

AMA PRA Category 1 Credit ™: 1.00

Participants
Wendy B. Demartini, MD, Stanford, CA (*Moderator*) Nothing to Disclose

Sub-Events

RC615A How to Improve Your Accuracy

Participants
Wendy B. Demartini, MD, Stanford, CA (*Presenter*) Nothing to Disclose

RC615B Incorporating Abbreviated MRI into Your Practice

Participants
Susan Weinstein, MD, Philadelphia, PA (*Presenter*) Consultant, Bracco Group

LEARNING OBJECTIVES

1. Discuss why AB-MR should be incorporated into your practice2. How to incorporate AB-MR into your practice

RC615C How to Interpret Abbreviated MRI

Participants
Janice S. Sung, MD, New York, NY (*Presenter*) Research Grant, General Electric Company

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106th Scientific Assembly and Annual Meeting
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RC616

Moving Past Burnout: Strategies Beyond Individual Interventions to Mitigate Work-related Stress and Promote Physician Wellness in Radiology (Sponsored by the RSNA Professionalism Committee)

LM

AMA PRA Category 1 Credit ™: .75

Participants
Rama S. Ayyala, MD, Cincinnati, OH (*Moderator*) Nothing to Disclose
Brandon P. Brown, MD, Indianapolis, IN (*Moderator*) Nothing to Disclose
Rama S. Ayyala, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose
Reed A. Omary, MD, Nashville, TN (*Presenter*) Nothing to Disclose
Cheri L. Canon, MD, Birmingham, AL (*Presenter*) Royalties, The McGraw-Hill Companies

For information about this presentation, contact:

ccanon@uabmc.edu

LEARNING OBJECTIVES

1) Understand the manifestations of burnout and recognize organizational causes that can be addressed to mitigate it. 2) Discuss the role of leadership in fostering a collegial and effective team to combat burnout and promote job satisfaction. 3) Describe the importance of a positive departmental culture in building physician resiliency as a long-term strategy to prevent burnout.

ABSTRACT

'Burnout' has been defined as psychological syndrome that arises in stressful work environments, has is frequently defined by three dimensions: emotional exhaustion, depersonalization, and perceived lack of accomplishment. In 2018, a survey of over 15000 physicians in 25 medical specialties showed that burnout among radiologists has climbed from the 18th to the 7th highest rate of burnout amongst all physicians, since a previous survey performed in 2013 (1). Burnout in medicine can be detrimental to quality and safety of patient care, and can lead to job dissatisfaction, decreased productivity, high physician turnover, and ultimately can contribute to physician shortages and increasing health care costs (2). Another critical consequence of burnout in medicine is the impact on physician mental health, with studies showing burnout associated with increased depression, substance abuse, and suicide in physicians (3). Although awareness of work-related stress in medicine has been present for decades, more recent changes to patterns of patient care through technological advances such as the electronic medical record (EMR) and Picture Archiving and Communication Systems (PACS), have increased that burden of stress. These innovations have certainly improved aspects of patient care, however they have also contributed to two potential causes of burnout such as heightened sense of isolation and sedentary work environments. In light of the increasing awareness of this issue in radiology, this refresher course, sponsored by the RSNA Professionalism Committee, will highlight organizational strategies can be developed and implemented to mitigate the sources of burnout, in order to help radiologists rediscover joy in their work and the satisfaction that can come through awareness of our impact.

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RC618

Cases in Body Oncologic Imaging that I Have Learned the Most From

CT MR OI US

Participants
Iva Petkovska, MD, New York, NY (*Moderator*) Nothing to Disclose
Luigi Aloj, MD, Cambridge, United Kingdom (*DPS Upload*) Nothing to Disclose

For information about this presentation, contact:

es220@cam.ac.uk

Sub-Events

RC618A Ultrasound

Participants
Deborah J. Rubens, MD, Rochester, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review some commonly performed examinations where US leads to oncologic diagnosis. 2) Identify those technical parameters which are critical to accurate ultrasound performance, especially color and spectral Doppler, as exemplified by pitfalls and 'missed' cases. 3) Explore the role of US in management of oncologic patients, including contrast enhanced ultrasound.

RC618B Magnetic Resonance Imaging

Participants
Richard Kinh Gian Do, MD,PhD, New York, NY (*Presenter*) Author, Reed ElsevierSpouse, Author, Wolters Kluwer nvSpouse, Data Monitoring Committee, Alk AbelloSpouse, Consultant, JDP Therapeutics

For information about this presentation, contact:

dok@mskcc.org

LEARNING OBJECTIVES

1) Assess the role of diffusion weighted imaging in oncology. 2) Explain the presence of susceptibility artifacts on different MRI sequences. 3) Compare the use of extracellular and hepatobiliary contrast agents for liver MRI.

RC618C PET/CT

Participants
Luigi Aloj, MD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Biochemical characterisation of cancer through PET imaging. 2) How combinations of radiopharmaceuticals may be relevant to diagnosis. 3) Tumour heterogeneity as detected by PET and implications for patient management. 4) The role of PET/CT in theragnostics.

RC621

Innovations in MR

MR PH

AMA PRA Category 1 Credits ™: 1.25

FDA Discussions may include off-label uses.

Participants
Matthew A. Bernstein, PhD, Rochester, MN (*Moderator*) Former Employee, General Electric Company; Intellectual property, General Electric Company

LEARNING OBJECTIVES

1) Review newer techniques that can be used to accelerate MR including simultaneous multislice (SMS), compressed sensing, and MR fingerprinting. 2) Review the basic principles of chemical exchange saturating transfer, and discuss its emerging applications. 3) Review recent advances in novel MR systems, including low cryogen magnets, dedicated and compact systems.

Sub-Events

RC621A New Directions in Fast MR

Participants
Kawin Setsompop, Charlestown, MA (*Presenter*) Research Grant, Siemens AG Royalties, General Electric Company Royalties, Koninklijke Philips NV Scientific Advisory Board, Kineticor

LEARNING OBJECTIVES

1) Describe emerging MR acquisition approaches and their ability to provide faster and higher quality imaging. 2) Identify the most suitable acquisition approach for improving the quality of various imaging sequences/clinical applications.

RC621B New Directions in AI and Machine Learning for MR

Participants
Florian Knoll, New York, NY (*Presenter*) Facebook AI research: Research partnership, Siemens Healthcare: Research partnership, Amazon Web Services: Dataset grant

For information about this presentation, contact:

florian.knoll@nyumc.org

LEARNING OBJECTIVES

1) Define the theoretical foundations of machine learning. 2) Choose the appropriate (deep) model for their particular research question. 3) Describe example applications in MRI where machine learning can be used. 4) Recognize limitations and challenges of using machine learning in emerging applications. 5) Discuss the potential clinical impact of machine learning on the field of MRI.

ABSTRACT

Recent basic science developments in optimization and machine learning, as well as widespread access to powerful computing resources and large datasets have the potential to change the way medical imaging is performed. I will discuss the potential to make MR imaging faster, cheaper, easier to use, more patient friendly and accessible, and to obtain new information. I will cover both methodological developments as well as clinical translation and validation and discuss ongoing developments as well as currently open research questions and potential pitfalls of the methodology.

RC621C New Directions in MR Scanners

Participants
Yunhong Shu, PhD, Rochester, MN (*Presenter*) Patent agreement, General Electric Company

LEARNING OBJECTIVES

1) List a variety of emerging technologies for MRI scanner design. 2) Understand major driving forces for these technology advancements. 3) Identify the advantages and suitable applications for specific MR scanners.

RC622

Dual Energy CT for Proton Therapy Applications

CT PH RO

Participants
Jon J. Kruse, PhD, Rochester, MN (*DPS Upload*) Nothing to Disclose
Kristy K. Brock, PhD, Houston, TX (*Moderator*) Grant, RaySearch Laboratories AB; License agreement, RaySearch Laboratories AB; Research support, Mirada Medical Ltd

Sub-Events

RC622A Clinical Need for Dual Energy CT in Proton Radiotherapy

Participants
Jon J. Kruse, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about calibration of Hounsfield Units for determination of relative stopping power for proton therapy planning. 2) Discuss potential sources of error in stopping power determination. 3) Describe treatment planning strategies to mitigate range uncertainties in proton therapy planning.

RC622B State of the Art in Dual Energy CT Technology

Participants
Jessica Miller, PhD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain basic dual-energy CT principles. 2) Compare current dual-energy CT techniques and associated relative electron density and effective atomic number information.

ABSTRACT

With dual-energy computed tomography (DECT), an additional measurement is obtained, allowing for the reconstruction of supplementary information, such as relative electron density and effective atomic number information. The additional information gained through DECT has potential to aid in several aspects of the radiation therapy process, including improving dose calculation accuracy for proton therapy. This course will discuss the basic principles of DECT and compare different vendor solutions for acquisition of DECT images.

RC622C Technical Challenges in the Integration of Dual Energy CT into Radiotherapy Treatment Planning

Participants
Jon J. Kruse, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Compare range uncertainty to other sources of dosimetric error in proton therapy. 2) Observe clinical examples of range variation in proton therapy.

RC623

MR Safety II

MR PH SQ

CME credit is not available for this session.

FDA Discussions may include off-label uses.

Participants
Emanuel Kanal, MD, Pittsburgh, PA (*Moderator*) Nothing to Disclose

Sub-Events

RC623A The American Board of MR Safety: Standardization and Certification

Participants
Heidi A. Edmonson, PhD, Rochester, MN (*Presenter*) Nothing to Disclose

RC623B The ACR Manual on MR Safety: The New Standard for 2020 and Beyond

Participants
Michael N. Hoff, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mnhoff@uw.edu

LEARNING OBJECTIVES

1) describe updated and new recommendations from the ACR for practicing MRI safety. 2) Apply ACR MRI safety guidance to their local facilities. 3) Identify new imaging environments and their requisite unique MRI safety considerations. 4) Define terminology for use in assessing MRI safety.

RC623C Philips Medical: Advancing Safety in MR Imaging and Environments

Participants
Johan Van den Brink, Best, Netherlands (*Presenter*) Employee, Koninklijke Philips NV

RC623D Siemens Medical: Advancing Safety in MR Imaging and Environments

Participants
Gudrun Ruyters, Erlangen, Germany (*Presenter*) Employee, Siemens AG

For information about this presentation, contact:

gudrun.ruyters@siemens-healthineers.com

LEARNING OBJECTIVES

1) MR safety relevant topics for MR imaging at Siemens Healthcare.2) understand gradient safety on high-performance gradient systems

RC623E Canon Medical: Advancing Safety in MR Imaging and Environments

Participants
Michael Steckner, PhD, Beachwood, OH (*Presenter*) Employee, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Learning about activities that Canon Medical undertakes to advance safety in MRI.

RC623F GE Healthcare: Advancing Safety in MR Imaging Environments

Participants
Saban Kurucay, Waukesha, WI (*Presenter*) Employee, General Electric Company

RC623G Hitachi Healthcare: Advancing Safety in MR Imaging and Environments

Participants
Shawn Etheridge, Twinsburg, OH (*Presenter*) Employee, Hitachi, Ltd

LEARNING OBJECTIVES

1) Understand Hitachi's support of research into potential reduction of RF heating effects in certain implantable devices with transverse field MR as compared to horizontal field MR.

RC627

Objection! Medicolegal Issues for Today's Radiologist

HP

Participants
Jonathan Mezrich, MD, Guilford, CT (*Moderator*) Nothing to Disclose
Jonathan Mezrich, MD, Guilford, CT (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Be aware of common medico-legal issues involved in radiology. 2) Be aware of potential legal/risk management issues involved in the use of Gadolinium. 3) Understand some of the liability risks inherent in communication of significant unexpected findings. 4) Be aware of tips to avoid malpractice exposure. 5) Understand the impact of lawsuits in emergency medicine and its impact on imaging.

Sub-Events

RC627A Gadolinium: An Emerging Risk-management Threat?

Participants
H. Benjamin Harvey, MD, JD, Nahant, MA (*Presenter*) Nothing to Disclose

RC627B Risky Business: Lawsuits in Emergency Medicine and Their Effects on Imaging

Participants
Saurabh Jha, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

RC627C Hiding in the Hedges: Tips to Minimize Your Malpractice Risk as a Radiologist

Participants
Jonathan Mezrich, MD, Guilford, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Better understand the risks of malpractice inherent in radiology practice. 2) Be aware of several tips to incorporate into daily practice to limit malpractice exposure.

RC629

MRI O-RADS

Thursday, Dec. 3 8:30AM - 9:30AM Room: Channel 5

GU MR OB

AMA PRA Category 1 Credit ™: 1.00

Participants
Caroline Reinhold, MD, MSc, Westmount, QC (*Moderator*) Nothing to Disclose

Sub-Events

RC629A Overview and Technique

Participants
Andrea G. Rockall, FRCR,MRCP, London, United Kingdom (*Presenter*) Speaker, Guerbet SA

LEARNING OBJECTIVES

1) To introduce MRI O-RADS (Ovarian-Adnexal Reporting and Data Systems). 2) To review the MRI O-RADS governing concepts. 3) To know the main terms for O-RADS MRI scores 0 and 1. 4) To understand the application of O-RADS MRI scores 0 and 1 to adnexal masses and the associated risk of malignancy. 5) To recognize O-RADS MRI score 1 lesions by review of cases.

RC629B O-RADS 1-2

Participants
Evan S. Siegelman, MD, Media, PA (*Presenter*) Advisory Board, Spreemo HealthConsultant, BioClinica, IncConsultant, ICON plcConsultant, inviCRO, LLC

LEARNING OBJECTIVES

1) Describe the MR terms that characterize adnexal lesions that are almost certainly benign (O-RADS 2). 2) Identify those MR imaging features that would upgrade an adnexal lesion to a higher O-RADS category. 3) Illustrate MR imaging examples of O-RADS 2 lesion such as endometrioma, cystadenoma, mature cystic teratoma, hydrosalpinx and peritoneal inclusion cyst.

RC629C O-RADS 3

Participants
Isabelle Thomassin-Naggara, MD, Paris, France (*Presenter*) Researcher, General Electric CompanyResearch funded, General Electric CompanyResearcher, Canon Medical Systems CorporationResearch funded, Canon Medical Systems CorporationResearch funded, Hologic, IncResearch funded, Siemens AGResearch funded, Guerbet SA

LEARNING OBJECTIVES

1) To combine all useful MR features to characterize indeterminate adnexal masses. 2) To describe how to perform DCE MR analysis on solid tissue. 3) To identify how lesions should be classified O-RADS 3. 4) To specify which adnexal lesions will be rated O-RADS 3

RC629D O-RADS 4-5

Participants
Andrea G. Rockall, FRCR,MRCP, London, United Kingdom (*Presenter*) Speaker, Guerbet SA

LEARNING OBJECTIVES

1) To know the main terms for O-RADS MR score 3. 2) To be familiar with the application of O-RADS MR score 3 to adnexal masses. 3) To recognise O-RADS MR score 3 lesions by review of cases.

ABSTRACT

The preponderant contribution of MRI in adnexal mass evaluation is its specificity because it provides confident diagnosis of many benign adnexal lesions A standardization of the MR reporting may allow a tailored, patient-centered approach, allowing avoidance of over-extensive surgery and/or fertility preservation where appropriate, whilst ensuring early detection of lesions with high likelihood of malignancy. O-RADS classification is accurate and based on 5 categories related to the rik of malignancy. An adnexal lesion with a solid tissue that enhances according a time intensity curve type 2 or 3 or which is associated with peritoneal implants should be categorized O-RADS 4 or 5. A lesion classified O-RADS 5 has a risk of malignangy higher than 95% and must be referred to a gynecological oncologist

RC629E Case Review

Participants
Elizabeth A. Sadowski, MD, Madison, WI (*Presenter*) Nothing to Disclose
Caroline Reinhold, MD, MSc, Westmount, QC (*Presenter*) Nothing to Disclose

RC632

It's Not Only Price but Quality: Consumer Facing Radiology

Tuesday, Dec. 1 5:00PM - 6:00PM Room: Channel 5

LM RS

AMA PRA Category 1 Credit ™: .50

Sub-Events

RC632A Price Transparency: Is it Hype or Reality?

Participants
Yoshimi Anzai, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

RC632B Financial Toxicity: What Radiologists Need to Know

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

rcarlos@med.umich.edu

LEARNING OBJECTIVES

1) Understand sources and impact of patient-level financial toxicity as an adverse event of screening, diagnosis and treatment.

RC632C Quality in Radiology: What Difference Does It Make?

Participants
David J. Seidenwurm, MD, Carmichael, CA (*Presenter*) Shareholder, Sutter Medical Group Shareholder, RASMG Medical Group Director, RASMG Medical GroupExpert Witness, Medical Legal

RC632D The Financial Impact of Payment Reform on Radiology

RC653

Novel Discoveries Using the NCI's Cancer Imaging Archive (TCIA) Public Data Sets

Tuesday, Dec. 1 2:00PM - 3:00PM Room: Channel 3

IN OI

AMA PRA Category 1 Credit ™: 1.00

Participants
Fred W. Prior, PhD, Little Rock, AR (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

FWPrior@uams.edu

LEARNING OBJECTIVES

1) Gain a general understanding of the scope and mission of The Cancer Imaging Archive (TCIA).2) Obtain a detailed understanding of how to leverage several of TCIA's now and most popular data sets.3) Learn about some of the major scientific discoveries that have resulted from these data.

ABSTRACT

This session will highlight popular data sets published by and major projects utilizing NCI's Cancer Imaging Archive (TCIA) with presentations from leading researchers and data contributors. Attendees will also learn about a number of new, major NIH data collection initiatives that are ongoing or coming in the near future which they can leverage in their own research.

ABSTRACT

This session will highlight popular data sets published by and major projects utilizing NCI's Cancer Imaging Archive (TCIA) with presentations from leading researchers and data contributors. Attendees will also learn about a number of new, major NIH data collection initiatives that are ongoing or coming in the near future which they can leverage in their own research.

Sub-Events

RC653A An Introduction to the Cancer Imaging Archive

Participants
Justin Kirby, Rockville, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the scope and mission of The Cancer Imaging Archive. 2) Gain a high level understanding of TCIA services and functionality. 3) Learn about new NIH data collection initiatives that will be generating high-value resources for the imaging research community.

ABSTRACT

This session will provide a brief introduction to The Cancer Imaging Archive (TCIA) to set the stage for more detailed presentations from the remaining speakers about popular data sets stored in TCIA and the novel discoveries that have resulted from them.

RC653B Identifying the Best Machine Learning Algorithms for Brain Tumor Segmentation, Progression Assessment, and Overall Survival Prediction in the BRATS Challenge

Participants
Spyridon Bakas, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sbakas@upenn.edu

RC653C Bone Marrow and Tumor Radiomics at (18)F-FDG PET/CT: Impact on Outcome Prediction in Non-small Cell Lung Cancer

Participants
Sarah Mattonen, PhD, London, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sarah.mattonen@uwo.ca

RC653D Open Access Publication of Covid-19 Image Data

Participants
Fred W. Prior, PhD, Little Rock, AR (*Presenter*) Nothing to Disclose

RC653E Revealing Tumor Habitats from Texture Heterogeneity Analysis for Classification of Lung Cancer Malignancy and Aggressiveness

Participants
Dmitry Cherezov, MS, Cleveland, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Characterize tissue represented by CT screen using texture features. 2) Estimate the number of habitats within a nodule. 3) Estimate malignancy of habitats within a dataset. 4) Represent heterogeneity of a nodule as quantitative features for its diagnosis.

ABSTRACT

We propose an approach for characterizing structural heterogeneity of lung cancer nodules using Computed Tomography Texture Analysis (CTTA). Measures of heterogeneity were used to test the hypothesis that heterogeneity can be used as predictor of nodule malignancy and patient survival. To do this, we use the National Lung Screening Trial (NLST) dataset to determine if heterogeneity can represent differences between nodules in lung cancer and nodules in non-lung cancer patients. 253 participants are in the training set and 207 participants in the test set. To discriminate cancerous from non-cancerous nodules at the time of diagnosis, a combination of heterogeneity and radiomic features were evaluated to produce the best area under receiver operating characteristic curve (AUROC) of 0.85 and accuracy 81.64%. Second, we tested the hypothesis that heterogeneity can predict patient survival. We analyzed 40 patients diagnosed with lung adenocarcinoma (20 short-term and 20 long-term survival patients) using a leave-one-out cross validation approach for performance evaluation. A combination of heterogeneity features and radiomic features produce an AUROC of 0.9 and an accuracy of 85% to discriminate long- and short-term survivors.

Printed on: 05/05/21

RC654

Patient-centric Radiology: How to Do It

AI ED HP IN

Participants
James V. Rawson, MD, Boston, MA (*Moderator*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*Moderator*) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about implementation of patient-centered radiology into your practice - translating your reports into patient's language, having your phone number in the report, using open reports, leveraging informatics, improving customer service.

Sub-Events

RC654A AI for Patient-centered Imaging

Participants
Bhavik N. Patel, MD, Stanford, CA (*Presenter*) Speakers Bureau, General Electric CompanyResearch Grant, General Electric Company

RC654B Patient-centered Radiology Training: How-to Guide

Participants
Carolynn M. DeBenedectis, MD, Natick, MA (*Presenter*) Nothing to Disclose

RC654C Translating Radiology Report to Patient's Language

Participants
Arun Krishnaraj, MD, MPH, Charlottesville, VA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the barriers to creating reports whose primary audience is patients. 2) Generate reports that are accessible to patients without a background in healthcare. 3) Assess the benefits of serving an often overlooked stakeholder.

ABSTRACT

The final product of a radiologist's work is the creation and dissemination of the radiology report. However, patients, who are the direct beneficiary of the output and decision making that occurs because of the content of the report, are rarely considered customers by the radiologists and their needs are often overlooked. This can lead to frustration on behalf of patients and a lack of shared decision making. To address this shortcoming, the session will discuss the barriers to creating radiology reports tailored to patients, tips for creating effective patient centereed reports, and the positive impact patient centered reports can have on the patient expereince.

RC654D Using Informatics to Transform Radiology to Patient-centered Practice

Participants
Seth J. Berkowitz, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC654E Improving Customer Service in Radiology

Participants
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed ElsevierGrant, Guerbet SAConsultant, Anderson Publishing, LtdAdvisory Board, IBM CorporationAdvisory Board, KLAS Enterprises LLC

LEARNING OBJECTIVES

1) List the five dimensions of Service Quality. 2) Describe examples of a quality improvement project that focuses on each of the five dimensions of service quality.

ABSTRACT

Radiology is a service-oriented specialty. The purpose of this lecture is to introduce the five dimensions of service quality. Examples of customer service initiatives will be provided to illustrate each of the service quality dimensions.

RC654F Radiologists' Experience with Open Radiology Reports

Participants
Olga R. Brook, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn about impact of open radiology reports on radiologist workflow in a large academic institution where open reports has been in practice for more than 10 years.

RC654G My Experience with Providing Direct Phone Line in Radiology Report

Participants
Jennifer L. Kemp, MD, Denver, CO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List the benefits of including radiologist contact information at the bottom of reports. 2) List potential obstacles to including radiologist contact information at the bottom of reports. 3) Develop a similar program of including contact information for radiologists in their own practices.

Printed on: 05/05/21

RC701

Thoracic Disease in the Community: A Practical Approach

CH

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC701A Idiopathic Interstitial Pulmonary Fibrosis: What We Need to Know

Participants
Gustavo S. Meirelles, MD,PhD, Sao Paulo, Brazil (*Presenter*) Partner, Ambra Saude; Stockholder, Fleury SA; Advisory Board, Boehringer Ingelheim GmbH; Partner, Datalife.ai; Partner, Bright Photomedicine;

For information about this presentation, contact:

gmeirelles@gmail.com

LEARNING OBJECTIVES

1) To be aware of the main clinical aspects of idiopathic interstitial pulmonary fibrosis (IPF). 2) To recognize the main patterns of usual interstitial pneumonia (UIP) on HRCT. 3) To understand the main signs on HRCT for differential diagnosis between UIP related to IPF and other interstitial lung diseases, such as non-specific interstitial pneumonia, UIP related to collagen-vascular diseases and hypersensitity pneumonitis. 4) To be knowledgeable about the algorithm for evaluation of patients with clinical suspicion of IPF. 5) To understand the role of HRCT and surgical lung biopsy, in conjonction with multidisciplinary discussion, for diagnosis of IPF.

RC701B Smoking-related Interstitial Lung Diseases

Participants
Carolina A. Souza, MD, Ottawa, ON (*Presenter*) Speaker, Pfizer IncSpeaker, Boehringer Ingelheim GmbHSpeaker, AstraZeneca PLCSpeaker, F. Hoffmann-La Roche LtdGrant, Boehringer Ingelheim GmbHAdvisory Board, AstraZeneca PLCAdvisory Board, Boehringer Ingelheim GmbHEducational Grant, Boehringer Ingelheim GmbH

LEARNING OBJECTIVES

1) Describe the spectrum of smoking-related interstitial lung diseases and their clinical manifestations. 2) Recognize the high-resolution CT appearances of smoking-related interstitial lung diseases. 3) Identify the most common imaging differential diagnoses of smoking-related interstitial lung diseases.

RC701C Connective Tissue Disease-related Interstitial Lung Disease

Participants
Kimberly G. Kallianos, MD, San Rafael, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand clinical workup of patients with suspected connective tissue disease related interstitial lung disease. 2) Increase comfort with synthesizing relevant serologic data. 3) Recognize key HRCT patterns seen in connective tissue disease related interstitial lung disease including nonspecific interstitial pneumonia (NSIP), organizing pneumonia (OP), NSIP/OP overlap, and lymphocytic interstitial pneumonia (LIP), as well as CTD-related usual interstitial pneumonia pattern.

RC701D Lung Transplantation: A Primer for Radiologists in the Community

Participants
Micheal McInnis, MD, Toronto, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the normal appearance and natural history of lung transplantation. 2) Identify the early pulmonary complications of lung transplantation. 3) Compare the obstructive and restrictive phenotypes of chronic lung allograft dysfuction (CLAD). 4) Identify other late complications of lung transplantation.

RC701E Lung Cancer Survivorship

Participants
Jana L. Taylor, MD, Montreal, QC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jana.taylor@mcgill.ca

LEARNING OBJECTIVES

1) Understand the concept of lung cancer survivorship and how this population will potentially be impacted by lung cancer screening. 2) Recognize the timing, appearace and incidence of local recurrence and second primary malignancies in this population. 3) Be aware of the current follow up recommendations for lung cancer survivors and the exisiting knowledge gaps for this population.

RC701F Imaging and Management of Pleural Diseases

Participants
Ashish Gupta, MBBS, Ottawa, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify signs of pleural abnormalities on cross sectional studies. 2) Differentiate between benign and malignant pleural lesions. 3) Provide clinically relevant differential diagnosis of pleural abnormalities.

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RC702

Mentoring and Coaching in Radiology

ED

Participants
Andrew J. Gunn, MD, Vestavia Hills, AL (*Moderator*) Consultant, BTG International LtdConsultant, Terumo CorporationConsultant, Penumbra, IncResearch support, Penumbra, Inc
Andrew J. Gunn, MD, Vestavia Hills, AL (*DPS Upload*) Consultant, BTG International LtdConsultant, Terumo CorporationConsultant, Penumbra, IncResearch support, Penumbra, Inc

LEARNING OBJECTIVES

1) Recognize advising as a component of career development at all stages. 2) Understand differences between coaching, mentoring, and teaching. 3) Describe key aspects of coaching in radiology.

Sub-Events

RC702A Coaching, Teaching and Mentoring in Radiology

Participants
Andrew J. Gunn, MD, Vestavia Hills, AL (*Presenter*) Consultant, BTG International LtdConsultant, Terumo CorporationConsultant, Penumbra, IncResearch support, Penumbra, Inc

RC702B Coaching Medical Students

Participants
Paul J. Rochon, MD, Denver, CO (*Presenter*) Speaker, Penumbra, IncAdvisory Board, Medtronic plc Speaker, Medtronic plc

LEARNING OBJECTIVES

1) To provide tools necessary to effectively coach medical students. 2) To discuss opportunities to be a better coach for medical students.

ABSTRACT

n/a

RC702C Coaching Radiology Residents

Participants
Jennifer W. Uyeda, MD, Somerville, MA (*Presenter*) Consultant, Allena Pharmaceuticals, Inc

RC702D Coaching Female Radiologists

Participants
Lucy B. Spalluto, MD,MPH, Nashville, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lucy.b.spalluto@vumc.org

LEARNING OBJECTIVES

1) Provide brief historical perspective of gender in radiology. 2) Discuss importance of diversity and inclusion in radiology. 3) Describe professional development programs and other opportunities to sponsor, coach, and mentor women in radiology and in leadership roles.

RC702E Coaching Under-represented Minorities in Radiology

Participants
Jason W. Stephenson, MD, Madison, WI (*Presenter*) Nothing to Disclose

RC702F Coaching Junior Faculty

Participants
Jessica B. Robbins, MD, Madison, WI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Ennumerate career development needs of junior faculty. 2) Describe approaches to meeting career development needs of junior faculty.

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RC703

Cardiac Cases: From Basic to Advanced

CA

AMA PRA Category 1 Credit ™: 1.00

Participants
Jill E. Jacobs, MD, New York, NY (*Moderator*) Nothing to Disclose
Smita Patel, FRCR,MBBS, Ann Arbor, MI (*Presenter*) Nothing to Disclose
Sachin S. Saboo, MD, FRCR, San Antonio, TX (*Presenter*) Nothing to Disclose
Daniel Ocazionez-Trujillo, MD, Houston, TX (*Presenter*) Nothing to Disclose
Sanjeev Bhalla, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

saboo100@gmail.com

LEARNING OBJECTIVES

To review key clinical and imaging features of 4 Basic to Advanced Cardiac casesDiscuss imaging based differential diagnosis of these cases

Printed on: 05/05/21

RC704

Interpreting Musculoskeletal Radiographs: A Master Class

MK

AMA PRA Category 1 Credit ™: 1.00

Participants
Mini N. Pathria, MD, La Jolla, CA (*Moderator*) Nothing to Disclose

Sub-Events

RC704A Errors and Misses: Testing Your Eyes

Participants
Yulia Melenevsky, MD, Vestavia, AL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

yuliavm@gmail.com

LEARNING OBJECTIVES

Understand and categorize errors in RadiologyDifferentiate perceptual and interpretive errorsLearn strategies to reduce errors in practice

RC704B Vexing Normal Variants

Participants
Mark W. Anderson, MD, Charlottesville, VA (*Presenter*) Nothing to Disclose

RC704C Shoulder Radiographs in the ER: Adding Value

Participants
Mini N. Pathria, MD, La Jolla, CA (*Presenter*) Nothing to Disclose

RC704D Wrist Radiographs: What Can You See?

Participants
Tetyana A. Gorbachova, MD, Huntingdon Valley, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gorbacht@einstein.edu

LEARNING OBJECTIVES

1) Review normal wrist anatomy on various radiographic projections and describe checklist for interpretation of clinical images. 2) Identify common pitfalls in diagnosis of wrist injuries on radiographs.

RC704E Hip and Femur Radiography: Up Your Game

Participants
Robert D. Boutin, MD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review pearls of wisdom (systematic approach). 2) Recognize diagnostic pitfalls (hotspots for errors).

RC704F Knee Radiographs: Read Like a Jedi

Participants
David A. Rubin, MD, Saint Louis, MO (*Presenter*) Scientific Advisory Board, ImageBiopsy Lab

LEARNING OBJECTIVES

1) Understand how the positioning used for standard knee radiographs influences the appearance of common pathologic entities. 2) Recognize the subtle radiographic clues of commonly mis-diagnosed knee disorders.

RC705

Quantitative Techniques for Neuroradiologists

BQ NR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Joseph A. Maldjian, MD, Dallas, TX (*Moderator*) Consultant, BioClinica, Inc
Haris I. Sair, MD, Baltimore, MD (*Moderator*) Nothing to Disclose

Sub-Events

RC705A The Role of Quantitative Imaging in Mild Traumatic Brain Injury

Participants
Esther L. Yuh, MD, PhD, San Francisco, CA (*Presenter*) Nothing to Disclose

RC705B Quantitative Feature Extraction and Integration for Prediction Using Artificial Intelligence

Participants
Reza Forghani, MD,PhD, Cote Saint-Luc, QC (*Presenter*) Researcher, General Electric CompanyInstitutional research collaboration, General Electric CompanyConsultant, General Electric CompanySpeaker, General Electric Company Founder, 4intelligent IncStockholder, 4intelligent IncStockholder, Real-Time Medical, Inc

For information about this presentation, contact:

reza.forghani@mcgill.ca

LEARNING OBJECTIVES

1) Will become familiar with higher order image based quantitative features and their potential role in quantitative biomarker development for future diagnostic assistant and prediction tools. 2) Will be introduced to the concept of knowledge-driven vs. data-driven approaches for image analysis. 3) Will be introduced to the machine learning subfield of artificial intelligence and its applications for image analysis and predictive modelling. 4) Will become familiar with the major steps in development of a predictive algorithm or classifier, including feature extraction and classifier functions. 5) Understand the difference between hand-crafted (or hand-engineered) features and deep extracted features. 6) Will become familiar with advantages and disadvantages of classic machine learning and deep neural networks for constructing prediction algorithms. 7) Will understand the strengths of more traditional (non-AI) vs AI-based approaches and how such information may be combined. 8) Will be briefly introduced to future applications and use of AI for integration of multi-dimensional omics data consisting of image and non-image-based features.

ABSTRACT

There has been long-standing interest for greater use of quantitative parameters for image analysis and decision support in the clinical setting. However, the impressive advances in computational power and development of robust artificial intelligence (AI) approaches and machine learning tools in the last decade have opened new horizons for the implementation and use of these tools for image analysis and quantitative biomarker development. In this lecture, the essentials of biomarker development using AI, specifically the subfield of machine learning, will be reviewed. The participant will be introduced to the major steps in development of a prediction algorithm, focusing on feature extraction (image analysis) and predictive algorithm or classifier development. More traditional (non-AI) and AI approaches will be contrasted, including a discussion of their respective strengths and potential for combined use. The lecture will conclude with a brief discussion of use of AI for integration of multi-dimensional omics data consisting of image and non-image-based features.

RC705C Flow and Metabolic Measurement in Cerebrovascular Disease

Participants
Laura B. Eisenmenger, MD, Middleton, WI (*Presenter*) Nothing to Disclose

RC706

Optimizing Your Head and Neck Protocols

HN NR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Sub-Events

RC706A Optimizing Temporal Bone MR

Participants
Joseph M. Hoxworth, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hoxworth.joseph@mayo.edu

LEARNING OBJECTIVES

1) Appraise the adequacy of CT and MRI protocols for temporal bone imaging. 2) Modify temporal bone CT and MRI protocols based on specific clinical indications.

RC706B Optimizing Head and Neck PET/MRI

Participants
Greg D. Avey, MD, Madison, WI (*Presenter*) Research Consultant, General Electric Company

RC706C Optimizing Brachial Plexus MR

Participants
Carlos H. Torres, MD,FRCPC, Ottawa, ON (*Presenter*) Nothing to Disclose

RC706D Optimizing Parathyroid CT

Participants
C. Douglas Phillips, MD, New York, NY (*Presenter*) Nothing to Disclose

RC706E Optimizing CSF Leak Protocol

Participants
Kristen L. Baugnon, MD, Brookhaven, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kmlloyd@emory.edu

LEARNING OBJECTIVES

1. To determine the optimal imaging modality for suspected skull base CSF leak.2. Provide with techniques to optimize cisternography imaging protocols and interpret these examinations.

RC706F Optimizing Cranial Nerve MR

Participants
Bruno A. Policeni, MD, Iowa City, IA (*Presenter*) Nothing to Disclose

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RC707

Novel Anti-cancer Agents in Genitourinary Malignancies: What Your Reports Should Include

GU OI

AMA PRA Category 1 Credit ™: 1.00

Participants
Priya R. Bhosale, MD, Bellaire, TX (*Presenter*) Nothing to Disclose
Andrew D. Smith, MD, PhD, Birmingham, AL (*Presenter*) CEO, AI Metrics LLC Owner, AI Metrics LLC CEO, Radiostics LLCOwner, Radiostics LLCCEO, Liver Nodularity LLC Owner, Liver Nodularity LLC Research Grant, General Electric CompanySpeaker, Canon Medical Systems CorporationSpeaker, AlgoMedica, Inc
Atul B. Shinagare, MD, Boston, MA (*Presenter*) Consultant, Arog Pharmaceuticals, IncConsultant, VirtualScopics, Inc

For information about this presentation, contact:

andrewdennissmith@uabmc.edu

LEARNING OBJECTIVES

1) Know the mechanisms of action and rationale behind use of various novel anticancer agents available to treat advanced renal, bladder, prostate and gynecologic malignancies. 2) Identify the typical and atypical patterns of tumor response with the novel anticancer agents using a combination of size-based, morphologic and immune-response criteria, and avoid common pitfalls in response assessment. 3) Detect adverse events and complications associated with the novel anticancer agents including immune-related adverse events, and understand the role of certain adverse events as imaging biomarkers.

ABSTRACT

Molecular targeted therapies, immune checkpoint inhibitors and hormonal therapies represent three classes of novel anticancer agents with distinct mechanisms of action, response patterns and toxicities. With the burgeoning use of these agents to treat advanced GU malignancies, the role of the radiologist as a key member of the treatment team has evolved. After attending this course, attendees will know how novel anticancer agents change the radiologic assessment of advanced genitourinary cancers, including their typical and atypical response patterns and common toxicities seen on imaging. This knowledge will inform the radiologists how to render appropriate reports of imaging exams and conduct an effective dialogue with the referring physicians about the management of genitourinary cancers.

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RC708

Mass Casualty Imaging and Workflow: Be Prepared!

Friday, Dec. 4 8:30AM - 9:30AM Room: Channel 3

ER

AMA PRA Category 1 Credit ™: 1.00

Participants
Ferco H. Berger, MD, Toronto, ON (*Moderator*) Speaker, Siemens AG
Christopher A. Potter, MD, Boston, MA (*Presenter*) Nothing to Disclose
Eric Roberge, MD, Fox Island, WA (*Presenter*) Nothing to Disclose
Ferco H. Berger, MD, Toronto, ON (*Presenter*) Speaker, Siemens AG

For information about this presentation, contact:

fhberger@gmail.com

LEARNING OBJECTIVES

To illustrate the importance of excersises for preparedness of disaster responseTo emphasize the role radiology should play in these exercises to adequately train the systemTo discuss the various types of exercises that exist and provide examples

RC709

State-of-the-Art Pancreatic Imaging

Sunday, Nov. 29 2:00PM - 3:00PM Room: Channel 3

GI

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC709A Optimizing Pancreatic Imaging Techniques

Participants
Eric P. Tamm, MD, Houston, TX (*Presenter*) Institutional Research Grant, General Electric Company

LEARNING OBJECTIVES

1) Understand the different imaging techniques available for imaging the pancreas. 2) Learn how to optimize CT scanning for pancreatic pathology including dual energy imaging. 3) Learn how to optimize MRI scanning for pancreatic pathology. 4) Learn about NCCN guidelines for scanning CT and MRI for pancreatic cancer.

RC709B Staging of Pancreatic Cancer in the Era of Neoadjuvant Treatment

Participants
Marc Zins, MD, Paris CEDEX 14, France (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mzins@hpsj.fr

LEARNING OBJECTIVES

1) To understand when and why neoadjuvant chemoradiotherapy is recommended in patients with pancreatic cancer. 2) To understand the optimal approach to imaging patients post neoadjuvant chemoradiotherapy for pancreatic cancer. 3) To appreciate the spectrum of imaging findings in this patient group. 4) To learn how to accurately select patients for curative-intent surgery after Neoadjuvant therapy.

RC709C Imaging of Pancreatic Neuroendocrine Tumors

Participants
Desiree E. Morgan, MD, Birmingham, AL (*Presenter*) Institutional Research Grant, General Electric Company; Consultant, General Electric Company

For information about this presentation, contact:

dmorgan@uabmc.edu

LEARNING OBJECTIVES

1) Identify imaging features of pancreatic neuroendocrine tumors that help to differenctiate them from pancreatic ductal adenocarcinoma. 2) Compare appearances of pancreatic neuroendocrine tumors on different imaging modalities and specify clinical utility of the different imaging modality choices. 3) Understand World Health Organization 2017 classification of pancreatic neuroendocrine tumors and implications for staging and treatment of patients.

RC709D Current Diagnosis and Reporting of Acute Pancreatitis

Participants
Bhavik N. Patel, MD, Stanford, CA (*Presenter*) Speakers Bureau, General Electric CompanyResearch Grant, General Electric Company

RC710

Thyroid Sonography: At a Tipping Point

Friday, Dec. 4 10:00AM - 11:00AM Room: Channel 3

HN NR US

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

RC710A Advanced ACR TI-RADS: Rationale, Challenges, and Validation

Participants
Franklin N. Tessler, MD, Birmingham, AL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ftessler@uabmc.edu

LEARNING OBJECTIVES

1) Understand the rationale for using a risk stratification system for thyroid nodules2) Be familiar with studies that have validated ACR TI-RADS3) Know how to handle challenging aspects of ACR TI-RADS and implement ACR TI-RADS in your practice

RC710B Thyroid Sonography: Cases for Aces

Participants
William D. Middleton, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the superior thyroid artery and understand its implications in performing FNA and evaluating diffuse thyroid disease. 2) List the primary tumors most likely to metastasize to the thyroid and know their typical appearance. 3) Differentiate cystic changes and calcificaiton in the thyroid cartilage from nodal metastases.

RC710C After TI-RADS: Bethesda Classification and Molecular Studies

Participants
Mary C. Frates, MD, Sharon, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mfrates@bwh.harvard.edu

LEARNING OBJECTIVES

1) Describe the utility of the Bethesda classification for cytology interpretation. 2) Compare and contrast the different molecular testing options. 3) Explain how to manage nodules with indeterminate results.

RC710D Post-operative Surveillance of Thyroid Cancer

Participants
Michelle L. Melany, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the central role of ultrasound in current ATA guidelines for surveillance of differentiated thyroid carcinoma. 2) Review nodal zone classifications, pathways of spread, and ultrasound features of locally recurrent tumor/lateral compartment adenopathy. 3) Review epidemiology of thyroid carcinoma and recent impact of professional (endocrinology, pathology, radiology) society adoption of newer guidelines upon the thyroid carcinoma 'epidemic'.

RC712

Peripheral Artery Disease: CTA and MRA

Thursday, Dec. 3 10:00AM - 11:00AM Room: Channel 3

CT MR VA

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants

Constantino S. Pena, MD, Key Biscayne, FL (*Moderator*) Speakers Bureau, Cook Group IncorporatedSpeakers Bureau, Abbott LaboratoriesSpeakers Bureau, ShockWave MedicalSpeakers Bureau, Penumbra, IncSpeakers Bureau, Cardinal Health, IncSpeakers Bureau, C. R. Bard, IncAdvisory Board, SurModics, IncAdvisory Board, Boston Scientific CorporationAdvisory Board, Halyard Health, Inc

Stephan Clasen, MD, Reutlingen, Germany (*Moderator*) Nothing to Disclose

Sub-Events

RC712A Interventional Procedure Planning: Role for CTA and MRA

Participants

Constantino S. Pena, MD, Key Biscayne, FL (*Presenter*) Speakers Bureau, Cook Group IncorporatedSpeakers Bureau, Abbott LaboratoriesSpeakers Bureau, ShockWave MedicalSpeakers Bureau, Penumbra, IncSpeakers Bureau, Cardinal Health, IncSpeakers Bureau, C. R. Bard, IncAdvisory Board, SurModics, IncAdvisory Board, Boston Scientific CorporationAdvisory Board, Halyard Health, Inc

LEARNING OBJECTIVES

1) Understand the value of peripheral CTA and MRA. 2) Discuss the benefits of CTA in comparison to MRA in the treatment of PAD. 3) Comprehend the importance of MRA sequences to highlight particular details in peripheral MRA. 4) Understand the importance of image reconstruction for peripheral CTA and MRA.

RC712B Peripheral CTA

Participants

Stephan Clasen, MD, Reutlingen, Germany (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

clasen_s@klin-rt.de

LEARNING OBJECTIVES

1) Describe techniques for acquisition, reconstruction, and image interpretation of peripheral CTA. 2) Discuss available data and evidence-based results for peripheral CTA, and expected impact on patient care. 3) Compare advantages and drawbacks of lower extremity CTA in comparison to other imaging modalities and diagnostic tools for arterial occlusive disease.

RC712C Peripheral MR Angiography

Participants

James C. Carr, MD, Chicago, IL (*Presenter*) Research Grant, Siemens AGAdvisory Board, Siemens AGTravel support, Siemens AGResearch Grant, Bayer AGAdvisory Board, Bayer AGTravel support, Bayer AGSpeaker, Bayer AGResearch Grant, Guerbet SAAdvisory Board, Bracco Group

RC712D Interventional Complications: Role for CTA and MRA

Participants

Charles Y. Kim, MD, Durham, NC (*Presenter*) Consultant, Boston Scientific CorporationAdvisory Board, Boston Scientific CorporationConsultant, F. Hoffmann-La Roche LtdAdvisory Board, F. Hoffmann-La Roche LtdConsultant, Humacyte, IncConsultant, GlaxoSmithKline plc

For information about this presentation, contact:

charles.kim@duke.edu

LEARNING OBJECTIVES

1) Understand decision making for assessment of stent patency with CTA vs MRA. 2) Describe endovascular aneurysm repair with endografts as well as types of endoleaks and associated implications. 3) Discuss current methods for optimal detection endoleaks with CTA and MRA, with understanding of advantages and disadvantages.

RC713

Pediatric Emergencies

Monday, Nov. 30 2:00PM - 3:00PM Room: Channel 3

ER PD

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC713A Pediatric Airway Emergencies

Participants
Tara L. Holm, MD, Minneapolis, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize normal airway anatomy in infants and children. 2) Describe the imaging findings of common airway emergencies in infants and children. 3) Discuss the imaging workup for pediatric airway emergencies.

RC713B Pediatric Intraluminal Foreign Bodies

Participants
Jonathan R. Wood, MD, Honolulu, HI (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jonathan.r.wood.mil@mail.mil

LEARNING OBJECTIVES

1) Recognize that a coin sagittally oriented on a frontal chest radiograph is likely in the esophagus and not in the trachea. 2) Explain the advantages and pitfalls of expiratory and decubitus chest radiographs as well as chest CT for the evaluation of an aspirated foreign body. 3) Describe the potential complications of coin, button battery, and magnet ingestion. 4) Recognize that chronic esophageal foreign bodies can present in an atypical manner, with a confusing clinical picture, and result in potentially morbid long term complications.

RC713C Imaging of Adnexal Emergencies in Children

Participants
Leann E. Linam, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Provide a differential for adnexal emergencies in children. 2) identify ovarian torsion. 3) know normal and abnormal ovarian volumes and ratios.

RC713D Pediatric Testicular Emergencies

Participants
Nadia F. Mahmood, MD, Sugar Land, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

nfmahmoo@texaschildrens.org

RC714

Dialysis Interventions

GU IR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Bien Soo Tan, FRCR,MBBS, Singapore, Singapore (*Moderator*) Nothing to Disclose
Charles E. Ray JR, MD,PhD, Chicago, IL (*Moderator*) Consultant, Medtronic plc; Editor with royalties, Thieme Medical Publishers, Inc

Sub-Events

RC714A Introduction

Participants
Bien Soo Tan, FRCR,MBBS, Singapore, Singapore (*Presenter*) Nothing to Disclose
Charles E. Ray JR, MD,PhD, Chicago, IL (*Presenter*) Consultant, Medtronic plc; Editor with royalties, Thieme Medical Publishers, Inc

RC714B Central Venous Catheters in the Dialysis Patient

Participants
Bien Soo Tan, FRCR,MBBS, Singapore, Singapore (*Presenter*) Nothing to Disclose

RC714C Dialysis Circuit Abnormalities: Outflow

Participants
Matthew M. Niemeyer, MD, Chicago, IL (*Presenter*) Nothing to Disclose

RC714D Dialysis Circuit Abnormalities: Inflow

Participants
Charles E. Ray JR, MD,PhD, Chicago, IL (*Presenter*) Consultant, Medtronic plc; Editor with royalties, Thieme Medical Publishers, Inc

RC714E Advanced Dialysis Interventions

Participants
Je Hwan Won, MD, Suwon, Korea, Republic Of (*Presenter*) Nothing to Disclose

RC714H Conclusion

Participants
Bien Soo Tan, FRCR,MBBS, Singapore, Singapore (*Presenter*) Nothing to Disclose
Charles E. Ray JR, MD,PhD, Chicago, IL (*Presenter*) Consultant, Medtronic plc; Editor with royalties, Thieme Medical Publishers, Inc

RC716

Gender-based Harassment and Microaggressions (Sponsored by the RSNA Committee on Diversity, Equity & Inclusion)

Tuesday, Dec. 1 8:30AM - 9:30AM Room: Channel 5

HP LM

AMA PRA Category 1 Credit ™: .50

Participants

Courtney M. Tomblinson, MD, Nashville, TN (*Moderator*) Nothing to Disclose
Judy Yee, MD, New York, NY (*Moderator*) Research Grant, EchoPixel, Inc; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company

LEARNING OBJECTIVES

1) To define gender-based harassment and microaggressions . 2) To share real examples of gender-based harassment and microaggressions . 3) To increase awareness of the gender-based harassment. 4)To provide coping mechanism and strategy for managing microaggressions.

ABSTRACT

Microaggressions can be defined as 'the subtle yet harmful forms of discriminatory behaviors experienced by members of oppressed groups'1. Often times, one's identity can be the stimulus for harassment and microaggressions, which are amplified by intersectionality when an individual belongs to more than one oppressed group. Harassment and microaggressions have been shown to have an impact on mental health and well-being. Many groups are frequent recipients of microaggressions, including but not limited to, gender, race, class, sexual orientation, religion, and more. According to the 2019 Women in the Workforce study conducted by LeanIn.org and McKinsey & Co, 73% of women reported experiencing microaggressions but only 1/3 of respondents spoke up to challenge it2. Recognizing harassment - toward oneself or others - and taking action when it happens can be difficult without a plan. Currently, the RSNA Annual Meeting lacks programming to address these specific, real workplace experiences that permeate daily interactions. Providing RSNA members with tools to prevent or counteract microaggressions would be a valuable offering.

Sub-Events

RC716A What are Microaggressions? How do we identify them?

Participants
Ann K. Jay, MD, Washington, DC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ann.k.jay@gunet.georgetown.edu

LEARNING OBJECTIVES

1) To define microaggressions. 2) To understand where microaggressions come from. 3) Learn how to recognize microaggressions.

RC716B Gender-based Harassment: Let's Share Real Stories

Participants
Kristin K. Porter, MD,PhD, Birmingham, AL (*Presenter*) Stockholder, Pfizer IncAdvisory Board, Bracco Group

RC716C Sexual Harassment in Radiology: Is It Real or Perception?

Participants
Aline Camargo, MD, Hershey, PA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To define sexual harassment. 2) To present statistics of sexual harassment in radiology. 3) To understand the reasons why only a small percentage of victims report sexual harassment. 4) To provide strategies to support and guide the victims.

RC716D Beyond The Denial: Strategy to Mitigate

Participants
Jenny T. Bencardino, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

RC716E Panel Discussion

RC721

Innovations in Cone-beam CT

CT PH

AMA PRA Category 1 Credit ™: 1.00

Participants
Jeffrey H. Siewerdsen, PhD, Baltimore, MD (*Moderator*) Research Grant, Siemens AG; Advisory Board, Siemens AG; Research Grant, Medtronic plc; Advisory Board, Carestream Health, Inc; License agreement, Carestream Health, Inc; License agreement, Precision X-Ray, Inc; License agreement, Elekta AB; ; ;

LEARNING OBJECTIVES

1) Learn about the range of technologies and clinical applications of cone-beam CT in image-guided interventions (including surgery, interventional radiology, and image-guided radiation therapy) and specialty diagnostic imaging (such as breast imaging and orthopaedic / musculoskeletal imaging). 2) Learn about the diversity of cone-beam CT imaging systems for image-guided interventions, including fixed-room and mobile C-arms, O-arms, and new embodiments. 3) Learn about the image quality challenges in cone-beam CT, including image noise and artifacts. 4) Learn about the methods being developed to address such challenges, including new detector types and 3D image reconstruction algorithms. 5) Learn about the systems and methods being developed to further improve spatial resolution in cone-beam CT, offering to extend imaging performance for applications such as breast imaging (detection of microcalcifications) and orthopaedic imaging (visualization / quantification of fine skeletal detail). 6) Learn about the methods by which cone-beam CT can give quantitative measures of pathophysiology, including quantitative imaging metrics related to musculoskeletal health in high-resolution orthopaedics imaging.

Sub-Events

RC721A Innovations in CBCT for Musculoskeletal/Orthopedic Imaging

Participants
Wojciech Zbijewski, PhD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Explain the technology of musculoskeletal (MSK) cone-beam CT (CBCT). 2) Identify key differences between MSK CBCT and other orthopedic imaging modalities. 3) Discuss emerging clinical applications of MSK CBCT.

RC721B Innovations in CBCT for Breast Imaging

Participants
John M. Boone, PhD, Sacramento, CA (*Presenter*) Board of Directors, Izotropic Imaging CorporationShareholder, Izotropic Imaging CorporationCo-author with royalties, Wolters Kluwer nvPatent agreement, The Phantom Laboratory

LEARNING OBJECTIVES

1) To inform the audience of the overall design and use of a dedicated breast CT scanner. 2) To demonstrate the performance of the scanner as assessed using mathematical observers and other quantitative metrics. 3) To further demonstrate the performance of the scanner based upon radiologist-observer studies.

RC721C Innovations in CBCT for Image-guided Interventions

Participants
Jeffrey H. Siewerdsen, PhD, Baltimore, MD (*Presenter*) Research Grant, Siemens AG; Advisory Board, Siemens AG; Research Grant, Medtronic plc; Advisory Board, Carestream Health, Inc; License agreement, Carestream Health, Inc; License agreement, Precision X-Ray, Inc; License agreement, Elekta AB; ; ;

RC722

Identification and Prevention of Accidents in Diagnostic Imaging and Nuclear Medicine

NM PH SQ

AMA PRA Category 1 Credit ™: .50

Participants
Mahadevappa Mahesh, PHD, Baltimore, MD (*Moderator*) Nothing to Disclose
Kimberly E. Applegate, MD, Zionsville, IN (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

mmahesh@jhmi.edu

LEARNING OBJECTIVES

1) Identify common patient near miss and accident scenarios in radiology. 2) Examine processes that are key to reduce accidents during imaging procedures. 3) Understand shared solutions for patient safety in nuclear medicine and radiology.

ABSTRACT

Radiation accidents in diagnostic imaging or in nuclear medicine are rare, however, it is important to know how to identify and prevent accidents. The goal of the refresher course is to provide a summary of the current situation of patient events and near misses that occur in radiology and nuclear medicine, what we can do by awareness of them, by sharing them amongst ourselves and others, and by setting up structures and processes to prevent future events involving radiation protection. Inviting patient advocates into event reviews may provide insights and solutions to complex situations.

Sub-Events

RC722A Introduction and Discussion of the Medical Physics Examples and Potential Solutions

Participants
Mahadevappa Mahesh, PHD, Baltimore, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

mmahesh@jhmi.edu

LEARNING OBJECTIVES

1) To examine settings to ensure radiation incidents are avoided. 2) To develop plan of action for post radiation incident evaluaiton. 3) To reflect on the processes such as quality control and training.

ABSTRACT

Defining radiation incidents in diagnostic imaging settings are key. Radiation incidents can lead to deterministic effects such as hair-loss or skin erythema, which are rare but possible due to prolonged fluoroscopy procedures or CT scans (CT perfusion studies) due to incorrect settings. Even though prevention is better and is achievable by routine review of equipment and protocol settings, but when radiation incidents occur, a physicist can do the following. First, physicist should record details of scan settings that have led to the radiation incident. Next, it is important to assess and make necessary changes to the scan settings to avoid future incidents. This should be followed by detail assessment of radiation exposure to patients (skin dose and organ dose) and work with the radiologists and other physicians to address the radiation events. In addition, tasks including regulatory compliance, staff training, and others will be discussed in this talk.

RC722B Discussion of Examples, Solutions and Tools

Participants
Kimberly E. Applegate, MD, Zionsville, IN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

keapple5123@gmail.com

LEARNING OBJECTIVES

1) Identify common patient near miss and accident scenarios in radiology. 2) Describe the value of tracking and understanding how near misses occur. 3) Discuss both structures and processes that reduce accidents during radiology and nuclear medicine patient imaging procedures.

RC722C Discussion of Pediatric Nuclear Medicine Examples and Potential Solutions

Participants
Frederic H. Fahey, DSc, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

frederic.fahey@childrens.harvard.edu

LEARNING OBJECTIVES

1) List 3 ways in which pediatric and adult patients differ. 2) Describe 3 types of accidents that can occur in pediatric nuclear medicine. 3) Discuss 3 methods that can be used to handle accidents that have occurred or minimize the potential for future accidents.

Printed on: 05/05/21

RC723

Optimization and Technology in Interventional Radiology

CT IR PH

FDA Discussions may include off-label uses.

Participants
Thaddeus A. Wilson, PhD, Memphis, TN (*Moderator*) Nothing to Disclose
William F. Sensakovic, PhD, Phoenix, AZ (*Moderator*) Founder, Telerad Physics Teaching, LLC
Robert G. Dixon, MD, Chapel Hill, NC (*DPS Upload*) Nothing to Disclose

For information about this presentation, contact:

bob_dixon@med.unc.edu

LEARNING OBJECTIVES

1) Apply techniques to optimize dose in the interventional setting. 2) Identify opportunities where ionizing radiation can be replaced by ultrasound to guide interventional procedures. 3) To familiarize attendees with new CT interventional techniques that will open new fields of interventional procedures.

Sub-Events

RC723A A Practical Approach to Optimizing Dose in the Interventional Suite

Participants
Robert G. Dixon, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Bob_Dixon@med.unc.edu

LEARNING OBJECTIVES

1) Review the importance of dose optimization in the angiography suite. 2) Discuss basic concepts that will help to build a culture of safety at your institution. 3) Identify simple, practical steps that operators can take to protect patients, staff and themselves in the IR suite.

RC723B Using Ultrasound in Place of CT and Fluoroscopy in the Interventional Suite

Participants
Patrick Warren, MD, Columbus, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss skills, techniques, and pitfalls of invasive sonography. 2) Discuss basic skills involved in utilizing ultrasound guidance in lieu of CT fluoroscopy or conventional fluoroscopy during minimally invasive percutaneous procedures in order to minimize radiation exposure to patients and healthcare providers. 3) Incorporate these component skill sets into further life-long learning for expansion of competency and implementation into clinical interventional practice.

RC723C Advances in Interventional Use of CT

Participants
Frank Dong, PhD, Beachwood, OH (*Presenter*) Equipment support, Siemens AG; Software support, Siemens AG

LEARNING OBJECTIVES

1) To familiarize attendees with new CT interventional techniques that will open new fields of interventional procedures. 2) To describe the potential benefits of Cone Beam CT (CBCT) navigation to perform imaging guided tumor ablations. 3) To compare the radiation doses between CBCT used in interventional procedures and conventional CT.

RC727

Principles of Cost-effectiveness Analysis and Value in Imaging

HP RS

Participants
Stella Kang, MD,MSc, New York, NY (*Moderator*) Royalties, Wolters Kluwer nv
Pari V. Pandharipande, MD, MPH, Chestnut Hill, MA (*Moderator*) Nothing to Disclose
Pari V. Pandharipande, MD, MPH, Chestnut Hill, MA (*DPS Upload*) Nothing to Disclose

Sub-Events

RC727A Introduction to Cost-effectiveness Analysis

Participants
Pari V. Pandharipande, MD, MPH, Chestnut Hill, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To define how the long-term costs, effectiveness, and cost-effectiveness of imaging can be measured. 2) To understand how policymakers utilize data from cost-effectiveness analyses. 3) To gain insight into the strengths and drawbacks of cost-effectiveness analysis as a means for judging value.

RC727B How Cancer Simulation Models Inform Screening Policy

Participants
Kathryn Lowry, MD, Seattle, WA (*Presenter*) Research Grant, General Electric Company

RC727C How Cost-effectiveness Analysis is Applied in Imaging Research

Participants
Stella Kang, MD,MSc, New York, NY (*Presenter*) Royalties, Wolters Kluwer nv

For information about this presentation, contact:

Stella.kang@nyulangone.org

LEARNING OBJECTIVES

1) Understand how to approach the question of whether a diagnostic imaging strategy is cost effective. 2) Apply methods of cost effectiveness analysis to recent areas of interest: imaging innovation, optimization, and clinical decision making. 3) Evaluate the clinical and research implications of results from cost effectiveness analysis through examples in radiology.

RC727D Beyond Cost: Bringing Value to Patients and Health Systems in Radiology

Participants
Andrew B. Rosenkrantz, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the importance of considering the value of imaging beyond cost considerations. 2) Recognize challenges in measuring value in radiology. 3) Describe current approaches for assessing the value of radiology and radiologists.

RC728

ACR Accreditation Updates II

PH

Participants
James M. Kofler JR, PhD, Jacksonville, FL (*Moderator*) Nothing to Disclose
Donna M. Reeve, MS, Silverdale, WA (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn new and updated information for the ACR CT imaging accreditation program. 2) Become familiar with the requirements for the ACR MRI accreditation program. 3) Learn updated information on the ACR Nuclear Mediciant and PET accreditation program.

Sub-Events

RC728A ACR CT Accreditation Update

Participants
Jessica Clements, MS, Pasadena, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the requirements of the ACR CT accreditation program, including updates to the QC manual and accreditation process.

RC728B ACR MRI Accreditation Update

Participants
Donna M. Reeve, MS, Silverdale, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Provide an overview of the current ACR MRI and Breast MRI Accreditation Program requirements. 2) Present recent changes to the MRI programs and updates to guidance documents. 3) Present planned changes to both ACR MRI programs.

RC728C ACR Nuclear Medicine and PET Accreditation Update

Participants
Osama R. Mawlawi, PhD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the requirements of the Nuclear Medicine and PET ACR accreditation programs. 2) Describe physics testing and QC requirements. 3) List common pitfalls in the accreditation process.

ABSTRACT

The ACR Nuclear Medicine (NM) and PET Accreditation program is a means of demonstrating that the department is performing quality imaging studies. The program itself evolves to address the current state of nuclear and PET imaging and comments from users. This presentation will review the current status of the physics requirements for this process.

RC729

Rectal MRI

GI MR

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC729A Protocol

Participants
Mukesh G. Harisinghani, MD, Boston, MA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) The attendee will get an overview of the MR technique used to stage rectal cancer patients. 2) The attendee will have an overview of the technical challenges in the imaging of rectal cancer and on how to overcome these. 3) The attendee will get et an overview of the relevant anatomy of rectum and anal canal as it pertains to rectal cancer.

RC729B T Staging

Participants
Marc J. Gollub, MD, New York, NY (*Presenter*) Nothing to Disclose

RC729C N Staging

Participants
Regina G. Beets-Tan, MD, PhD, Amsterdam, Netherlands (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. To know how to deal with the nodal staging and restaging in rectal cancer2. To know the MR imaging features 3. To understand the impact of your findings on clinical decision making

ABSTRACT

Nodal MR staging in rectal cancer remains a challenge for radiologists. Yet nodal disease is one of the important risk factors during treatment decision making. This lecture aims to provide an understanding of how we should deal with the limitations of MRI for interpreting nodal disease and provide the audience a guideline for clinical practice

RC729D Response to Therapy

Participants
Kartik S. Jhaveri, MD, Mississauga, ON (*Presenter*) Research Grant, General Electric CompanyResearch Grant, Bayer AGResearch Consultant, Perspectum Ltd

For information about this presentation, contact:

kartik.jhaveri@uhn.ca

LEARNING OBJECTIVES

1) Review MRI and Pathologic TRG. 2) Discuss timing and optimal technique for performance of post therapy MRI. 3) Discuss MRI reporting of post CRT MRI.

RC729E Case Review

Participants
Marc J. Gollub, MD, New York, NY (*Presenter*) Nothing to Disclose
Regina G. Beets-Tan, MD, PhD, Amsterdam, Netherlands (*Presenter*) Nothing to Disclose

RC732

Resilience, Social, and Emotional Intelligence to Mitigate Burnout

LM

AMA PRA Category 1 Credit ™: .75

Participants
Achala S. Vagal, MD, Cincinnati, OH (*Moderator*) Research Grant, Cerovenus

Sub-Events

RC732A Elements of Burnout: Not Just Work Volume Intensity

Participants
Felix S. Chew, MD, Seattle, WA (*Presenter*) Nothing to Disclose

RC732B Remedies to Mitigate Burnout at Workplace

Participants
Claire E. Bender, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cbender@mayo.edu

LEARNING OBJECTIVES

1) Define the different levels of responisiblity for mitigation (from CEO/Chhair to individual; this will be about who owns the probelm. The importance of culture will be included here.) 2) Present individual radiologist mitigation strategies (what works and what does not work). 3) Present leadership mitigation strategies. 4) Provide special strategies for radiology residents/trainees.

ABSTRACT

Not needed. Course objectives describe the course offering. Thanks, claire

RC732C Resilience in Radiology: How to Cultivate and Disseminate

Participants
Stacy E. Smith, MD, Weston, MA (*Presenter*) Nothing to Disclose

RC732D Impact of Radiology Resident Involvement in Community Services

Participants
Teresa Chapman, MD,MA, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

tesswill@uw.edu

LEARNING OBJECTIVES

1) Discuss aspects of community involvement that indirectly and positively impact resident well-being. 2) Develop ideas for involvement of trainess at the audience members' home institutions for community engagement.

RC753

The RSNA Technology Stack for Semantics and Reporting: RadLex, RadElement and RadReport

Saturday, Dec. 5 3:30PM - 4:30PM Room: Channel 3

IN LM

AMA PRA Category 1 Credit ™: .75

Participants
Marta E. Heilbrun, MD,MS, Atlanta, GA (*Moderator*) Nothing to Disclose

Sub-Events

RC753A The LOINC/RSNA Radiology Playbook: A Unified Terminology for Radiology Procedures

Participants
Daniel J. Vreeman, MS, Research Triangle Park, NC (*Presenter*) President, Blue Sky Premise, LLC

LEARNING OBJECTIVES

1) Explain the purpose and scope of the LOINC terminology standard. 2) Identify and select the key tools for implementing codes from the LOINC/RSNA Radiology Playbook. 3) Understand the development process for the LOINC/RSNA Radiology Playbook.

RC753B What is RadLex?

Participants
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Presenter*) Co-founder, DexNote, LLC

LEARNING OBJECTIVES

1) Define the characteristics of terminologies and ontologies. 2) Describe the scope of RadLex content and its applications. 3) Compare several tools for using RadLex.

RC753C RadPath Correlation Using RadLex

Participants
Ross W. Filice, MD, Washington, DC (*Presenter*) Co-founder, DexNote LLCResearch Grant, NVIDIA CorporationAdvisor, BunkerHill Health, Inc

LEARNING OBJECTIVES

1) Learn how the RadLex ontology can be used to automatically correlate radiology reports with pathology outcomes.

RC753D What is radelement.org?

Participants
Marc D. Kohli, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Define a common data element. 2) Describe how common data elements can be used to improve interoperability for interpretation. 3) Describe how common data elements are structured/organized.

RC753E Building Clinically Useful CDEs

Participants
Victoria Chernyak, MD,MS, Bronx, NY (*Presenter*) Consultant, Bayer AG

For information about this presentation, contact:

vichka17@hotmail.com

LEARNING OBJECTIVES

1) To review advantages common data elements (CDE) offer for clinical reporting, computer-assisted reporting and image annotation. 2) To describe development of CDE based on ACR Assist RADS modules.

RC753F What is the RSNA Template Library?

Participants
Marta E. Heilbrun, MD,MS, Atlanta, GA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the goals and intent behind the RSNA Template Library. 2) Appreciate the submission and review process for the templates in the library. 3) Explore opportunities to use the library to support data mining and AI initiatives.

RSNA 2020
HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

RC754

Cinematic Rendering: Principles, Pearls, and Clinical Applications

IN

Participants
Elliot K. Fishman, MD, Owings Mills, MD (*Moderator*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company
Steven P. Rowe, MD, PhD , Baldwin, MD (*Presenter*) Nothing to Disclose
Elliot K. Fishman, MD, Owings Mills, MD (*Presenter*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company
Linda C. Chu, MD, Lutherville, MD (*Presenter*) Nothing to Disclose
Elliot K. Fishman, MD, Owings Mills, MD (*DPS Upload*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company

LEARNING OBJECTIVES

1) Understand the principles of cinematic rendering and how it differs from classic 3D techniques like volume rendering and maximum intensity projection (MIP) techniques. 2) Understand the potential role of cinematic rendering in applications ranging from oncology to trauma to vascular imaging. 3) Understand the role of cinematic rendering in specific applications in the pancreas, liver, kidneys and cardiovascular imaging. 4) understand how to implement cinematic rendering in your practice. 5) understand the pitfalls of creating images with cinematic rendering and how to help minimize them.

ABSTRACT

Cinematic Rendering (CR) represents an advance in volume visualization with a high fidelity display of CT data. The technique has evolved with the introduction of faster GPU's at a lower cost and these GPU;s being used for medical imaging. In this refresher course we will discuss the basic principles of Cinematic Rendering and its advantages over classic volume rendering (VR) and maximum intensity projection technique (MIP). Case studies illustrating the advantages and disadvantages of each techniques will be discussed and illustrated. We will also discuss the range of current clinical applications focusing on oncology (pancreas, liver, kidney, small bowel) musculoskeletal trauma, cardiothoracic imaging (including cardiac imaging) and vascular imaging.

Printed on: 05/05/21

RC801

Case-based Cardiothoracic Imaging in the Post-operative/Post-intervention Patient

CA CH

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC801A Imaging of Airway Interventions

Participants
Myrna C. Godoy, MD, PhD, Houston, TX (*Presenter*) Research Grant, Siemens AG

For information about this presentation, contact:

mgodoy@mdanderson.org

RC801B Normal Imaging Manifestations of Resection and Complications

Participants
Jane P. Ko, MD, New York, NY (*Presenter*) Research collaboration, Siemens AGSpouse, Employee, ElevateBioSpouse, Stockholder, ElevateBioSpouse, Consultant, ElevateBio

LEARNING OBJECTIVES

1) To review the normal appearance after surgical therapy for lung cancer. 2) To identify complications of therapy. 3) To understand causes of potential interpretive pitfalls.

RC801C The Post-radiation Chest

Participants
Michelle S. Ginsberg, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ginsberm@mskcc.org

LEARNING OBJECTIVES

1) To review different radiation methods and the normal post treatment appearance including both short- and long-term changes. 2) To identify complications and learn to distinguishing recurrent tumor from evolving post treatment changes.

RC801D Cardiac Devices: What is it and Where Should it Be?

Participants
Philip A. Araoz, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RC801E Adult Post-operative Appearances of Congenital Cardiac Disease

Participants
Prachi P. Agarwal, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

RC801F Normal and Abnormal Post-Procedural/Intervention Appearances of the Aorta

Participants
Nila J. Akhtar, MD, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

akhtar.nila@mayo.edu

RC802

The Forgotten Milestones

ED PR

AMA PRA Category 1 Credit ™: .75

Participants
Roopa Ram, MD, Little Rock, AR (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

rram@uams.edu

Sub-Events

RC802A Practice-based Learning and Improvement

Participants
Nupur Verma, MD, Seattle, WA (*Presenter*) Nothing to Disclose

RC802B Interpersonal and Communication Skills

Participants
Alisa Kanfi, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

RC802C Systems-based Practice

Participants
Syed A. Bokhari, MD, New Haven, CT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

To review, understand and refersh the meaning of systems-based practice.How to teach and evaluate trainees in this competencyHow to keep up the 'practice' with rapidly changing systems

RC802D Professionalism

Participants
Roopa Ram, MD, Little Rock, AR (*Presenter*) Nothing to Disclose

RC804

Musculoskeletal Applications of Machine Learning

AI MK

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Behrang Amini, MD, PhD, Houston, TX (*Moderator*) Nothing to Disclose

Sub-Events

RC804A Techniques and Applications

Participants
Martin Torriani, MD, Boston, MA (*Presenter*) Nothing to Disclose

RC804B Measuring Model Performance

Participants
Behrang Amini, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose

RC804C Machine Learning for Trauma Imaging

Participants
Michael L. Richardson, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand current state of the art in computer interpretation of musculoskeletal trauma images. 2) Be aware of current pitfalls in computer image interpretation of trauma images. 3) Be aware of non-interpretational advances in trauma imaging, such as radiation and contrast reduction.

RC804D Machine Learning for Cartilage Imaging

Participants
Jacob C. Mandell, MD, Waltham, MA (*Presenter*) Nothing to Disclose

RC804E Clinical Applications of Machine Learning for Bone Tumor Diagnosis

Participants
Christopher F. Beaulieu, MD, PhD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the historical foundation of computer aided diagnosis of bone tumors. 2) Understand current technical approaches to bone tumor assessment. 3) Appreciate methods for integration of computer assistance into clinical workflow.

RC804F Automating Clinical Workflow

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NVResearcher, Koninklijke Philips NVAdvisory Board, Bayer AGAdvisory Board, Aidoc LtdAdvisory Board, Inference Analytics, IncAdvisory Board, Subtle Medical

RC806

Neuro/Head and Neck 911

ER HN NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Sapna Rawal, MD, Toronto, ON (*Moderator*) Nothing to Disclose
Tabassum A. Kennedy, MD, Madison, WI (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

sapna.rawal@uhn.ca

Sub-Events

RC806A Do-not-miss Neurovascular Emergencies

Participants
Hediyeh Baradaran, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hediyeh.baradaran@hsc.utah.edu

LEARNING OBJECTIVES

1) Identify emergent neurovascular findings in cross-sectional imaging. 2) Describe carotid artery dissections appropriately.

RC806B Upper Aerodigestive Tract Emergencies

Participants
Nicholas A. Koontz, MD, Fishers, IN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

nakoontz@iupui.edu

LEARNING OBJECTIVES

After participating in this course, learners will: 1) Be familiar with the cross sectional imaging appearance of common upper aerodigestive tract emergencies, including trauma, infection, and other emergencies; 2) Gain insight into imaging search patterns for screening trauma patients for pharyngoesophageal and laryngotracheal injury with blunt and penetrating trauma; and 3) Be able to differentiate various infectious emergencies involving the upper aerodigestive tract, including awareness of important clinical ramifications of imaging findings

RC806C Facial and Skull Base Emergencies

Participants
Alok A. Bhatt, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the common and uncommon pathologies that can occur within the face and skull base in the emergency setting. 2) Illustrate pertinent radiologic anatomy of the maxillofacial region and skullbase, highlighting landmarks to interrogate, for emergent conditions involving the head and neck. 3) Discuss the key findings that must be communicated to the referring physician for proper mangement and treatment.

RC806D Spine Emergencies

Participants
Lubdha M. Shah, MD, Salt Lake Cty, UT (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Develop differential diagnosis based on the spinal compartments and imaging features. 2) Review use of various imaging modalities to evaluate spine pathologies. 3) Use supratentorial findings to develop differential diagnosis for spinal pathology.

RC811

2020 Nuclear Cardiology Live (20 Cases on Amyloidosis, Sarcoidosis, PET with CFR, Advanced SPECT, and Infection Imaging)

CA NM

AMA PRA Category 1 Credit ™: 1.00

Participants

Sharmila Dorbala, MD,MPH, Boston, MA (*Moderator*) Research Grant, Pfizer IncAdvisory Board, Pfizer Inc Advisory Board, General Electric CompanyResearch Grant, General Electric Company
Sharmila Dorbala, MD,MPH, Boston, MA (*Presenter*) Research Grant, Pfizer IncAdvisory Board, Pfizer Inc Advisory Board, General Electric CompanyResearch Grant, General Electric Company
E. Gordon Depuey, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Using a live case format and focused on practical hands on image interpretation and didactics we will teach advanced SPECT and cardiac PET including perfusion, viability, sarcoidosis, infection imaging, and hybrid imaging. The learning objectives for this session are: 1) How to perform a systematic approach to interpretation of myocardial perfusion SPECT; 2) The advantages of new software methods for SPECT reconstruction, including iterative reconstruction, resolution recovery, and noise compensation; Principles of slid state detector SPECT as well as its advantages and shotcomings. 3) New hardware and software advancements to decrease patient radiation dose; Advantages and pitfalls of attenuation correction for SPECT; Advantages of cardiac PET myocardial perfusion imaging; Protocols for cardiac PET imaging.

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RC813

Read Cases with Experts: Fetal Cases

OB PD

AMA PRA Category 1 Credit ™: 1.00

Sub-Events

RC813A Fetal Spine Cases

Participants
Beth M. Kline-Fath, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

RC813B Fetal Airway Cases

Participants
Amy R. Mehollin-Ray, MD, Houston, TX (*Presenter*) Nothing to Disclose

RC813C Fetal GU Cases

Participants
Teresa Victoria, MD,PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

victoria@email.chop.edu

LEARNING OBJECTIVES

1) Basic fetal MR GU anatomy will be explained. 2) Challenging GU cases will be discussed.

ABSTRACT

the goal of the session will be to review challenging GU cases with evaluation by means of a systematic approach that allows us to get to the final diagnosis

Printed on: 05/05/21

RC814

Non-Vascular Interventions

IR

AMA PRA Category 1 Credit ™: 1.00

Participants
David C. Madoff, MD, New Haven, CT (*Moderator*) Advisory Board, Zimmer Biomet Holdings, IncConsultant, General Electric CompanyConsultant, Merck & Co, IncConsultant, Sirtex Medical LtdConsultant, Boston Scientific CorporationConsultant, Johnson & JohnsonConsultant, Siemens AG
Claire Kaufman, MD, Salt Lake City, UT (*Moderator*) Research Consultant, Merit Medical Systems, Inc

Sub-Events

RC814A Transthoracic Biopsy Considerations

Participants
Ramona Gupta, MD, Chicago, IL (*Presenter*) Nothing to Disclose

RC814B Chest Tube Placement and Management

Participants
David M. Tabriz, MD, Chicago, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss steps in placement, management, and removal of chest tubes. 2) Understand the components of a chest tube drainage system. 3) Describe the chest tube drainage system findings and differential diagnosis of an air-leak.

RC814C Thoracic Duct Embolization

Participants
Bill S. Majdalany, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

bmajdal@emory.edu

LEARNING OBJECTIVES

1) Present etiologies of chylothorax and evolution of thoracic duct embolization. 2) Review approaches and algorithmic approach for thoracic duct embolization. 3) Discuss results of thoracic duct embolization for various etiologies of chylothorax.

RC814D Treating Ascites: Paracentesis, TIPs, PleuRx, Denver Shunt: Which One and Why?

Participants
David C. Madoff, MD, New Haven, CT (*Presenter*) Advisory Board, Zimmer Biomet Holdings, IncConsultant, General Electric CompanyConsultant, Merck & Co, IncConsultant, Sirtex Medical LtdConsultant, Boston Scientific CorporationConsultant, Johnson & JohnsonConsultant, Siemens AG

RC814E Percutaneous Biliary Drainage and Stenting

Participants
Bien Soo Tan, FRCR,MBBS, Singapore, Singapore (*Presenter*) Nothing to Disclose

RC814F Refractory Abscess Management

Participants
Claire Kaufman, MD, Salt Lake City, UT (*Presenter*) Research Consultant, Merit Medical Systems, Inc

RC815

Tomosynthesis

BR

Participants
Sarah M. Friedewald, MD, Chicago, IL (*Moderator*) Consultant, Hologic, IncResearch Grant, Hologic, Inc
Sarah M. Friedewald, MD, Chicago, IL (*DPS Upload*) Consultant, Hologic, IncResearch Grant, Hologic, Inc

Sub-Events

RC815A Case Challenge 1

Participants
Catherine S. Giess, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cgiess@bwh.harvard.edu

LEARNING OBJECTIVES

1) Discuss challenges in evaluating non-calcified lesions on digital breast tomosynthesis 2) Review benefits and challenges of DBT biopsy for non-calcified lesions 3) Present challenging cases and strategies to improve diagnostic evaluation and timely diagnosis.

RC815B Case Challenge 2

Participants
Reni S. Butler, MD, New Haven, CT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

reni.butler@yale.edu

LEARNING OBJECTIVES

1) Discuss capability of digital breast tomosynthesis to aid in detection of early breast cancer. 2) Provide examples of how digital breast tomosynthesis facilitates the diagnosis of benign lesions. 3) Present diagnostic approach to work-up and management of architectual distortion seen only with digital breast tomosynthesis.

RC815C Understand the Artifacts and Optimize Your Workflow

Participants
Sarah M. Friedewald, MD, Chicago, IL (*Presenter*) Consultant, Hologic, IncResearch Grant, Hologic, Inc

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RC816

Artificial Intelligence and Global Radiology Education: Overcoming Current Barriers to Create a New Teaching Paradigm (Sponsored by the RSNA Committee of International Radiology Education)

AI ED

AMA PRA Category 1 Credits ™: 1.25

Participants
Jeffrey B. Mendel, MD, West Newton, MA (*Moderator*) Advisor, McKesson Corporation
Jeffrey B. Mendel, MD, West Newton, MA (*Presenter*) Advisor, McKesson Corporation
Frank J. Minja, MD, New Haven, CT (*Presenter*) Nothing to Disclose
David A. Rosman, MD, Jamaica Plain, MA (*Presenter*) Nothing to Disclose
Tessa S. Cook, MD, PhD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Andreas M. Rauschecker, MD,PhD, Mill Valley, CA (*Presenter*) Nothing to Disclose
Bhavya Rehani, MD, Palo Alto, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the limitations of the current methods of remote and onsite apprenticeship model for teaching in radiology and how remote learning can be disrupted by issues with travel, pandemics, etc. 2) Understand the different theories of educational. 3) Learn what AI tools are currently available and under development for radiology education 4) Learn how AI tools can be used in global radiology education.

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RC821

Innovations in Hybrid Imaging

CT MR NM PH

Participants
Osama R. Mawlawi, PhD, Houston, TX (*Moderator*) Nothing to Disclose
Osama R. Mawlawi, PhD, Houston, TX (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Become more proficient with the latest innovations in PET/CT imaging and their impact of scanner performance. 2) Learn about the challenges and opportunities in PET/MR image quantification and potential clinical applications. 3) Understand the various corrections necessary to generate a quantifiable SPECT image.

ABSTRACT

This sesion will cover the latest innovations in hybrid immaging. The session will have three speakers covering 3 different topics. The first talk will cover the latest in PET/CT imaging including silicon photomultiplier tubes, larger axial fields of view and the effects these innovations have on scanner performance. The second talk will focus on PET/MR imaging and disuss the challenges and opportunities of PET/MR image quantification and potential clinical applications. Finally, the third talk will focus on SPECT/CT image quantification while discussing the various correction factors and processes needed to to generate a quantifiable SPECT image.

Sub-Events

RC821A Innovations in PET/CT

Participants
Osama R. Mawlawi, PhD, Houston, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List the latest advances in PET/CT imaging. 2) Understand the impact of these innovations on scanner performance and image quality. 3) Recognize the differences between commercial PET/CT systems with respect to these innovations.

ABSTRACT

This talk will focus on the latest innovations in PET/CT imaging. Topics covered will include silicon photomultiplier (SiPM) tubes, large axial PET scanners, data driven gating, and the impact these innovations have on scanner performance and image quality.

RC821B Opportunities in PET/MR

Participants
Thomas Beyer, PhD, Vienna, Austria (*Presenter*) Co-founder, cmi-experts GmbH; Co-founder, Dedicaid GmbH

For information about this presentation, contact:

thomas.beyer@meduniwien.ac.at

LEARNING OBJECTIVES

1) Appreciate benefits and challenges of quantification in PET. 2) Be made aware of the basic principles of fully-integrated PET/MR imaging systems. 3) Understand the fundamental challenges and potential of MR-guided PET quantification. 4) Be pointed to potential applications of fully-integrated PET/MR in clinical research, and possibly routine.

ABSTRACT

PET is a non-invasive imaging technique that provides reproducible and fully-quantitative information on preselected metabolic/signaling pathways. PET is highly sensitive, thus, requiring only small amounts of biomarkers to be used for visualization and quantification purposes. By comparison to high-resolution anatomical images PET images appear blurred, which is attributed to the positron range effects and the limited detector size of the PET ring systems.Today, clinical PET imaging systems are offered almost exclusively in combination with CT and MR systems. Combined PET/MR, in particular, offers a number of intrinsic methodological advantages over PET only. These include, the use of MR imaging (e.g., by means of MR navigators) to estimate involuntary patient motion as a pre-requisite for motion compensation, and, thus, subsequent improvement of PET image quality and quantification. Following appropriate motion compensation, PET data can be improved in quality and accuracy through the use of MR-guided partial volume corrections and image reconstruction. In this presentation we will highlight the most important advances of PET instrumentation and data processing that help facilitate fully-integrated PET/MR in the first place, and draw a benefit from this integration for the PET data. This includes a brief discussion of the effect of the static MR field on positron range effects, in particular for higher-energetic positron emitters. Overall, increase volume sensitivity helps reduce the amount of radiotracer injected into patients or shorten the emission scan time, in combination with increased signal-to-noise in the emission images (thanks to the use of time-of-flight, a concept different from TOF-MR) it helps increase sensitivity and reader accuracy of PET images. Lastly, advances in image reconstruction have brought the level of PET, and the appearance of the PET images, closer to the common understanding of radiologically useful images.

RC821C SPECT/CT Quantitation

Participants
Srinivas C. Kappadath, PhD, Houston, TX (*Presenter*) Research Grant, General Electric Company Research Grant, BTG International Ltd Consultant, BTG International Ltd Consultant, ABK Biomedical Inc Consultant, Terumo Corporation

For information about this presentation, contact:

skappadath@mdanderson.org

LEARNING OBJECTIVES

1) Identify the various correction factors applied to SPECT. 2) Understand the processes used for quantification of SPECT. 3) Describe the various approaches used commercially for SPECT quantitation.

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RC829

Cancer Response

BQ GI GU MR

AMA PRA Category 1 Credits ™: 1.25

Participants
Victoria Chernyak, MD,MS, Bronx, NY (*Moderator*) Consultant, Bayer AG

For information about this presentation, contact:

vichka17@hotmail.com

Sub-Events

RC829A Liver Metastases Response

Participants
Vahid Yaghmai, MD, Orange, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Review optimal imaging methods. 2) Assessment of response based on size, necrosis and combined criteria. 3) Assessment of response per lesion versus per patient. 4) Tumor-specific assessment.

RC829B HCC Response

Participants
Bachir Taouli, MD, New York, NY (*Presenter*) Research Grant, Bayer AGResearch Grant, Takeda Pharmaceutical Company LimitedResearch Grant, Regeneron Pharmaceuticals, IncConsultant, Alexion Pharmaceuticals, IncConsultant, Bayer AG

For information about this presentation, contact:

bachir.taouli@mountsinai.org

LEARNING OBJECTIVES

1) Review imaging protocols used for assessment of HCC response to locoregional and systemic therapies. 2) Review imaging criteria applied to HCC response. 3) Review pitfalls and future directions.

RC829C Pancreatic Cancer Response

Participants
Zhen J. Wang, MD, San Francisco, CA (*Presenter*) Stockholder, NEXTRAST, INC; Consultant, General Electric Company

For information about this presentation, contact:

Zhen.Wang@ucsf.edu

LEARNING OBJECTIVES

1) Become familiar with the limitations of anatomic imaging in assessing treatment response for pancreatic ductal adenocarcinoma (PDAC).2) Learn tips on how to avoid over-staging on anatomic imaging following treatment of PDAC.

RC829D Rectal Cancer Response

Participants
Iva Petkovska, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To learn how to distinguish between partial from complete clinical response on MRI after total neoadjuvant therapy (TNT) in locally advanced rectal cancer. 2) To improve confidence among radiologists in diagnosing complete clinical response after total neoadjuvant therapy (TNT) on MRI. 3) To review imaging protocol.

RC829E Prostate Cancer: Diagnosis of Recurrence and Response to Therapy

Participants
Nicole Curci, MD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Understand the role of post-treatment imaging after:-Surgery-Radiation-Focal Therapy

RC829F Q/A

RC832

Diagnostic Safety in Radiology

LM SQ

AMA PRA Category 1 Credit ™: .75

Sub-Events

RC832A **Physician Performance Metrics: What Makes Sense?**

Participants
Nadja Kadom, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

RC832B **Communication Safety: Communication of Critical or Non-Critical Imaging Findings**

Participants
Jason B. Wiesner, MD, Granite Bay, CA (*Presenter*) Nothing to Disclose

RC832C **Incidence Reporting and Culture of Safety**

Participants
Phuong-Anh T. Duong, MD, Salt Lake City, UT (*Presenter*) Nothing to Disclose

RC832D **Radiologist Responsibility in Radiation Safety**

Participants
Christina Brunnquell, PhD, Seattle, WA (*Presenter*) Nothing to Disclose

RC832E **Q&A**

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RC853

Artificial Intelligence in Radiology: The Hype is Over-What is Next?

Wednesday, Dec. 2 3:30PM - 4:30PM Room: Channel 5

AI IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Axel Wismueller, MD,PhD, Pittsford, NY (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about fundamental challenges and opportunities of artificial intelligence in radiology. 2) Review s cientific challenges of contemporary machine learning. 3) Define practical bottlenecks for adoption of AI in clinical practice. 4) Identify novel methods to address such challenges. 5) Learn about current clinical applications of AI in radiology.

ABSTRACT

Artificial Intelligence (AI) is expected to have a major impact on how we will practice radiology in the future: AI will revolutionize imaging interpretation and protocolling, reduce radiation exposure and contrast agent dosage, streamline patient scheduling, and support efficient communication of clinically meaningful imaging information to referring physicians and their patients. Hence, it is evident that AI will re-define all aspects of the radiology profession by making radiologists better and faster in what they do. The recent AI hype, however, has led to unrealistic promises on how fast we might see such changes in clinical practice, or even see radiologists replaced by machines. Yet, the perceived mismatch between such inflated expectations and the negligible impact and limited visibility of AI solutions in current radiology has led to a broad disillusionment among many clinical radiologists about the relevance of AI for their daily practice. Facing this situation, it is time to re-establish credibility in the field and systematically address unsolved both scientific and practical challenges for successful adoption of AI in radiology, which will be reviewed in this presentation. Here, scientific challenges include current limitations of machine learning, pertaining to explainable artificial intelligence, machine-supported image annotation, effective human-machine complementarity, and unsupervised data exploration. Practical challenges include cost-effectiveness analysis of AI, validation of relevant performance measures, such as diagnostic accuracy and turnaround times, and the definition of clinically meaningful patient outcome measures for AI in prospective clinical trials. This session will review these current limitations to adoption of AI in radiology and will present strategies to overcome them from multiple perspectives, including clinical, scientific, and industry viewpoints.

Sub-Events

RC853A Artificial Intelligence in Radiology: Challenges and Opportunities

Participants
Axel Wismueller, MD,PhD, Pittsford, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about fundamental challenges and opportunities of artificial intelligence in radiology. 2) Review scientific challenges of contemporary machine learning. 3) Review methods for explainable artificial intelligence in radiology. 4) Define practical bottlenecks for adoption of AI in clinical practice. 5) Identify novel methods to address such challenges. 6) Learn about current clinical applications of AI in radiology.

RC853B Tackling the Challenges of Next Generation Healthcare

Participants
Holger R. Roth, PhD, Bethesda, MD (*Presenter*) Employee, NVIDIA Corporation Researcher, NVIDIA Corporation

RC853C Radiologist Workflow and AI: Challenges and Opportunities

Participants
William W. Boonn, MD, Penn Valley, PA (*Presenter*) CEO, Equium Intelligence IncShareholder, Equium Intelligence IncFormer CMIO, Nuance Communications, IncShareholder, Nuance Communications, Inc

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RCA11

Creating AutoHotkey Scripts to Automate Repetitive Tasks and Optimize Radiology Workflow: Basic Core Concepts (Hands-on)

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Nicholas Said, MD, MBA, Durham, NC (*Moderator*) Nothing to Disclose
Matthew P. Thorpe, MD, PhD, Rochester, MN (*Presenter*) Nothing to Disclose
Arkadij Grigorian, MD , Brooklyn, NY (*Presenter*) Nothing to Disclose
Nicholas Said, MD, MBA, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

arcadi.grigorian@protonmail.com

LEARNING OBJECTIVES

1) Introduce AutoHotkey, the free open-source custom scripting language for Microsoft Windows, and how it can be used to adapt systems to users, improve efficiency and ergonomics, and optimize radiology workflow. 2) Learn to use the AutoHotkey platform to program your first scripts in a hands-on training environment.

ABSTRACT

Radiology workflow is often riddled with inefficiencies requiring Radiologists to perform repetitive tasks as they adapt to complex systems. AutoHotkey is a free, open-source custom scripting language for Microsoft Windows that allows users of most levels of computer skill to automate repetitive tasks in any Windows application. This hands-on session will introduce attendees to the AutoHotkey platform and how it can be leveraged to adapt systems to users and institutions. Attendees will learn to program their first scripts and how to access script generation resources.

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RCA12

Introduction to Social Media: The Basics (Hands-on)

IN

Participants
Amy K. Patel, MD, Liberty, MO (*Moderator*) Nothing to Disclose
Saad Ranginwala, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Kimberly Beavers, MD, Winter Park, FL (*Presenter*) Nothing to Disclose
Amy K. Patel, MD, Liberty, MO (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Appreciate the professional relevance of social media for radiologists 2) Understand the differences between social media in personal and professional roles 3) Understand the differences between and advantages/disadvantages of multiple social media platforms 4) Establishing and tips for optimal usage of a twitter account

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RCA22

How to Prepare 3D Models to Develop Multi-material 3D Printed Vascular Phantoms (Hands-on)

IN VA

Participants
Ciprian N. Ionita, PhD, Buffalo, NY (*Moderator*) Grant, Canon Medical Systems Corporation
Ciprian N. Ionita, PhD, Buffalo, NY (*Presenter*) Grant, Canon Medical Systems Corporation
Kelsey N. Sommer, East Amherst, NY (*Presenter*) Nothing to Disclose
Ciprian N. Ionita, PhD, Buffalo, NY (*DPS Upload*) Grant, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Learn how to simplify complex vascular trees in order to create a 3D printed phantom with manageable flow conditions. 2) Learn how to use multiple objects for multimaterial 3D printing. 3) Learn how to create vessel wall structures. 4) Learn how to add support structure to allow facile use of the phantom in a bench-top simulation.

ABSTRACT

Development of 3D printed vascular models can be challenging since it involves more complex 3D mesh manipulations following standard segmentation. For example, imaging procedures such as CT angiography can provide vessel geometry and vascular disease morphology such as vascular atherosclerosis. These 3D structure are essential but not sufficient to develop a 3D printed model which could be used for flow simulations and endovascular procedures simulations. In this hands-on session we will show how to manipulate post-segmentation a coronary tree in order to develop a flow phantom. We will use a MeshMixer which is a freeware available for download for all users. A 3D coronary geometry which includes an atherosclerotic plaque will be available for the user. Using this geometry the attendants will go through the steps of creating the model.

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RCA23

Interactive Artificial Intelligence for Non-coders: Image Classification Basics for Beginners

AI IN

AMA PRA Category 1 Credit ™: .75

Participants
Walter F. Wiggins, MD, PhD, Durham, NC (*Moderator*) Nothing to Disclose
Walter F. Wiggins, MD, PhD, Durham, NC (*Presenter*) Nothing to Disclose
Kirti Magudia, MD,PhD, San Francisco, CA (*Presenter*) Nothing to Disclose
Michael T. Caton, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

walter.wiggins@duke.edu

LEARNING OBJECTIVES

1) Name the three main categories of image analysis problems that are suitable for deep learning. 2) Explain the basic rationale for dividing a data set into training, validation, and test subsets. 3) Train a model with transfer learning, including fine tuning and analyzing training curves.

ABSTRACT

In this hands-on session, participants will have the opportunity to learn the basics principles of training a deep learning model for radiologic image classification by working through step-by-step example in a self-contained, web-hosted environment (Google Colab). Using the RSNA Pneumonia Detection Challenge data set, learners will train a model to classify chest radiographs as positive or negative for pneumonia. This session will cover basic terminology and concepts such as splitting data into training/validation/test subsets, transfer learning and analyzing training curves. No prior coding or machine learning experience is necessary.

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RCA25

Interactive Artificial Intelligence for Non-coders: Object Localization and Image Segmentation

AI IN

AMA PRA Category 1 Credit ™: 1.00

Participants

Peter Chang, MD, Irvine, CA (*Moderator*) Nothing to Disclose
Peter Chang, MD, Irvine, CA (*Presenter*) Nothing to Disclose
Jae Ho Sohn, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Michelle Bardis, MS, Irvine, CA (*Presenter*) Nothing to Disclose
Simukayi Mutasa, MD, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the difference between image classification, object localization and image segmentation. 2) Explain the steps required in data collection and annotation for object localization and image segmentation tasks. 3) Assess the benefits and drawbacks of utilizing object detection and image segmentation methods as opposed to object classification. 4) Examine the current state of the art base neural network architectures for object detection and image segmentation at a qualitative level. 5) Run a previously trained object detection and segmentation network for localizing intracranial hemorrhage.

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RCA32

Image to 3D Prints: How 3D Printing Works (Hands-on)

IN

Participants
Beth A. Ripley, MD, PhD, Seattle, WA (*Moderator*) Nothing to Disclose
Beth A. Ripley, MD, PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Tatiana Kelil, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Dmitry Levin, Seattle, WA (*Presenter*) Nothing to Disclose
Anish Ghodadra, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose
Sarah Bastawrous, DO, Seattle, WA (*Presenter*) Nothing to Disclose
Beth A. Ripley, MD, PhD, Seattle, WA (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe an overview of how 3D printing works, from medical imaging to physical printed model. 2) Explain basic software requirements for converting DICOM images to 3D-printable files. 3) Recognize that there are multiple types of 3D printers, each with strengths and weaknesses 4) Apply basic 3D printed model post-processing techniques learned during the session, such as support material removal. 5). Describe some of the basics of quality assurance for 3D printing labs.

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RCA34

Creating Patient-specific Anatomical Models for 3D Printing

IN

Participants

Nicole Wake, PhD, Bronx, NY (*Moderator*) Consultant, General Electric CompanyIn-kind support, Stratasys, Ltd
Nicole Wake, PhD, Bronx, NY (*DPS Upload*) Consultant, General Electric CompanyIn-kind support, Stratasys, Ltd
Nicole Wake, PhD, Bronx, NY (*Presenter*) Consultant, General Electric CompanyIn-kind support, Stratasys, Ltd
Amy E. Alexander, MS, Rochester, MN (*Presenter*) Nothing to Disclose
Andy Christensen, BS, Littleton, CO (*Presenter*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies
Peter C. Liacouras, PhD, North Potomac, MD (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

RCA41

Work Smarter, Not Harder: Reading Room Efficiencies and Ergonomics (Hands-on)

Saturday, Dec. 5 2:00PM - 3:00PM Room: Channel 3

IN

AMA PRA Category 1 Credit ™: .75

Participants
Puneet Bhargava, MD, Seattle, WA (*Moderator*) Editor, Reed Elsevier

LEARNING OBJECTIVES

1) Outline how to organize your personal workspace for optimal reading room productivity. 2) Outline work related pathologies that develop with poor use of ergonomics; elucidate suggestions for optimum ergonomics to prevent work-related injuries. 3) Using available hardware and software scripting tools to adapt the system to the radiologist and minimize inefficiency caused by repetitive tasks embedded in the workflow.

Sub-Events

RCA41A Reading Room Efficiencies: Applying Personal Productivity Techniques to Optimize Reading Room Productivity

Participants
Puneet Bhargava, MD, Seattle, WA (*Presenter*) Editor, Reed Elsevier

RCA41B How About Reading Room Ergonomics: Solutions to Preserve Your Body and Eyes

Participants
Omer A. Awan, MD, Lutehrville-timonium, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Outline work related pathologies that develop with poor use of ergonomics. 2) Elucidate suggestions for optimum ergonomics to prevent work related injuries.

ABSTRACT

n/a

RCA41C Clickonomics: Leveraging Readily Available Hardware and Software Tools to Eliminate Wasteful Repetitive Tasks Embedded in Routine Workflow

Participants
Nicholas Said, MD, MBA, Durham, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about readily available hardware and software tools that can minimize inefficiency caused by repetitive tasks embedded in the Radiology workflow. 2) Learn how to use these tools both independently and synergistically.

ABSTRACT

Radiology workflow is often riddled with inefficiencies requiring Radiologists to perform repetitive tasks as they adapt to complex systems. The presentation will highlight readily available software and hardware tools that can be leveraged to curtail repetitive micro-inefficiencies littered through a typical radiology workday. We will discuss how tools can be synergistically employed to curtail inefficiency and increase daily productivity.

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RCA42

Getting Stuff Done: A Hands-on Technology Workshop to Enhance Personal Productivity (Hands-on)

IN

Participants
Puneet Bhargava, MD, Seattle, WA (*Moderator*) Editor, Reed Elsevier
Puneet Bhargava, MD, Seattle, WA (*Presenter*) Editor, Reed Elsevier
Sherry S. Wang, MBBS, Salt Lake City, UT (*Presenter*) Royalties, Reed Elsevier
Matthew B. Morgan, MD, Sandy, UT (*Presenter*) Consultant, Reed Elsevier
Monica M. Sheth, MD, Manhasset, NY (*Presenter*) Nothing to Disclose
Puneet Bhargava, MD, Seattle, WA (*DPS Upload*) Editor, Reed Elsevier

For information about this presentation, contact:

sherry.wang@utah.edu

LEARNING OBJECTIVES

1) Introduce the concept of 'Getting Things Done.' Learn the concepts of Inbox Zero and other email management techniques. 2) Using tools such as note-taking applications, citation and password managers. 3) Using self-inquiry techniques, review how to make meaningful and powerful changes in how we engage with technology.

Printed on: 05/05/21

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RCA43

Interactive Artificial Intelligence for Non-coders: Basics of Information Extraction from Radiology Reports

AI IN

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Walter F. Wiggins, MD, PhD, Durham, NC (*Moderator*) Nothing to Disclose
Walter F. Wiggins, MD, PhD, Durham, NC (*Presenter*) Nothing to Disclose
Igor R. dos Santos, MD, Sao Paulo, Brazil (*Presenter*) Nothing to Disclose
Felipe C. Kitamura, MD, MSC, Sao Paulo, Brazil (*Presenter*) Consultant, MD.ai, Inc
Luciano M. Prevedello, MD, MPH, Columbus, OH (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

kitamura.felipe@gmail.com

walter.wiggins@duke.edu

LEARNING OBJECTIVES

1) Understand the benefits of structured reporting for information extractionn. 2) Define the basic terminology of text analysis (e.g. preprocessing, parsing, tokenization). 3) Train a model to classify chest radiograph reports as 'positive' or 'negative' for opacity.

ABSTRACT

In this hands-on session, participants will have the opportunity to learn the basic principles of information extraction from radiology reports by working through a step-by-step example in a self-contained, web-hosted environment (Google Colab). Using radiology reports from the National Library of Medicine/Indiana Univ. Chest X-ray data set, learners will train a model to classify radiology reports as positive or negative for opacity. This session will cover basics of text analysis (also known as 'natural language processing or NLP') and concepts such as structured reporting, report parsing, and preprocessing of text. No prior coding or machine learning experience is necessary.

Printed on: 05/05/21

RCC11

Secure Image Sharing for Education and Patient Care in Radiology

ED IN

Participants
Saad Ranginwala, MD, Chicago, IL (*Moderator*) Nothing to Disclose
Saad Ranginwala, MD, Chicago, IL (*DPS Upload*) Nothing to Disclose

LEARNING OBJECTIVES

1) Learn about the advantages of using mobile devices for sharing radiological images, both for education and patient care. 2) Know about the risks involved in sharing personal data when using public messaging services like WhatsApp. 3) Learn about the strategies and techniques to share medical images safely and securely. 4) Know about the existing regulations for protection of privacy and personal data.

Sub-Events

RCC11A Methods and Tools for Removing Protected Health Information from Images

Participants
Jason M. Hostetter, MD, Baltimore, MD (*Presenter*) Founder, Pacsbin.com

For information about this presentation, contact:

jason.hostetter@som.umaryland.edu

LEARNING OBJECTIVES

1) Understand HIPAA requirements for PHI removal from medical images. 2) Review challenges in medical image anonymization. 3) Compare current tools available for image anonymization and sharing.

RCC11B Image Sharing on Social Media: Guidelines and Tips

Participants
Saad Ranginwala, MD, Chicago, IL (*Presenter*) Nothing to Disclose

RCC11C Example Implementation of Secure Image Sharing in Radiology

Participants
Wyatt M. Tellis, PhD, San Francisco, CA (*Presenter*) Officer, EyePACS, LLC

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RCC12

2020 Informatics Year in Review: Key Advances in AI, Radiomics, Text Mining and More

AI IN

Participants
William Hsu, PhD, Los Angeles, CA (*Moderator*) Research Grant, Siemens AG
Po-Hao Chen, MD, MBA, Cleveland, OH (*Presenter*) Nothing to Disclose
William Hsu, PhD, Los Angeles, CA (*Presenter*) Research Grant, Siemens AG
William Hsu, PhD, Los Angeles, CA (*DPS Upload*) Research Grant, Siemens AG

LEARNING OBJECTIVES

1) Identify the year's most important advances in imaging informatics. 2) Describe the ways in which Artificial Intelligence (AI) and machine learning are impacting radiology. 3) Define how radiomics, radiogenomics, and 'big data' have added to our knowledge of radiology.

ABSTRACT

The field of imaging informatics continues to advance rapidly. Machine learning, a form of artificial intelligence (AI), has improved the ability to detect image features, make diagnoses, and assess prognosis from image data. Radiomics - which generates high-dimensionality datasets from radiology images - provides insights to support precision medicine. Novel approaches have improved sharing of images and image-derived findings with patients and clinicians. Current research efforts go beyond pixel data to integrate imaging with other biomedical data, standardize imaging workflows, and improve the quality and utility of image-derived information in clinical practice. This session reviews key advances in imaging informatics research published this past year.

RCC13

Building a Social Media and Web Brand

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Alex Towbin, MD, Cincinnati, OH (*Moderator*) Author, Reed ElsevierGrant, Guerbet SAConsultant, Anderson Publishing, LtdAdvisory Board, IBM CorporationAdvisory Board, KLAS Enterprises LLC

LEARNING OBJECTIVES

1) Describe the importance of building a brand for themselves and for their department. 2) Describe how social media can be used to impact radiology education. 3) Describe how a hashtag can help to galvanize a specialty around a common theme.

Sub-Events

RCC13A The Importance of Branding for Radiologists and Radiology Departments

Participants
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed ElsevierGrant, Guerbet SAConsultant, Anderson Publishing, LtdAdvisory Board, IBM CorporationAdvisory Board, KLAS Enterprises LLC

LEARNING OBJECTIVES

1) List three social media platforms that can be used to promote a practice. 2) Provide three examples of content that can be delved for social media platforms.

RCC13B Using Multiple Social Media Channels to Educate

Participants
Vikas Shah, MRCP, FRCR, Leicester, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe the benefits and limitations of using social media to educate. 2) Contrast the features of the most popular social media channels used to convey radiology education. 3) Develop a strategy to commence educational activities using social media. 4) Understand rules, regulation and best practice suggestions to protect patient privacy and data. 5) Recognize how online educational activity can help to build a personal brand.

RCC13C Social Marketing and the Power of a Hashtag

Participants
Catherine Slotnick, New York, NY (*Presenter*) Nothing to Disclose

RCC13D Q&A

Participants
Alex Towbin, MD, Cincinnati, OH (*Presenter*) Author, Reed ElsevierGrant, Guerbet SAConsultant, Anderson Publishing, LtdAdvisory Board, IBM CorporationAdvisory Board, KLAS Enterprises LLC

RCC22

Medical 3D Printing Regulatory & Quality Considerations

Monday, Nov. 30 10:00AM - 11:00AM Room: Channel 3

IN SQ

AMA PRA Category 1 Credit ™: .75

Participants
Andy Christensen, BS, Littleton, CO (*Moderator*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies

Sub-Events

RCC22A Quality Assurance Perspectives for Medical 3D Printing in the Hospital

Participants
Anish Ghodadra, MD, Pittsburgh, PA (*Presenter*) Nothing to Disclose

RCC22B 3D Printing in Hospitals: Conceptual Regulatory Framework

Participants
Nooshin Kiarashi, PhD, Silver Spring, MD (*Presenter*) Nothing to Disclose

RCC22C NIOSH Perspective on 3D Printing in the Hospital Environment

Participants
Gary A. Roth, PhD, Cincinnati, OH (*Presenter*) Nothing to Disclose

RCC22D Quality Assurance for Medical Imaging and Post-processing for 3D Printed Models

Participants
Shuai Leng, PHD, Rochester, MN (*Presenter*) Nothing to Disclose

RCC22E Sterilization of 3D Printed Models and Guides

Participants
Randal Eveland, PhD, Mentor, OH (*Presenter*) I am an employee of STERIS. STERIS (STERIS.com) is a leading provider of infection prevention and procedural products and services, focused primarily on the critical markets of healthcare, pharmaceutical and research and medical devices.

For information about this presentation, contact:

randal_eveland@steris.com

LEARNING OBJECTIVES

1) Identify key considerations for sterilization of a 3D printed surgical guide or model intended for surgical use.

RCC23

Medical Device Cybersecurity: A Total Product Lifecycle Approach

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Debra Bruemmer, BS,MBA, Rochester, MN (*Moderator*) Nothing to Disclose

Sub-Events

RCC23A **Medical Device Security and the FDA**

Participants
Aftin Ross, PhD, Silver Spring, MD (*Presenter*) Nothing to Disclose

RCC23B **Medical Device Security in a Connected World**

Participants
Debra Bruemmer, BS,MBA, Rochester, MN (*Presenter*) Nothing to Disclose

RCC23C **Defending the Impossible: Internet of Medical Things**

Participants
Janine Medina, MS, Brooklyn, NY (*Presenter*) Nothing to Disclose

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RCC24

Creating Publicly Accessible Radiology Imaging Resources for Machine Learning and AI

Sunday, Nov. 29 2:00PM - 3:00PM Room: Channel 2

AI IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Curtis P. Langlotz, MD,PhD, Menlo Park, CA (*Moderator*) Stockholder, Nines.aiAdvisory Board, Nines.aiStockholder, whiterabbit.aiAdvisory Board, whiterabbit.aiStockholder, Galileo CDS, IncAdvisory Board, Galileo CDS, IncStockholder, Bunker Hill, IncBoard of Directors, Bunker Hill, IncResearch Grant, General Electric CompanyResearch Grant, Siemens AGResearch Grant, Koninklijke Philips NVResearch Grant, Alphabet Inc
John B. Freymann, BS, Rockville, MD (*Presenter*) Nothing to Disclose
Jayashree Kalpathy-Cramer, MS, PhD, Charlestown, MA (*Presenter*) Research support, General Electric CompanyResearch support, F. Hoffmann-La Roche Ltd
George L. Shih, MD, New York, NY (*Presenter*) Consultant, MD.ai, IncStockholder, MD.ai, Inc
Erich Huang, PhD, Rockville, MD (*Presenter*) Nothing to Disclose
Curtis P. Langlotz, MD,PhD, Menlo Park, CA (*Presenter*) Stockholder, Nines.aiAdvisory Board, Nines.aiStockholder, whiterabbit.aiAdvisory Board, whiterabbit.aiStockholder, Galileo CDS, IncAdvisory Board, Galileo CDS, IncStockholder, Bunker Hill, IncBoard of Directors, Bunker Hill, IncResearch Grant, General Electric CompanyResearch Grant, Siemens AGResearch Grant, Koninklijke Philips NVResearch Grant, Alphabet Inc

For information about this presentation, contact:

john.freymann@nih.gov

langlotz@stanford.edu

LEARNING OBJECTIVES

1) Learn about practical challenges of data preparation (e.g. de-identification) and possible venues for hosting public data sets. 2) Learn techniques for image pre-processing to improve reproducibility and generalizability. 3) Learn about tools for creating 'ground truth' labeling of imaging data sets. 4) Learn statistical approaches to properly create training & testing cohort.

ABSTRACT

Well-curated and annotated imaging data sets have been recognized as a prerequisite to the development of computer-aided detection and diagnostic algorithms, but with the new advances in machine learning and artificial intelligence, special attention to how these data sets are prepared is even more critical. This session will provide attendees with an opportunity to learn from leaders in the fields of radiology and AI about their experiences developing and leveraging publicly-accessible data resources for AI. Participants will learn about practical challenges such as de-identification, image pre-processing steps to improve reproducibility, tools & techniques for creating 'ground truth' labeling, and statistical approaches to properly create training & testing cohorts.

RCC25

3D Printing Basics

IN

Participants
Andy Christensen, BS, Littleton, CO (*Moderator*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies
Andy Christensen, BS, Littleton, CO (*DPS Upload*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies

Sub-Events

RCC25A Current 3D Printing Initiatives Overview (Codes, Registry, DICOM, QA, SIG)

Participants
Andy Christensen, BS, Littleton, CO (*Presenter*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies
Justin R. Ryan, PhD, San Diego, CA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jryan2@rchsd.org

RCC25B How to Start a 3D Printing Lab

Participants
Jane S. Matsumoto, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RCC25C Image Segmentation and CAD Modeling Strategies/Tools

Participants
Nicole Wake, PhD, Bronx, NY (*Presenter*) Consultant, General Electric CompanyIn-kind support, Stratasys, Ltd

RCC25D Technologies and Post Processing Considerations

Participants
Peter C. Liacouras, PhD, North Potomac, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the basic principle of Additive Manufacturing (3D Printing) and how it differs from subtractive technology. 2) Understand the principles of the software needed to convert Medical Images into three-dimensional printed models and what factors contribute to the quality of each model. 3) Become familiar with the different types of Additive Manufacturing (3D Printing) technologies.

ABSTRACT

This presentation will provide a basic understanding of 3D Printing (Additive Manufacturing) Technologies and general knowledge applicable to the medical field. The basic principles of 3D Printing will be discussed along with thedifferent technologies which encompass the field. The steps of converting radiographic images into three-dimensional printable files and the differences between the multitude of additive manufacturing techniques will be the primary focuses.

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RCC31

The Imaging Standards You Need to Know: DICOM, LOINC, SNOMED, HL7, FHIR, ICD-10, and CPT

IN

AMA PRA Category 1 Credit ™: .75

Participants
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Moderator*) Co-founder, DexNote, LLC

LEARNING OBJECTIVES

1) Define the concept of interoperability in the healthcare enterprise. 2) Describe the role of technology standards with regard to imaging. 3) Identify important trends in the current evolution of these standards.

Sub-Events

RCC31A Introduction

Participants
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Presenter*) Co-founder, DexNote, LLC

RCC31B ICD-10 and CPT

Participants
Jan Taylor, Durham, NC (*Presenter*) Nothing to Disclose

RCC31C LOINC

Participants
Swapna Abhyankar, Indianapolis, IN (*Presenter*) Nothing to Disclose

RCC31D DICOM, DICOMweb

Participants
Kevin O'Donnell, Pacifica, CA (*Presenter*) Employee, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Understand how DICOM is organized. 2) Apply that organization to match up your needs (RFP) with vendor products (DICOM Conformance Statement). 3) Review what DICOM covers in radiology, cardiology, and other specialties. 4) Learn how DICOMweb fits with FHIR. 5) Preview a couple early-adopter DICOM features.

RCC31E HL7 and FHIR

Participants
Brad Genereaux, Santa Clara, CA (*Presenter*) Employee, NVIDIA Corporation

RCC31F SNOMED-CT

Participants
Walter S. Campbell, PhD, Omaha, NE (*Presenter*) Nothing to Disclose

RCC31G Building Standards Into Clinical Workflow via Integrating the Healthcare Enterprise Profiles

Participants
Christopher J. Roth, MD, Durham, NC (*Presenter*) Nothing to Disclose

RCC32

Reimbursement Topics in 3D Printing

HP IN

Participants
Andy Christensen, BS, Littleton, CO (*Moderator*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies
Frank J. Rybicki III, MD, PhD, Cincinnati, OH (*Moderator*) Director, Imagia Cybernetics Inc
Andy Christensen, BS, Littleton, CO (*DPS Upload*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies

Sub-Events

RCC32A Reimbursement: Roadmap for Anatomic Models

Participants
Frank J. Rybicki III, MD, PhD, Cincinnati, OH (*Presenter*) Director, Imagia Cybernetics Inc

RCC32B Anatomic Model CPT Codes Overview

Participants
Andy Christensen, BS, Littleton, CO (*Presenter*) Stockholder, Somaden LLCStockholder, UNYQ Design Stockholder, VizuaStockholder, Dimension Inx Stockholder, Integrum ABBoard of Directors, Integrum AB Stockholder, Precision ADMBoard of Directors, Precision ADM Stocholder, CollPlant Biotechnologies

LEARNING OBJECTIVES

1) Review the recently established Category III CPT Codes for anatomic models and anatomic guides. 2) Understand how the codes should be applied for certain 3D printing clinical indications. 3) Learn how major institutions throughout the US are implementing the new codes in clinical practice.

RCC32C Anatomic Model Registry

Participants
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Presenter*) Co-founder, DexNote, LLC

LEARNING OBJECTIVES

1) Define the need for a registry in clinical 3D printing. 2) Describe the RSNA-ACR 3D Printing Registry project. 3) Apply the registry data dictionary to the submission of clinical cases. 4) Explain the types of analyses which will be enabled by registry data.

RCC32D Applying 3D Printing Codes to a Medical Practice

Participants
Jane S. Matsumoto, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RCC33

Medical 3D Printing: Clinical Applications I

IN

Participants
Nicole Wake, PhD, Bronx, NY (*Moderator*) Consultant, General Electric CompanyIn-kind support, Stratasys, Ltd
Nicole Wake, PhD, Bronx, NY (*DPS Upload*) Consultant, General Electric CompanyIn-kind support, Stratasys, Ltd

Sub-Events

RCC33A 3D Printing Applications in Craniomaxillofacial and Neurological Surgery

Participants
Jonathan M. Morris, MD, Rochester, MN (*Presenter*) Nothing to Disclose

RCC33B 3D Printing Applications in Orthopaedic Surgery

Participants
Adnan M. Sheikh, MD, Ottawa, ON (*Presenter*) Speaker, Siemens AG

RCC33C 3D Printing for Congenital Heart Disease

Participants
Shi-Joon Yoo, MD, Toronto, ON (*Presenter*) Nothing to Disclose

RCC33D 3D Printing for Vascular Applications

Participants
Ciprian N. Ionita, PhD, Buffalo, NY (*Presenter*) Grant, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Teach the steps required to build hallow vascular phantoms which could be used for flow and endovascular simulations. 2) Demonstrate the benefit of using 3D printed cardiovascular phantoms for training. 3) Demonstrate the benefit of the 3D printed cardiovascular phantoms for pre-treatment simulations in high risk surgery patients.

ABSTRACT

Patient specific vascular phantoms manufactured using 3D printing can be a valuable tool for device testing, software validation and endovascular treatment planning. Traditional vascular phantoms are made from one material and they are a simplification of the patient anatomy. They model one artery, rarely included branching arteries and the arterial wall mechanical properties are not properly modeled. In addition, inclusion of pathologies such as atherosclerotic plaques or surrounding anatomical structures is practically inexistent. New advancements in multi-material 3D printing allow development of phantoms replicating complex vascular systems and vascular disease which can mimic mechanical properties of the vessels and physiological aspects of the blood flow. In this presentation we will describe how to design comprhensive vascular phantoms which includes significant distal vasculature and vascular lesions such as atherosclerotic plaques and aneurysms. We will review various uses of the patient specific vascular phantoms for treatment planning of vascular diseases such as abdominal aortic aneurysms with the Fenestrated Endo Vascular Aortic Repair device. We will show how significant surgery outcome improvement may be achieved in patients undergoing pre-treatment simulation using patient specific phantoms.

RCC33E 3D Printing in Urologic Oncology

Participants
Nicole Wake, PhD, Bronx, NY (*Presenter*) Consultant, General Electric CompanyIn-kind support, Stratasys, Ltd

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RCC34

Decision Support and Implications for Federal Regulations (PAMA): What You Need to Know and Do

IN

AMA PRA Category 1 Credit ™: 1.00

Participants

Ramin Khorasani, MD, Roxbury Crossing, MA (*Moderator*) Nothing to Disclose
Ali Raja, MD, MBA, Brookline, MA (*Presenter*) Nothing to Disclose
Keith D. Hentel, MD, MS, Briarcliff, NY (*Presenter*) Nothing to Disclose
John Mongan, MD,PhD, San Francisco, CA (*Presenter*) Research funded, General Electric Company; Spouse, Employee, AbbVie Inc
Pamela T. Johnson, MD, Baltimore, MD (*Presenter*) Intellectual property, Medical Imaging and Population HealthIntellectual property, Decision Support and Implications for Federal Regulations (PAMA): What You Need to Know and Do

For information about this presentation, contact:

PamelaJohnson@jhmi.edu

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RCC35

Challenges and Strategies to Making AI Reliable in Clinical Practice

AI IN

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Participants
Daniel L. Rubin, MD, Palo Alto, CA (*Moderator*) Consultant, F. Hoffmann-La Roche Ltd

For information about this presentation, contact:

daniel.l.rubin@stanford.edu

Sub-Events

RCC35A AI Bias, Generalizability and Instability: Clinical Implications and Approaches to Better Practice

Participants
Daniel L. Rubin, MD, Palo Alto, CA (*Presenter*) Consultant, F. Hoffmann-La Roche Ltd

For information about this presentation, contact:

daniel.l.rubin@stanford.edu

RCC35B Clinical Trials in AI: Should We Demand Real World Evidence for the Safety and Efficacy of AI Models?

Participants
Luke Oakden-Rayner, Adelaide, Australia (*Presenter*) Nothing to Disclose

RCC35C Meaningful Post-market Surveillance for AI Systems: Regulatory and Clinical Considerations

Participants
Hugh Harvey, MBBS, London, United Kingdom (*Presenter*) Advisor, Smart ReportingAdvisor, Segmed.aiAdvisor, AlgoMedica, IncAdvisor, Everlight RadiologyManaging Director, Hardian Health

For information about this presentation, contact:

hugh@hardianhealth.com

LEARNING OBJECTIVES

1) Understand the regulatory post-market surveillance requirements under US and EU frameworks. 2) Learn that PMS and PMCF are different, and must be planned ahead 3) How to use best practice guidance to report post market studies 4) KNowledge of failure case analysis and sub-stratification studies

ABSTRACT

Both the FDA and the European Commission are setting their sights on post-market clinical follow up as regulatory standard for monitoring the safety and efficacy of algorithms in the wild. However, PMCF and ongoing surveillance are a new subject to developers and clinicians alike - the new era of 'technovigilance' is upon us!

RCC41

Medical 3D Printing: Clinical Applications II

IN

Participants
Peter C. Liacouras, PhD, North Potomac, MD (*Moderator*) Nothing to Disclose
Amy E. Alexander, MS, Rochester, MN (*DPS Upload*) Nothing to Disclose

Sub-Events

RCC41A 3D Printing Applications for Abdominal, Hepatobiliary, and Gastrointestinal Conditions

Participants
David H. Ballard, MD, Saint Louis, MO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

davidballard@wustl.edu

LEARNING OBJECTIVES

1) Define current abdominal, hepatobiliary, and gastrointestinal clincal appropriateness guidelines. 2) Illustrate uses of 3D printed anatomic models for guiding treatment in abdominal, hepatobiliary, and gastrointestinal conditions through cases examples. 3) Assess current 3D pritning abdominal literature and identify areas for future work.

RCC41B 3D Printing for Breast Cancer

Participants
Lumarie Santiago, MD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Lumarie.Santiago@mdanderson.org

LEARNING OBJECTIVES

1) Understand the preferred source imaging exam for 3D printing in breast diseases. 2) Appreciate the importance of multi-modality correlation during the segmentation process. 3) Identify possible limitations in segmentation accuracy. 4) Recognize the impact of the intended use of 3D printed breast models in their design and post processing.

ABSTRACT

We shall review the workflow for 3D printing of breast diseases and review the preferred source imaging exam for 3D printed breast models and the importance of multi-modality correlation between breast MRI, mammography and other breast imaging studies ensures accuracy of segmentation. We will address possible sources of limitation in the segmentation process and discuss how the intended use impacts model design including the anatomy to be included, planes of articulation, print ratio, post processing and material selection. The integration of temporal data in the creation of a 4D breast model will also be discussed.

RCC41C 3D Printing in Radiation Therapy

Participants
James Robar, PhD, Halifax, NS (*Presenter*) Co-founder, Adaptiiv Medical Technologies Inc

For information about this presentation, contact:

James.robar@nshealth.ca

LEARNING OBJECTIVES

The learning objectives of this course are as follows: 1) To understand the rationale for 3D printing in radiation oncology. 2) To appreciate advantages of 3D printing in external beam photon therapy with regard to accuracy and workflow. 3) To understand new flexibility offered by 3D printing in electron external beam therapy. 4) To understand the role of 3D printing in surface high dose rate brachytherapy. 5) To become acquainted with forthcoming methods including intracavitary and interstitial brachytherapy. 6) To become aware of forthcoming research areas such as 3D printed dosimeters.

RCC41D 3D Printed Anatomic Guides

Participants
Amy E. Alexander, MS, Rochester, MN (*Presenter*) Nothing to Disclose

RCC41E 3D Printing in Orthotics and Prosthetics

Participants
Peter C. Liacouras, PhD, North Potomac, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand how digital technology and 3D printing can be used for the creation of custom prosthetic components. 2) Make informed decisions on appropriate 3D printing materials. 3) Understand differences between military and civilian amputee populations. 4) Utilize computed tomography in the prosthetic component design process. 5) Give examples of assistive technology devices.

Printed on: 05/05/21

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RCC42

Ethics of AI in Radiology: Summary of the European and North American Multisociety Statement

Saturday, Dec. 5 8:30AM - 9:30AM Room: Channel 3

AI IN

AMA PRA Category 1 Credit ™: 1.00

Participants
J. R. Geis, MD, Fort Collins, CO (*Presenter*) Nothing to Disclose
Judy W. Gichoya, MBChB,MS, Atlanta, GA (*Presenter*) Nothing to Disclose
Elmar C. Kotter, MD, MSc, Freiburg, Germany (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

elmar.kotter@uniklinik-freiburg.de

LEARNING OBJECTIVES

1) Realize that AI will make clinical and workflow decisions in radiology. While this will mature into a reliable and robust infrastructure, currently no one has meaningful experience using such machines for patient care at scale. This gives rise to considerable potential for errors with high consequences. 2) Realize that your radiology data are extremely valuable for commercial purposes. Understand how to control access to those data, and to make your enterprise aware. 3) Recognize different types of bias in radiology data. 4) Appreciate ethical issues for machine learning and AI in radiology. 5) Understand unique aspects of transparency, fairness, and privacy when using AI in radiology.

ABSTRACT

It is challenging to use decision-making AI machines in radiology situations that previously could only be done by humans. AI offers great promise but comes with numerous potential pitfalls, and is inevitably biased to some degree. Radiologists have a duty to understand the benefits and risks of AI agents they use, to alert patients and stakeholders to potential pitfalls as appropriate, and to monitor AI products to guard against harm. While this will undoubtedly mature into a reliable and robust infrastructure, currently we lack meaningful experience using such machines for patient care at scale. This gives rise to considerable potential for errors with high consequences.Because developing AI driven machines today requires massive amounts of well labeled radiology data, the value of those data is skyrocketing and the drive to provide commercial access to radiology data will become overwhelming. Currently how to allow, manage, and contract for that data access is evolving at a rate which outstrips our current knowledge or abilities. We are at risk of making expensive and calamitous mistakes with radiology data.In addition to the significant good which will come from using these data to make better predictions and improve patient health, the opportunity unquestionably exists to obtain incredibly significant additional income by using these data in unethical ways which may harm patients, other cohorts, or the common good. Limiting radiology AI to ethical uses means leaving a massive amount of money on the table. One of our greatest challenges is how to thwart those who will attempt to acquire this value.Patients, radiologists, and other cohorts in the radiology community are at risk of being engulfed by digital surveillance and categorized and manipulated by intelligent and autonomous machines.AI has dramatically altered our perception of radiology examinations and associated data --- their value, how to use them and how they may be misused. As much as understanding AI, radiologists have a moral duty both to understand their data, and to use the data they collect to improve the common good, extract more information about patients and their diseases, and improve the practice of radiology.

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RCC43

Advanced Cinematic Rendering

IN

Participants

Elliot K. Fishman, MD, Owings Mills, MD (*Moderator*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company
Elliot K. Fishman, MD, Owings Mills, MD (*Presenter*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company
Linda C. Chu, MD, Lutherville, MD (*Presenter*) Nothing to Disclose
Elliot K. Fishman, MD, Owings Mills, MD (*DPS Upload*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company

Printed on: 05/05/21

RCC45

NIH Imaging Data Commons - A Cloud-based Open Integrated Resource for Cancer Imaging Research

Thursday, Dec. 3 5:00PM - 6:00PM Room: Channel 5

AI IN RS

AMA PRA Category 1 Credit ™: 1.00

Participants
Keyvan Farahani, PhD, Bethesda, MD (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

farahani@nih.gov

Sub-Events

RCC45A Cancer Research Data Commons

Participants
Todd Pihl, Rockville, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

todd.pihl@nih.gov

LEARNING OBJECTIVES

1) Understand the resources available from the Cancer Research Data Commons and how I can interact with them.

RCC45B Imaging Data Commons

Participants
Andriy Fedorov, PhD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

andrey.fedorov@gmail.com

LEARNING OBJECTIVES

1) Develop understanding of the Imaging Data Commons and and its role within the Cancer Research Data Commons. 2) Learn about the planned timeline for development of the various capabilities of IDC. 3) Understand the current status of IDC and the available learning materials to support early adopters of the resource.

ABSTRACT

NCI Imaging Data Commons (IDC) is a new component being developed as part of the NCI Cancer Research Data Commons (CRDC). CRDC is envisioned as "a virtual, expandable infrastructure that provides secure access to many different data types across scientific domains, allowing users to analyze, share, and store results, leveraging the storage and elastic compute, or ability to easily scale resources, of the cloud" (https://datascience.cancer.gov/data-commons). IDC is intended to connect cancer imaging researchers with publicly available cancer imaging data, linked with other types of cancer data, and co-located with cloud-based computational resources. IDC will provide the tools to search and visualize cancer imaging data, including data archives collected during the course of planning and delivering image-guided therapies, define cohorts and use those cohorts for cloud-based analysis to better understand the disease and evaluate treatment options. The goal of this presentation is to introduce the audience to IDC.

RCC45C Cloud Resources and Computing

Participants
William J. Longabaugh, MS, Seattle, WA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

wlongabaugh@isbscience.org

LEARNING OBJECTIVES

1) Learn about the various National Cancer Institute (NCI) Cancer Research Data Commons (CRDC) cloud resources; 2) Understand how the cloud resources can be used to analyze data hosted by the CRDC data nodes, including the Imaging Data Commons; 3) Gain insights into how the various components of the CRDC interact

ABSTRACT

The National Cancer Institute (NCI) Imaging Data Commons (IDC) is just one component of the entire NCI Cancer Research Data Commons (CRDC). CRDC consists of both data nodes and cloud resources. Examples of the former include the IDC, the Genomic Data Commons (GDC), the Proteomic Data Commons (PDC), and the Integrated Canine Data Commons (ICDC); other nodes are scheduled to be added. The cloud resources include the Institute for Systems Biology's ISB-CGC, the Seven Bridges Cancer

Genomics Cloud, and the Broad Institute's FireCloud. These cloud resources provide computational, collaboration, data exploration, storage, tool, and workflow resources that can be deployed to run analyses, using data provided by the researcher and/or by the data nodes. This presentation will introduce how the Cloud Resources can be used to analyze data, and how the pieces of the CRDC interact.

RCC45D Imaging AI on the Cloud

Participants
Bradley J. Erickson, MD, PhD, Rochester, MN (*Presenter*) Board of Directors, VoiceIt Technologies, LLCStockholder, VoiceIt Technologies, LLCBoard of Directors, FlowSigma, LLCOfficer, FlowSigma, LLCStockholder, FlowSigma, LLC

RCC45E Radiomics and AI-Imaging Biomarkers

Participants
Hugo Aerts, PhD, Boston, MA (*Presenter*) Consultant, Onc.AI

Printed on: 05/05/21

RCC51

AI and Machine Learning in Radiology: Practical Considerations for Real World Implementation

AI IN

AMA PRA Category 1 Credits ™: 1.25

Participants
Paul J. Chang, MD, Chicago, IL (*Moderator*) Co-founder, Koninklijke Philips NVResearcher, Koninklijke Philips NVAdvisory Board, Bayer AGAdvisory Board, Aidoc LtdAdvisory Board, Inference Analytics, IncAdvisory Board, Subtle Medical

Sub-Events

RCC51 Introduction

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NVResearcher, Koninklijke Philips NVAdvisory Board, Bayer AGAdvisory Board, Aidoc LtdAdvisory Board, Inference Analytics, IncAdvisory Board, Subtle Medical

RCC51A Integration of AI in Radiology Workflow

Participants
Luciano M. Prevedello, MD, MPH, Columbus, OH (*Presenter*) Nothing to Disclose

RCC51B Practical Supervision/Data Curation Strategies

Participants
George L. Shih, MD, New York, NY (*Presenter*) Consultant, MD.ai, IncStockholder, MD.ai, Inc

RCC51C Practical IT Considerations for AI and Machine Learning

Participants
Paul J. Chang, MD, Chicago, IL (*Presenter*) Co-founder, Koninklijke Philips NVResearcher, Koninklijke Philips NVAdvisory Board, Bayer AGAdvisory Board, Aidoc LtdAdvisory Board, Inference Analytics, IncAdvisory Board, Subtle Medical

RCC52

Image Sharing in 2020

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
David S. Mendelson, MD, Larchmont, NY (*Moderator*) Advisory Board, General Electric CompanyAdvisory Board, Nines RadiologyAdvisory Board, OutboundWorksSpouse, Employee, Novartis AG

Sub-Events

RCC52A RSNA Image Share

Participants
David S. Mendelson, MD, Larchmont, NY (*Presenter*) Advisory Board, General Electric CompanyAdvisory Board, Nines RadiologyAdvisory Board, OutboundWorksSpouse, Employee, Novartis AG

LEARNING OBJECTIVES

1) Understand the rationale for Image Exchange. What are the barriers to internet based exchange>2) Learn of the technical standards that can enable robust national network based exchange3) Review the role of ONC in the USA4) Learn the history of the RSNA Image Share as it has developed solutions for: A) Image enabled PHRs B) HIE based exchange with our partner- Carequality

ABSTRACT

CDs have been the mainstay of image exchange for better than a decaded. It is time to move to internet exchange so that images can safely and securely be moved as easily as we move movies, photos and music. Modern standards based technologies can be employed to accomplish this goal. Such technologies include IHE, DICOM, DICOMweb,and HL7 FHIR. Workflow is an important consideration and should drive the implementation of these technologies Early solutions will be described as well as how one might extend these solutions to other healthcare data. Image enable PHRs and HIEs are becoming mainstay soltutions. The RSNA has partnered with Carequality, a national framework for interoperability and connectivity to achieve the goals of ONC in the United Sates.

RCC52B Sequoia, Carequality and Interoperability

Participants
Didi Davis, Knoxville, TN (*Presenter*) Nothing to Disclose

ABSTRACT

The Sequoia Project Our work takes the form of independent initiatives, each with its own mission, governance, membership and structure. We are an ideal home for projects that require a collaborative environment in which multiple parties with differing perspectives can work together. We can provide the sustaining management services and governance support required to allow new initiatives to grow and succeed. Our initiatives work independently but draw upon each other's perspective and expertise as appropriate. Past successful initiatives include: Carequality is a public-private collaborative endeavor focused on interconnecting data sharing networks through a trusted exchange framework and common agreement, designed and maintained by its community. What if you had a cell phone plan that only allowed you to call other customers of your carrier? That's the situation for most healthcare providers today when they join a data sharing network. Carequality is a public-private, multi-stakeholder collaborative that has come together to meet this challenge. Our community, drawn from all parts of the healthcare ecosystem, uses a consensus-based process to enable seamless connectivity across all participating networks. https://carequality.org/overview-video/

RCC52C XDS vs. DICOM Regional Imaging Sharing: A Comparative Look

Participants
Jason Nagels, Newmarket, ON (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jnagels@shn.ca

RCC52D Running an Effective Hospital Image Library

Participants
Hope H. Harten, MBA, Durham, NC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hope.holliday@duke.edu

LEARNING OBJECTIVES

After completing this course the attendee should be able to: 1) Identify key factors critical to building a successful hospital image library. 2) Develop a strategy for gaining buy-in from internal stakeholders. 3) Build a local network of hospitals and imaging facilities

with the common purpose of eliminating CDs for image transfer.

RCC52E Considerations in Non-DICOM Image Sharing

Participants
Brian Willaert, Rochester, MN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

willaert.brian@mayo.edu

LEARNING OBJECTIVES

This section of the talk will concentrate on the image exchange network support for transferring non-DICOM image types. The results of a short survey of the image exchange vendors will be presented, along with an overview of the Mayo Clinic handling of traditionally non-DICOM image types.

ABSTRACT

Non-DICOM support by image exchange networks, including a survey of Image Exchange vendors. An overview of Non-DICOM handling experience at Mayo Clinic will be given, as well as other considerations/decisions to be made in handling of Non-DICOM image exchange.

Printed on: 05/05/21

RCC53

Medical 3D Printing: Educational Models and Related Technologies

IN

Participants
Summer J. Decker, PhD, Tampa, FL (*Moderator*) Nothing to Disclose
Summer J. Decker, PhD, Tampa, FL (*DPS Upload*) Nothing to Disclose

Sub-Events

RCC53A 3D Printing Applications in Education

Participants
Summer J. Decker, PhD, Tampa, FL (*Presenter*) Nothing to Disclose

RCC53B Utilizing 3D Printing for Medical Simulation Models and Phantoms

Participants
Sarah A. Flora, ARRT, Danville, PA (*Presenter*) Nothing to Disclose

RCC53C Overview of Surface Scanning and Photogrammetry

Participants
Michael Raphael, MS, Owings Mills, MD (*Presenter*) Nothing to Disclose

RCC53D Virtual and Augmented Reality

Participants
Justin Sutherland, PhD, Ottawa, ON (*Presenter*) Co-founder, Realize Medical Inc

RCC54

PACS and Diagnostic Viewers in 2020

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Donald Dennison, Waterloo, ON (*Moderator*) Nothing to Disclose

Sub-Events

RCC54A Thorny Questions to Answer During a PACS Replacement

Participants
Christopher J. Roth, MD, Durham, NC (*Presenter*) Nothing to Disclose

RCC54B Supporting, Maintaining and Optimizing Today's Integrated Reading Environment

Participants
Donald Dennison, Waterloo, ON (*Presenter*) Nothing to Disclose

RCC54C The Most Important Technology Questions to Answer When Replacing Your PACS

Participants
Sylvia Devlin, MS,RT, Fulton, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Planning a Remote Support PACS Overhaul2. Go-Live Strategies3. Post Go-Live Lessons Learned

Printed on: 05/05/21

RCC55

CT Protocol Management Across a Healthcare System

CT IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Kevin Little, PhD, Columbus, OH (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Understand the importance of CT protocol management to an imaging practice. 2) Identify tools that can be used to develop consistent protocols across multiple systems. 3) Develop awareness of the Management of Acquisition Profiles (MAP) IHE profile and features that should be requested from CT scanner vendors.

ABSTRACT

CT protocols, which include all clinical and technical parameters for a given study, are the starting point for achieving high-quality images with reasonable radiation and contrast doses. An imaging practice that desires to follow the ALARA principle and produce high-quality images should have standardized protocols across their enterprise. Accreditation standards require a periodic review of all scanner protocols. However, variations among vendors, models, and clinical indications mean that managing and optimizing dozens of parameters for each protocol on every scanner in a health system is challenging. Even when variations between systems are limited, managing protocol names and parameters across multiple systems can be difficult. The purpose of this symposium is to identify tools and techniques that may be used to manage protocols across multiple systems and to provide a framework for protocol optimization.

Sub-Events

RCC55A Overview of CT Protocol Parameters and Protocol Management Pitfalls

Participants
Kevin Little, PhD, Columbus, OH (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Recognize the practical and regulatory requirements for protocol management. 2) Identify the technical and clinical parameters that may be included as part of a CT protocol. 3) Understand common difficulties in managing protocols across system vendors, models, and geographic locations.

RCC55B Available Methods, Strategies, and Tools for CT Protocol Management

Participants
Timothy P. Szczykutowicz, PhD, Madison, WI (*Presenter*) Equipment support, General Electric CompanyLicense agreement, General Electric CompanyFounder, Protocolshare.org LLCMedical Advisory Board, medInt Holdings, LLCConsultant, General Electric CompanyConsultant, Takeda Pharmaceutical Company Limited

LEARNING OBJECTIVES

1) Apply the master protocol concept to your acquisition parameters over your CT fleet. 2) Apply the master protocol concept to your reconstruction parameters over your CT fleet. 3) Gain an understanding of current commercial and custom solutions for protocol management.

ABSTRACT

The talk will detail a CT protocol management strategy called the master protocol concept. The concept groups together phases of indication requiring similiar: levels of image quality, body regions, scan times, and contrast enhancement. Once grouped, 'master' acquisition parameters can be defined for each master protocol. We will show how this simplifies protocol management across a diverse fleet of CT scanners. In other words, it changes a three phase abdomen CTA protocol from being thought of as composed of three unique sets of acqusition parameters into: abdomen CTA master, then 2 phases using the routine abdomen master. We will also apply the same concept to reconstruction parameters. This allows the creation, for example, of identical lung field images across any protocol imaging the chest whether it is a dedicated thoracic protocol or a gated chest CTA. Lastly, we will survey current commerical and custom solutions for protocol management. The goal of the survey will be to inform the attendee on what options exsist today to guide their selection of such a producitivity/complainace informatics solution.

RCC55C Details and Features of DICOM Protocol Storage and the IHE Management of Acquisition Protocols (MAP) Profile

Participants
Kevin O'Donnell, Pacifica, CA (*Presenter*) Employee, Canon Medical Systems Corporation

LEARNING OBJECTIVES

1) Understand the protocol execution and management capabilities enabled by DICOM Protocol Storage objects. 2) Understand the protocol management architecture defined in the IHE MAP Profile. 3) Learn how to request standards-based protocol features in products.

SPCP31

Thailand Presents

OT

AMA PRA Category 1 Credits ™: 2.00

Sub-Events

SPCP31A To Perform MRI Spine in Thailand: What to Keep in Mind

Participants
Suphaneewan Jaovisidha, MD, Bangkok, Thailand (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To develop an idea regarding certain common diseases in Thailand that may be encountered in spinal MR imaging and included areas. 2) Apply appropriate imaging signs/findings to differentiate such conditions from other.

ABSTRACT

Spinal MR imaging is performed worldwide due to many diseases involving this structure. The protocol ranges from basic sequences to recent technology. Since Thailand is endemic area of certain infectious and hematologic diseases, presentation of such in MR imaging of spine and included area is not infrequent. Imaging findings, clues for differentiation, and related research will be discussed.

SPCP31B Aging Brain Imaging Research in Thailand

Participants
Orasa J. Chawalparit, MD, Bangkok, Thailand (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

orasa.cha@gmail.com

LEARNING OBJECTIVES

1) To update the researches involving in dementia in Thai population in order to apply in clinical practice and preparing for upcoming absolute aging society of Thailand by the year 2025.

ABSTRACT

By 2025, Thailand is going to be an absolute aging society which means about 14 million people will be older than 60 years old. The most burdened health care problems in elderly are sarcopenia and dementia. Previous study confirmed the same common causes of dementia in Thai population as other countries leading by Alzheimer's disease. Through many studies in Thai population about dementia were published, only a few involved in imaging study. This presentation is to update the audiences about researches in aging brain in the aspect of imaging done in Thai elderly. Most of the studies are aimed for applying in clinical practice and preparing for the coming aging society in Thailand.

SPCP31C Strengthening Nuclear Medicine Neuroimaging in Thailand

Participants
Tanyaluck Thientunyakit, MD, Bangkok, Thailand (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

stanyalu@hotmail.com

LEARNING OBJECTIVES

1) To demonstrate the recent development of nuclear medicine neuroimaging facilities and strengthening nuclear neuroimaging in Thailand.

ABSTRACT

In the past few years, there have been continuous efforts to develop facilities and resources to support nuclear medicine neuroimaging in Thailand. Multidisciplinary collaborations have been established for different purposes, including clinical services, standard guidelines, trainings and researches in order to be medical and educational hub in South-East Asia. Successful national and internation collaborations as well as future project plans will be also discussed.

SPCP31D Interventional Neuroradiology in Thailand: Trend of Practice and Training

Participants
Anchalee Churojana, MD, Bangkok, Thailand (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

achurojana@gmail.com

LEARNING OBJECTIVES

1) To demonstrate the trend of Interventional Neuroradilogy practice and system of training in Thailand. 2) To describe the characteristics of the involve diseases, such as acute ischemic stroke, intracranial aneurysms, dural arteriovenous shunts, spinal vascular diseases.

ABSTRACT

Interventional Neuroradiology (INR) training in Thailand has started since 2004. The common procedures for neurovascular diseases are mechanical thrombectomy, embolization of intracranial aneurysms, arteriovenous malformations of central nervous system, dural arterivenous shunts and neurovascular truama. The trend of INR is rapidly increasing. However, as our socioeconomic status, cost-effectiveness is the most concern for chosing materials and devices. The important limitations are reimbursement system and referral pathway, particulary when dealing with mechanical thrombectomy.

SPCP31E Emerging of Interventional Radiology Practice in Thailand

Participants
Jirawadee Yodying, MD, Bangkok , Thailand (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jirawadee.yod@mahidol.ac.th

LEARNING OBJECTIVES

1) To demonstrate how Interventional Radiology practice and application has been rapidly emerged in Thailand. 2) To uncover problems and challenges confronting with Thai medical professionals and patients. 3) To discuss possible initiatives to advance Interventional Radiology roadmap in Thailand.

ABSTRACT

With the growing demand of high-quality medical care in Thailand, advanced treatments are expecting. Intervention Radiology (IR) imaging guidance technique is preferred minimally invasive treatment providing precision, effectiveness and early recovery. IR has been strengthened and rapidly emerged over the past 5-10 years as driven by standardized training programs, increasing number of IR medical professionals & resources and national & international collaboration. In this regard, Thailand could potentially become a leading IR hub in Southeast Asia region. However, our key challenges are limited patient awareness, considerably high cost of treatment and specialist resource constraint. This presentation would be beneficial for those who are willing to implement IR for their own facilities and discuss possible regional & global initiatives to advance IR roadmap in Thailand.

SPCP31F Many Faces of Pediatric Tuberculosis in Thailand

Participants
Supika Kritsaneephaiboon, MD, Hat Yai, Thailand (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe the variety of clinical and imaging features of pediatric tuberculosis including pulmonary and extrapulmonary tuberculosis in Thailand. 2) To discuss and summarize the difference between adult and pediatric tuberculosis.

ABSTRACT

Pediatric tuberculosis (TB) is clinical challenging but preventable and treatable disease. Its incidence (aged 0-14 years) in Thailand is about 1% of all total new and relapsed TB cases. The manifestation can exhibit in a variety of clinical and imaging features depending on organ site involvement and mimic other diseases. The most common site is in the lung up to 80% and the extrapulmonary manifestation is lymphadenopathy followed by meningitis, pleural TB, military TB and skeletal TB and less commonly forms including abdominal, renal and cutaneous disease. Familiarity of the imaging characteristics provides the diagnostic clues of pediatric TB.

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SPDL01

Deep Learning: A Hands-On Introduction

AMA PRA Category 1 Credit ™: .75

Participants
Bradley J. Erickson, MD, PhD, Rochester, MN (*Presenter*) Board of Directors, VoiceIt Technologies, LLCStockholder, VoiceIt Technologies, LLCBoard of Directors, FlowSigma, LLCOfficer, FlowSigma, LLCStockholder, FlowSigma, LLC

LEARNING OBJECTIVES

1) Learn basic theory behind deep learning. 2) Learn how to access high performance computing resources. 3) Learn how to use tutorial articles on deep learning.

ABSTRACT

In this course, users will get an introduction to deep learning, including high level theory, as well as an introduction on how to do deep learning. There will be portions of the course that describe how to access high performance computing resources that are widely and freely available, which is an important component to deep learning. The course will also leverage the 'Magician's Corner' series, which is published in *Radiology:AI*. At the end of this introduction, the attendees should be able to run some of the basic examples for deep learning and know how to access more advanced examples.

Printed on: 05/05/21

SPFF31

Fast 5

Tuesday, Dec. 1 5:00PM - 5:30PM Room: Channel 3

AMA PRA Category 1 Credit ™: .50

Participants
Richard E. Heller III, MD, Chicago, IL (*Moderator*) Nothing to Disclose

For information about this presentation, contact:

richard.heller@radpartners.com

LEARNING OBJECTIVES

1) Review the overall pros and cons of online teaching. 2) Enumerate features of three of the most popular online teaching platforms: Zoom, Cisco Webex, and Microsoft Teams. 3) Briefly discuss the future of online teaching platforms in radiology education.

ABSTRACT

The COVID pandemic that began in December 2019 has significantly affected all aspects of our day-to-day lives as radiologists, markedly reducing in-person conferences, side-by-side readouts, altered clinical schedules and rotations, caused postponements of certifying examinations, and delayed research activities. Teaching hospitals and radiology faculty have done a tremendous job in adapting to these highly unusual circumstances, turning to online or virtual platforms as novel teaching aids. Residency programs have primarily responded to the pandemic by transitioning to virtual teaching rounds, allowing residents to work from home, and conducting readouts virtually (73%). These platforms have their pros and cons. They are convenient and accessible, saving commuting time thereby increasing clinical productivity. Because the connections in these platforms are two way, interactive case based conferences and readout sessions can be mimicked, with both trainee and mentor seeing the images simultaneously. Programs such as poll everywhere, RSNA Diagnosis Live and Kahoot enable active learning through audience participation and even hand-raising function. Still, there is value in active and personal side-by-side teaching of trainees at the workstation, which has been shown to be the most critical component in the education of future Radiologists. The benefits of the face-to-face encounter cannot be emphasized enough, in which relationships develop and both parties engage not just with verbal communication and tone of voice but also body language and facial expressions. Several virtual platforms are now available, three of the most popular in radiology being Zoom, Cisco Webex and Microsoft Teams. Each has their own advantages and disadvantages. Armed with these new tools, a shift in radiology education is beginning. Some conferences and meetings have switched to an all-virtual platform, including the RSNA. Who knows if more radiologists will prefer the virtual option in the future, with the convenience and flexibility that it brings, and best of all, the option to read out in our pajamas. Fortunately, previous investigations have concluded that these platforms have not significantly resulted in an overall decline in trainee education and knowledge. However, the traditional side-by-side readout, central to radiology education, must not be totally abandoned, and should be progressively re-introduced, along with the easing of social restriction measures. For now, it is imperative that we prioritize safety by sticking to our pajames, while keeping in mind that social interaction and supporting each other, online or offline, enhances the development and advancement of our specialty.

Sub-Events

SPFF31A International Medical Graduates in Radiology: Challenges & Opportunities

Participants
George K. Vilanilam, MBBS, Little Rock, AR (*Presenter*) Nothing to Disclose

SPFF31B Culture Club: Why Radiology Practice Culture Matters More than Ever

Participants
Michael D. Fishman, MD, Boston, MA (*Presenter*) Consultant, Zebra Medical Vision LtdScientific Advisory Board, Hologic, Inc

SPFF31C What We Learned from the Pandemic: The Importance of Community

Participants
Jennifer S. Weaver, MD, Albuquerque, NM (*Presenter*) Nothing to Disclose

SPFF31D Can You Hear Me Now? A Resident's Perspective on Virtual Radiology Education

Participants
Aisling Fagan, MBBCh, London, United Kingdom (*Presenter*) Nothing to Disclose

SPFF31E Talking to Thumbnail Images: Radiology Education Today (& Tomorrow?)

Participants
Dyan V. Flores, MD, Vancouver, BC (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dyanflores@yahoo.com

LEARNING OBJECTIVES

1) Review the overall pros and cons of online teaching. 2) Briefly discuss history of ways radiology education adapted to emerging technologies and unusual events. 3) Discuss the future of radiology education after this pandemic.

ABSTRACT

My name is Dyan Flores and I am a Clinical Fellow of MSK Imaging in St. Paul's Hospital in Vancouver. Like most of you, I have spent the last few months talking to thumbnails.This image looks familiar, right ?The pandemic that began in December 2019 has upended radiologists' lives. The CDC's recommendation for social distancing has effectively knocked out in-person conferences, side-by-side readouts, altered clinical schedules and rotations, postponed certifying examinations, and delayed research activities.Social distancing meant up to 50% drop in the volume of elective imaging, which also adversely affected case mix diversity.As my previous colleagues have shown, radiology faculty and trainees have done a tremendous job in adapting, turning to online platforms as novel teaching aids, allowing residents to work from home and for readouts to be conducted virtually.These platforms have their pros and cons. Overall, they are convenient and accessible, saving precious commuting time and potentially increasing clinical productivity. Because the connections in these platforms are two way, interactive case based conferences and readout sessions can be mimicked, with both trainee and mentor seeing the images simultaneously. More recent programs enable active learning through audience participation and even hand-raising function.On the other hand, some of these platforms continue to be plagued by security concerns, and working them out does involve a bit of a learning curve. Furthermore, based on recent surveys, there is concern for the loss of personal side-by-side teaching of trainees at the workstation, a mainstay in the education of future radiologists. Feelings of isolation, reduced camaraderie, and loss of non-verbal feedback including body language and facial expressions are also worrisome. `This is not the first time that radiology education has been challenged by emerging technologies or highly unusual circumstances. The noon conference teaching method known as the hot seat conference, is both interactive and stressful. It is the original, the classic, the Godfather radiology teaching method that is film and case-based, whose origins are unclear. It is just the way we have always done things. Radiology education was also drastically changed by the invention of the personal computer, paving the way for the digital age. The 1970s gave rise to PACS, increasing workflow and reducing operational costs. Education-wise, it resulted in large collections of teaching files and applications, making e-learning or filmless education what it is today. The artist formerly known as the overhead projector was superseded by Powerpoint in the 1990s. As the volume of data increased, education transformed from being learner-centered to being instructor-centered, as focus shifted towards the delivery of information rather than the learner's thought process. The 2000s gave birth to a giant baby known as social media. Between the 2011 and 2012 RSNA meetings, the use of Twitter increased by at least 30% with most educators leveraging this technology to engage attendees and promote collaboration. We have been doing online teaching since March, possibly the longest time that educators have had to do so. In some institutions, even with more relaxed social distancing measures, most rounds are still conducted online, and I must admit, I am getting used to talking to thumbnails. The RSNA this year will be completely virtual, and who knows whether most people will prefer this option in the future.Fortunately, recent published data have shown that these platforms have not adversely affected trainee education and are generally well-accepted by residents. However, there is a call from some groups that the traditional side-by-side readout should be gradually and progressively re-introduced, along with the easing of social restriction measures.It cannot be denied that radiology education is facing another major transformation due to the pandemic, and nobody knows for certain what the next few months will bring. But whether seated side by side or facing each other screen to screen, radiology education will continue to evolve, as it always has. Change is inevitable. In fact, only 1 thing is constant and it is a theme that you heard during this entire session: visionary medicine will always require human insights. Thank you.'

Printed on: 05/05/21

SPFR61

Friday Imaging Symposium: Important Cases Not to Miss: Case-based Review from Head to Toe: Part I

Friday, Dec. 4 10:00AM - 11:00AM Room: Channel 1

BR CA GI NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Girish M. Fatterpekar, MBBS, New York, NY (*Moderator*) Nothing to Disclose
Myles T. Taffel, MD, New York City, NY (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify common misinterpretations of imaging findings that could result in incorrect diagnoses. 2) Recognize subtle, but important, imaging clues that may go overlooked and thus result in a delay in patient care. 3) Analyze key clinical and imaging features to avoid potential diagnostic pitfalls and aid in the identification of the correct diagnosis.

Sub-Events

SPFR61A Neuroradiology Focused Cases

Participants
Sohil H. Patel, MD, Charlottesville, VA (*Presenter*) Nothing to Disclose

SPFR61B Cardiothoracic Focused Cases

Participants
Kristopher W. Cummings, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cummings.kristopher@mayo.edu

LEARNING OBJECTIVES

Review important but often over-looked thoracic imaging findings that alter patient management

SPFR61C Breast Focused Cases

Participants
Debbie L. Bennett, MD, Saint Louis, MO (*Presenter*) Advisory Board, Devicor Medical Products, IncSpeaker, Hologic, Inc

LEARNING OBJECTIVES

1) Recognize appearance of breast cancers that may be misinterpreted as benign findings. 2) Understand complementary role of imaging modalities, particularly mammography and ultrasound. 3) Be familiar with clinical red flags in patient history and presentation.

ABSTRACT

This session will review challenging breast imaging cases with atypical imaging findings of breast cancer. Cases with imaging overlap between benign entities (calcifications and masses) will be reviewed. The complementary role of ultrasound and mammography in evaluation of breast problems will also be highlighted through cases. 'Red flags' in patient history and symptoms will also be reviewed to help guide the radiologist in appropriate management of breast issues.

SPFR61D Gastrointestinal Focused Cases

Participants
Meghan G. Lubner, MD, Madison, WI (*Presenter*) Grant, Koninklijke Philips NVGrant, Johnson & JohnsonSpouse, Consultant, Farcast Biosciences

For information about this presentation, contact:

mgsaur@yahoo.com

LEARNING OBJECTIVES

Review challenging GI diagnoses with emphasis on pitfalls and key diagnostic findings.

SPFR62

Friday Imaging Symposium: Important Cases Not to Miss: Case-based Review from Head to Toe: Part II

Friday, Dec. 4 11:00AM - 12:00PM Room: Channel 1

GU HN MK

AMA PRA Category 1 Credit ™: 1.00

Participants
Girish M. Fatterpekar, MBBS, New York, NY (*Moderator*) Nothing to Disclose
Myles T. Taffel, MD, New York City, NY (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify common misinterpretations of imaging findings that could result in incorrect diagnoses. 2) Recognize subtle, but important, imaging clues that may go overlooked and thus result in a delay in patient care. 3) Analyze key clinical and imaging features to avoid potential diagnostic pitfalls and aid in the identification of the correct diagnosis.

Sub-Events

SPFR62A Genitourinary Focused Cases

Participants
Lauren M. Burke, MD, Chapel Hill, NC (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Establish a systematic method of abdominal and pelvic cross-sectional imaging findings that you don't want to miss. 2) Identify acute and emergent findings on cross-sectional imaging through case based learning. 3) Understand underlying pathophysiology and clinical follow-up of discussed pathologies.

SPFR62B Head & Neck Focused Cases

Participants
Mari Hagiwara, MD, Brooklyn, NY (*Presenter*) Nothing to Disclose

SPFR62C Musculoskeletal Focused Cases

Participants
Robert D. Boutin, MD, Stanford, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify misinterpretations in musculoskeletal radiology that are clinically significant and how to effectively make the correct diagnosis.

SPFR62D Panel Discussion/Q&A

SPOI11

Oncodiagnosis Panel: Cervical Cancer

GU OI

AMA PRA Category 1 Credit ™: .75

Participants
Nina A. Mayr, MD, Seattle, WA (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Explain and apporopriately apply CT, MRI, and FDG PET-CT to stage uterine cervical cancer. 2) Audience will understand indications and contraindications for primary surgery for cervical cancer.

ABSTRACT

2018 FIGO Staging System for Cervical Cancer now formally includes cross-sectional imaging. Imaging can be used to assess tumor size and loco-regional spread and to evaluate for lymphadenopathy and distant metastases. A systematic process for reporting imaging (CT, MR, Pet) findings, and interdiciplinary collaboration between radialogists, radiation oncologists and gynecologic oncologists results in improved clinical decision making, particularly in determining appropriateness of primary surgery versus definitive chemoradiation.

Sub-Events

SPOI11A Introduction

Participants
Nina A. Mayr, MD, Seattle, WA (*Presenter*) Nothing to Disclose

SPOI11B Imaging

Participants
Susanna I. Lee, MD,PhD, Boston, MA (*Presenter*) Royalties, Wolters Kluwer nv; Royalties, Springer Nature

SPOI11C Surgery

Participants
Steven E. Waggoner, MD, Cleveland, OH (*Presenter*) Nothing to Disclose

SPOI11D Radiation Therapy

Participants
Eric Leung, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose

SPOI11E Panel Discussion Q&A

Participants
Nina A. Mayr, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Susanna I. Lee, MD,PhD, Boston, MA (*Presenter*) Royalties, Wolters Kluwer nv; Royalties, Springer Nature
Steven E. Waggoner, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Eric Leung, MD, FRCPC, Toronto, ON (*Presenter*) Nothing to Disclose

SPPH01

AAPM/RSNA Physics Tutorial Session 1

CT MR PH

AMA PRA Category 1 Credit ™: 1.00

Participants
Thaddeus A. Wilson, PhD, Memphis, TN (*Moderator*) Nothing to Disclose

Sub-Events

SPPH01A Modern MRI Protocols and How They Exploit Contrast

Participants
Anshuman Panda, PhD, Scottsdale, AZ (*Presenter*) Nothing to Disclose

SPPH01B Contrast in CT

Participants
Rick R. Layman, PhD, Houston, TX (*Presenter*) Researcher, Siemens AG

For information about this presentation, contact:

rrlayman@mdanderson.org

SPPH01C How Do We View and Improve Contrast in Nuclear Medicine

Participants
James R. Halama, PhD, Maywood, IL (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Learn the definitions of contrast in the context of nuclear medicine imaging.Learn and understand the root causes for loss of contrast in nuclear medicine images.Understand the methods for display of nuclear medicine images and their effect on image contrast.Learn about digital processing methods that are employed to improve image contrast in both planar and SPECT imaging.

SPPH02

AAPM/RSNA Physics Tutorial Session 2

PH RS

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Thaddeus A. Wilson, PhD, Memphis, TN (*Moderator*) Nothing to Disclose

Sub-Events

SPPH02A Contrast Agents in Ultrasound and Their Clinical Adoption/Use

Participants
Peter N. Burns, PhD, Toronto, ON (*Presenter*) Research collaboration, Koninklijke Philips NV
Shuchi K. Rodgers, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

SPPH02B Contrast-enhanced Mammography

Participants
Ingrid Reiser, PhD, Chicago, IL (*Presenter*) Spouse, Editor, IEEE Transactions on Communications

For information about this presentation, contact:

ireiser@uchicago.edu

SPPH02C Pediatric Imaging: Size Does Matter

Participants
Keith J. Strauss, MS, Cincinnati, OH (*Presenter*) Consultant, Medical Physics Consultants, Inc Consultant, Koninklijke Philips NV Speakers Bureau, Koninklijke Philips NV

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RSNA 2020
HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SPSC20

Controversy Session: Radiology Report Substance, Structure and Style-Who's Right?

Sunday, Nov. 29 10:00AM - 11:00AM Room: Channel 2

IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Stephen C. O'Connor, MD, Springfield, MA (*Moderator*) Nothing to Disclose
Stephen C. O'Connor, MD, Springfield, MA (*Presenter*) Nothing to Disclose
Adam E. Flanders, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
David M. Yousem, MD, Evergreen, CO (*Presenter*) Royalties, Reed Elsevier; Royalties, Analytical Informatics, Inc; Speaker, MRIOnline; Board Member, MRIOnline
Dhakshina M. Ganeshan, FRCR,MBBS, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

dyousem1@jhu.edu

ThomasJeffersonUniversityHospital

dganeshan@mdanderson.org

stephen.o'connor@bhs.org

LEARNING OBJECTIVES

1) Discuss the advantages and disadvantages of structured reporting. 2) Discuss the advantages and disadvantages of traditional narrative reporting style. 3) Describe several common pitfalls encountered in structured reporting. 4) Describe the current state of the published literature regarding the pros and cons of structured reporting. 5) Bring an informed perspective back to their individual institutions to help drive high-quality reporting practices.

ABSTRACT

Accurate, timely and high quality radiology reports are critical to ensure optimal patient care. While the traditional narrative reports have their own advantages, lack of consistency in terms of language, length and style can potentially hinder patient managament. Use of structured radiology reports, especially those based on best practices, can help demosntrate the value of radiologists to referring physicians and patients. Radiology departments can successfully implement structured reporting initiative, by adopting a colloborative, multi-displinary approach with input from all stakeholders.

SPSC30

Controversy Session: Policy is Culture: Addressing Radiologist Productivity, RVU's, and Perverse Incentives

Saturday, Dec. 5 2:00PM - 3:00PM Room: Channel 2

LM

AMA PRA Category 1 Credit ™: 1.00

Participants

Steven P. DeColle, Edmonton, AB (*Moderator*) Nothing to Disclose
Kurt A. Schoppe, MD, Grapevine, TX (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Describe how RVU's are created. 2) Review what is included in an RVU. 3) Examine how RVU's have changed over time for diagnostic and interventional procedures. 4) Propose how RVU tracking can help and hurt radiologist productivity.

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SPSC40

Controversy Session: Triple Rule Out Chest CT in the ER-Should It Be the 'One Stop Shop' for Chest Pain?

Thursday, Dec. 3 10:00AM - 11:00AM Room: Channel 2

CA CH CT ER

AMA PRA Category 1 Credit ™: 1.00

Participants

Karen G. Ordovas, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Phillip M. Young, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Juan C. Batlle, MD, Miami, FL (*Presenter*) Speakers Bureau, Boehringer Ingelheim GmbH
Karen G. Ordovas, MD, Seattle, WA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To describe the specific technique utilized for triple rule out protocol including radiation dose and contrast dose. 2) To list added value of triple rule out protocol as compared to coronary CTA only for assessment of patients with acute chest pain. 3) To name potential harmful effects of replacing a coronary CTA protocol with a triple rule out protocol for assessment of acute chest pain.

Printed on: 05/05/21

SPSC41

Controversy Session: Fractional Flow Reserve CT (CT-FFR) for Indeterminate Stenosis on Coronary CTA-Should It Replace CT Perfusion?

Tuesday, Dec. 1 10:00AM - 11:00AM Room: Channel 2

CA CT

AMA PRA Category 1 Credit ™: 1.00

Participants

Suhny Abbara, MD, Dallas, TX (*Moderator*) Royalties, Reed Elsevier; ;
Geoffrey D. Rubin, MD, Tucson, AZ (*Presenter*) Consultant, Fovia, IncAdvisor, HeartFlow, IncAdvisor, Boehringer Ingelheim GmbHAdvisor, Nano-X Imaging
Ricardo C. Cury, MD, Coral Gables, FL (*Presenter*) Research Grant, General Electric CompanyConsultant, EssilorLuxotticaConsultant, Covera Health

LEARNING OBJECTIVES

1) Discuss advantages of CT-based FFR techniques for assessing coronary atherosclerotic disease. 2) Describe weaknesses of CT-based FFR techniques for assessing coronary atherosclerotic disease. 3) Discuss advantages of CT perfusion for evaluating coronary atherosclerotic disease. 4) Describe weaknesses of CT perfusion for evaluating coronary atherosclerotic disease.

Printed on: 05/05/21

SPSC42

Controversy Session: Platelet Rich Plasma (PRP) and Musculoskeletal Injectables-Show Me the Science

Friday, Dec. 4 2:00PM - 3:00PM Room: Channel 2

MK

AMA PRA Category 1 Credit ™: 1.00

Participants
Corrie M. Yablon, MD, Ann Arbor, MI (*Moderator*) Nothing to Disclose

Sub-Events

SPSC42B Platelet-Rich Plasma (PRP): Does It Really Work for Treating Tendon Injury?

Participants
Kenneth S. Lee, MD, Madison, WI (*Presenter*) Grant, General Electric CompanyGrant, Johnson & JohnsonResearch support, SuperSonic ImagineRoyalties, Reed Elsevier

LEARNING OBJECTIVES

1) To discuss the current evidence of PRP therapy for the treatment of tendon injury. 2) To compare PRP with other injectables such corticosteroid, whole blood, dry needling, and mesenchymal stem cells for the treatment of tendon injury.

SPSC42C PRP: Proceed with Caution

Participants
Connie Y. Chang, MD, Boston, MA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cychang@mgh.harvard.edu

LEARNING OBJECTIVES

1) Discuss the variables to be considered when deciding to incorporate PRP into your practice.

SPSC42D Why You Should Join the PRP Party

Participants
Ogonna K. Nwawka, MD, New York, NY (*Presenter*) Research Grant, General Electric Company

LEARNING OBJECTIVES

1) To discuss the pros of incorporating PRP techniques in your radiology practice.

SPSC42E Does PRP Add Any Significant Therapeutic Advantage Relative to Other Forms of Intratendinous Therapy in the Treatment of Tendon Disorders?

Participants
Ronald S. Adler, MD, PhD, New York, NY (*Presenter*) Nothing to Disclose

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SPSC43

Controversy Session: To Look or Not to Look-Does Every Woman with Newly Diagnosed Breast Cancer Need Axillary Imaging?

Monday, Nov. 30 2:00PM - 3:00PM Room: Channel 2

BR

AMA PRA Category 1 Credit ™: 1.00

Participants
Maxine S. Jochelson, MD, New York, NY (*Moderator*) Speaker, General Electric CompanyConsultant, Bayer AG
Victoria L. Mango, MD, Maplewood, NJ (*Presenter*) Support, Koios Medical, IncConsultant, Bayer AG
Gaiane M. Rauch, MD, PhD, Houston, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

gmrauch@mdanderson.org

LEARNING OBJECTIVES

1) To elaborate on the accuracy of various imaging modalities for the detection of axillary adenopathy in women with recently diagnosed breast cancer. 2) To familiarize the audience with the various medical and surgical approaches in newly diagnosed breast cancer. 3) To inform how the treatment options do or do not affect imaging approaches.

SPSC44

Controversy Session: Incidental Pancreatic Cyst Management

Wednesday, Dec. 2 2:00PM - 3:00PM Room: Channel 2

GI

AMA PRA Category 1 Credit ™: 1.00

Participants
Desiree E. Morgan, MD, Birmingham, AL (*Moderator*) Institutional Research Grant, General Electric Company; Consultant, General Electric Company
William W. Mayo-Smith, MD, Weston, MA (*Moderator*) Nothing to Disclose

Sub-Events

SPSC44A Introduction

Participants
William W. Mayo-Smith, MD, Weston, MA (*Presenter*) Nothing to Disclose

SPSC44B Incidental Pancreatic Cyst Risks: The Facts

Participants
Ivan Pedrosa, MD, Dallas, TX (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ivan.pedrosa@utsouthwestern.edu

LEARNING OBJECTIVES

To understand the magnitude of the problem of incidental pancreatic cystsTo recognize the risk associated with incidental pancreatic cysts

SPSC44C Pancreatic Cyst Management Algorithms: The Mess

Participants
Atif Zaheer, MD, Baltimore, MD (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) List different managment algorithms for the management of pancreatic cysts. 2) Discuss the similarities and differences among the management algorithms.

ABSTRACT

Pancreatic cysts are commonly seen on imaging. Since some of these have a malignant potential, multiple management algorithms are present for optimal management. The algorithms have their inherent differences based on their target populations, clinical and imaging features under scrutiny and the time line of these follow ups. We will discuss the similarities and differences between these algorithms and discuss the key features of each of them to have a better understanding of their management.

SPSC44D ACR Pancreatic Cyst Guidelines: The Summary

Participants
Desiree E. Morgan, MD, Birmingham, AL (*Presenter*) Institutional Research Grant, General Electric Company; Consultant, General Electric Company

LEARNING OBJECTIVES

1) Review the 2017 ACR white paper on incidental pancreatic cyst management and summarize patterns of recommendations.

SPSC44E Should ACR Guidelines Be Followed-YES

Participants
Elizabeth M. Hecht, MD, New York, NY (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ehechtmd@gmail.com

LEARNING OBJECTIVES

1) Debate the pros and cons of applying the ACR guidelines in clinical practice.

ABSTRACT

While the risk of malignancy is low for small incidentally discovered asymptomatic pancreatic cysts, no one wants to miss a cancer. However, surveillance can be costly for patients and the healthcare system. The ACR management guidelines published in 2017

provided algorithms intended to help the radiologist and care providers but there are competing guidelines and recommendations. Current management guidelines strengths and weakness will be discussed and debated.

SPSC44F Should ACR Guidelines by Followed-NO

Participants
David M. Hough, MD, Rochester, MN (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

Gain an understanding of reasons that you may elect NOT to follow the ACR Pancreatic Cyst recommendations for incidental small pancreatic cysts in your practice.

ABSTRACT

Small incidental pancreatic cysts are common, they are unlikely to show significant growth, and have a low risk of malignancy even if they do grow. EUS of small cysts seldom adds value. Lifelong surveillance has been advocated by some. Guidelines can be valuable, but consider following small cysts less frequently, for longer duration, and with less reliance on EUS, than recommended in the ACR white paper.

SPSC44G Panel Discussion

SPSC50

Controversy Session: Peer Review and Peer Learning-Are We Just Meeting Requirements or Are We Really Improving Our Practices?

Thursday, Dec. 3 5:00PM - 6:00PM Room: Channel 2

HP

AMA PRA Category 1 Credit ™: 1.00

Participants
Jay K. Pahade, MD, Southport, CT (*Moderator*) Consultant, General Electric Company

LEARNING OBJECTIVES

1) To understand the regulatory facts and myths pertaining to requirements for peer review and Ongoing Professional Practice Evaluation (OPPE) and how to set up a peer learning system that meets regulatory requirements. 2) To share methods that help foster participation in a peer review/peer learning program. 3) To demonstrate how a peer learning program can be structured to drive continuous practice improvement and show stakeholders the value created by a radiology department.

Sub-Events

SPSC50A Actual Regulatory Requirements of Peer Review and OPPE: Myths and Truth

Participants
Lane F. Donnelly, MD, Woodside, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To understand the regulatory facts and myths pertaining to requirements for peer review and Ongoing Professional Practice Evaluaiton (OPPE). 2) To understand how to set up a peer learning system, function as a learning health system, and meet regulatory requirements.

ABSTRACT

See Learning Objectives

SPSC50B Peer Learning: Changing the Culture of Your Practice to Foster Participation

Participants
Jennifer C. Broder, MD, Burlington, MA (*Presenter*) Nothing to Disclose

SPSC50C Case Studies: Examples of How Peer Review and Peer Learning Can Drive Practice Improvement

Participants
Richard E. Sharpe JR, MD, MBA, Scottsdale, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

RichSharpeJr+rsna@gmail.com

SPSH20

Hot Topic Session: Stroke Imaging-How Recent Trials Are Changing Radiologists' Practices

Saturday, Dec. 5 3:30PM - 4:30PM Room: Channel 2

ER NR

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
Max Wintermark, MD, San Carlos, CA (*Moderator*) Consultant, More HealthConsultant, Magnetic InsightConsultant, icoMetrix NVConsultant, NinesConsultant, Subtle MedicalConsultant, Nous
Howard A. Rowley, MD, Madison, WI (*Moderator*) Research Consultant, iSchemaView, IncConsultant, W. L. Gore & Associates, IncConsultant, General Electric Company

For information about this presentation, contact:

max.wintermark@gmail.com

Sub-Events

SPSH20A What the Trials Tell Us About Thrombectomy

Participants
Jeremy J. Heit, MD,PhD, Los Altos, CA (*Presenter*) Consultant, Medtronic plcConsultant, Terumo CorporationScientific Advisory Board, iSchemaView, IncMedical Advisory Board, iSchemaView, Inc

For information about this presentation, contact:

jheit@stanford.edu

LEARNING OBJECTIVES

1) To review the results of the recent stroke trials as they pertain to thrombectomy. 2) To understand the impact of the trials on stroke patient workflow in the cath lab.

SPSH20B How the Trials Have Changed CT Workup for Stroke Patients

Participants
Richard Aviv, MBBCh, FRCR, Ottawa, ON (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To review the results of the recent stroke trials as they pertain to CT. 2) To understand the impact of the trials on stroke patient workflow in the CT suite.

SPSH20C How the Trials Have Changed MRI Workup for Stroke Patients

Participants
Kambiz Nael, MD, Los Angeles, CA (*Presenter*) Medical Advisory Board, Canon Medical Systems Corporation

For information about this presentation, contact:

kamiznael@gmail.com

LEARNING OBJECTIVES

1) To review the results of the recent stroke trials as they pertain to MRI. 2) To understand the impact of the trials on stroke patient workflow using MRI.

ABSTRACT

Neuroimaging for acute stroke encompasses parenchymal imaging to assess the brain tissue status, vascular imaging to assess patency of major arterial branches of neck and brain and perfusion imaging to assess salvageable brain. While CT is the most commonly used imaging modality for acute stroke imaging, MRI remains the most accurate modality for detection of acute infarction. In this presentation we will review the role of MRI in screening and treatment planning of acute stroke patients as relate to thrombolysis and endovascular thrombectomy. Recent clinical trials will be reviewed and treatment guidelines according to the latest American Heart Association (AHA)/American Stroke Association (ASA) guidelines will be discussed. We will also highlight how an effective MRI workflow can be configured in the setting of acute stroke imaging.

SPSH20D Imaging of Cerebral Edema: An Up-and-Coming Target?

Participants
Ruediger von Kummer, MD, Dresden, Germany (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

ruediger.vonkummer@ukdd.de

LEARNING OBJECTIVES

1) To learn how to predict malignant edema on imaging. 2) To learn about new therapeutics targeting the edema in stroke patients.

ABSTRACT

Within the first 6 hours of ischemic stroke onset, CT or MRI cannot detect histological changes indicating brain tissue infarction, because signs of tissue death are extremely subtle and hard to detect even with a microscope under experimental conditions. In this acute phase of ischemic stroke, the degree of regional ischemia triggers two types of tissue water content changes. Below a cerebral blood flow (CBF) of 30 ml/100gxmin the extracellular space shrinks and cells swell due to a shift of water molecules from the extracellular to the intracellular space (cellular edema). Diffusion weighted MRI (DWI) is highly sensitive to detect brain tissue with cellular edema and thus the pattern of brain tissue suffering from moderate to severe ischemia. Extended cellular edema predicts the development of space-occupying vasogenic edema with life-threatening mass effects (malignant edema). Pure cellular edema is not associated with net water uptake, thus does not affect the tissue's x-ray attenuation, and cannot be detected with CT. Ion depletion in the extracellular space triggers, however, net water uptake from capillaries with some rest-flow through special endothelium channels that can be blocked with low-dose glibenclamide. This edema type was called "ionic" and is observed in brain tissue with a CBF < 20 ml/100gxmin only, a threshold below which brain tissue cannot survive for more than 30 min. Ionic brain edema is thus a marker of irreversible ischemic injury. Because brain tissue water content correlates with tissue radiodensity, CT can detect and quantify ionic edema thus identifying tissue that is unlikely to recover and monitoring therapeutic interventions to reduce ionic edema.

Printed on: 05/05/21

SPSH40

Hot Topic Session: Artificial Intelligence and Implications for Health Equity: Will AI Improve Equity or Increase Disparities?

Tuesday, Dec. 1 3:30PM - 4:30PM Room: Channel 2

AI IN

AMA PRA Category 1 Credit ™: 1.00

Participants
Judy W. Gichoya, MBChB,MS, Atlanta, GA (*Moderator*) Nothing to Disclose

Sub-Events

SPSH40A Introduction

Participants
Judy W. Gichoya, MBChB,MS, Atlanta, GA (*Presenter*) Nothing to Disclose

SPSH40B Do we want Algorithms to Reinforce Biases, or Fight Against Them?

Participants
Ziad Obermeyer, MD, Berkeley, CA (*Presenter*) Stockholder, Berkeley Data Ventures; Advisor, LookDeep Health

For information about this presentation, contact:

zobermeyer@berkeley.edu

SPSH40C Investigating Problems Performance and Potential Model Bias: A Practical Approach

Participants
Luke Oakden-Rayner, Adelaide, Australia (*Presenter*) Nothing to Disclose

SPSH40D Machine Learning Models for Breast Cancer Disparities

Participants
Constance D. Lehman, MD,PhD, Boston, MA (*Presenter*) Institutional Research Grant, General Electric Company
Regina Barzilay, PhD, Cambridge, MA (*Presenter*) Nothing to Disclose

SPSH51

Hot Topic Session: Integrated Diagnostics-Risk Predictions of Breast Cancer

Friday, Dec. 4 10:00AM - 11:00AM Room: Channel 2

BQ BR

AMA PRA Category 1 Credit ™: 1.00

Participants
Fiona J. Gilbert, MD, Cambridge, United Kingdom (*Moderator*) Research Grant, Hologic, IncResearch Grant, General Electric Company Research Consultant, Alphabet IncResearch support, Bayer AGResearch collaboration, Volpara Health Technologies Limited

Sub-Events

SPSH51A Prediction/Prevention in Breast Cancer

Participants
Douglas F. Easton, PhD, Cambridge, United Kingdom (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) To appreciate the genetic markers conferring risk of breast cancer. 2) To understand the contribution of Single Nucleotide Polymorphisms to risk. 3) To understand risk scores and how they can be used to develop risk adapted screening programme.

SPSH51B Imaging Biomarkers for Risk Prediction

Participants
Sarah J. Vinnicombe, FRCR,MRCP, Cheltenham, United Kingdom (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

sarah.vinnicombe@nhs.net

LEARNING OBJECTIVES

1) To learn about imaging biomarkers from mammography, ultrasound and MRI that contribute to risk prediction/prognosis. 2) To appreciate how imaging biomarkers can be integrated into risk prediction models. 3) To understand the limitations of the various techniques.

SPSH51C Radiogenomics: Prognostic Information from Breast Imaging

Participants
Despina Kontos, PhD, Philadelphia, PA (*Presenter*) Research Grant, Hologic, Inc

LEARNING OBJECTIVES

1) To understand the process of identifying radiogenomic information using breast imaging examples. 2) To learn about the integration of the radiomic information into other prognostic information (eg age, histology). 3) To appreciate the current adoption of radiogenomics in clinical practice.

SPSH52

Hot Topic Session: Integration of Novel Blood, CSF and Imaging Biomarkers for the Early Diagnosis of Alzheimer's Disease

Friday, Dec. 4 3:30PM - 4:30PM Room: Channel 2

BQ MI NR

AMA PRA Category 1 Credit ™: 1.00

Participants
Ciprian Catana, MD, PhD, Charlestown, MA (*Moderator*) Nothing to Disclose

Sub-Events

SPSH52A Congruence Between Cerebrospinal Fluid and PET Biomarkers of Alzheimer's Disease and Relationships with Cognitive Decline in the Pre-Dementia Phase

Participants
Sterling Johnson, PhD, Madison, WI (*Presenter*) Advisory Board, F. Hoffmann-La Roche LtdResearch Grant, Cerveau Technologies, Inc

LEARNING OBJECTIVES

1) Appreciate that PET and CSF methods for assessing AD pathology have different molecular targets and different sensitivities. 2) Learn and apply the features of the Alzheimer's Disease biomarker framework. 3) Understand the profile of PET and CSF biomarkers in each cognitive stage of AD; particularly in the prolonged pre-symptomatic stage.

ABSTRACT

Alzheimer's disease (AD) is a dual proteinopathy and has a simple definition from a neuropathology perspective involving the presence of amyloid plaques and neurofibrillary tangles. These changes can be estimated with positron emission tomography (PET) and cerebrospinal fluid (CSF) assays of beta-amyloid (ab42) and tau. PET and CSF biomarkers of AD have been validated sufficiently in the scientific literature such that a Biomarker Framework has been proposed for defining and staging AD during life. This is pertinent because AD has a prolonged pre-symptomatic phase (twenty years or more) during which secondary prevention approaches may be tested/applied if the disease can be confidently identified. In this talk the relative utility of PET and CSF biomarkers for AD will be presented, with particular emphasis on biomarker changes during the prolonged pre-symptomatic phase of the disease. We will review the spatiotemporal patterns of each modality and discuss new evidence that the onset age of the amyloid component of AD can be estimated with amyloid PET imaging. Finally we will review the predictive relationship between AD biomarkers and cognitive decline, where new evidence suggests that a longer duration (or chronicity) and greater abundance of AD proteinopathy is associated with a greater risk of cognitive decline.

SPSH52B Beyond Amyloid and Tau: Biofluids Biomarkers to Profile the Heterogeneous Drivers of Decline in Alzheimer's Disease and Related Disorders

Participants
Steven E. Arnold, MD, Charlestown, MA (*Presenter*) Speaker, AbbVie IncTravel support, AbbVie IncSpeaker, Biogen Idec IncTravel support, Biogen Idec IncSpeaker, Merck & Co, IncTravel support, Merck & Co, IncSpeaker, F. Hoffmann-La Roche LtdTravel support, F. Hoffmann-La Roche LtdScientific Advisory Board, CortexymeScientific Advisory Board, vTvConsultant, Athira PharmaConsultant, Cassava Sciences, IncConsultant, Cognito Therapeutics, IncConsultant, EIP Pharma, LLCConsultant, Orthogonal Neuroscience Inc

LEARNING OBJECTIVES

1) Understand the utility of molecular biomarkers for diagnosis of Alzheimer's disease2) Understand the limitations of current molecular biomarkers for prognosis and mechanistic understanding of dementia3) Learn about developing approaches to better profile the multiple pathophysiologies driving Alzheimer's and related dementias

ABSTRACT

Alzheimer's disease and related neurodegenerative dementias in aging are complex disorders with diverse pathophysiological mechanisms driving neurodegeneration and cognitive failure. This presentation will highlight some of the limitations of current amyloid and tau biomarkers for prognosis and treatment response in neurodegenerative dementias. It will ten review emerging molecular imaging and biofluid biomarkers that may better predict course and allow personalized targeting of heterogenous disease mechanisms.

SPSH53

Hot Topic Session: Artificial Intelligence-Decision Support: The Coronavirus Experience in USA and China

Sunday, Nov. 29 5:00PM - 6:00PM Room: Channel 2

AI PH

AMA PRA Category 1 Credit ™: 1.00

Participants
Jerome Z. Liang, PhD, Stony Brook, NY (*Moderator*) Nothing to Disclose
Greg Zaharchuk, MD, PhD, Stanford, CA (*Presenter*) Research Grant, General Electric CompanyResearch Grant, Bayer AGStockholder, Subtle Medical
Shi-Yuan Liu, MD, Huangpu, China (*Presenter*) Nothing to Disclose
Berkman Sahiner, PhD, Silver Spring, MD (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Berkman.sahiner@fda.hhs.gov

LEARNING OBJECTIVES

1) Learn a Radiologist's view on AI for applications in medicine, particularly in chest radiology. 2) Learn a Radiologist's experience in Coronavirus and AI use in early detection, accurate diagnosis and follow up decision support in USA and China. 3) Learn a Radiologist's experience in Coronavirus and AI use in radiological workflow and infection control in USA and China. 4) Understand the role of imaging in the management of Coronavirus. 5) Understand the potential pitfalls surrounding Coronavirus AI tools and future development. 6) Learn how AI could be used in the setting for resource utilization and prognosis. 7) Understand the latest technical achievements and potential of AI in radiological imaging. 8) Learn about technical challenges of AI in radiological imaging. 9) Understand basic principles of performance evaluation of AI software devices.

SPSH54

Hot Topic Session: Non-pulmonary Manifestation of COVID-19

Tuesday, Dec. 1 5:00PM - 6:00PM Room: Channel 2

AMA PRA Category 1 Credit ™: 1.00

Participants
Christine O. Menias, MD, Phoenix, AZ (*Moderator*) Royalties, Reed Elsevier
Javad R. Azadi, MD, Baltimore, MD (*Moderator*) Nothing to Disclose

Sub-Events

SPSH54A Abdominal Manifestations

Participants
Margarita V. Revzin, MD, Wilton, CT (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

margarita.revzin@yale.edu

LEARNING OBJECTIVES

1. Understand the pathophysiology and clinical presentation of the SARS-CoV-2 virus in the abdomen and pelvis 2. Learn the most appropriate imaging modalities and current radiological recommendations for the diagnosis of abdominal manifestations of COVID-19 and their related complications 3. Recognize key imaging features of the abdominal manifestations of COVID-19 infection, as well as their complications.

ABSTRACT

Infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) results in the coronavirus disease 2019 (COVID-19), which was declared an official pandemic by the World Health Organization (WHO) on March 11, 2020. Infection has been reported in most countries around the world, and by August 15th there have been over 21 million cases of COVID-19 reported worldwide with over 700,000 COVID-19-associated deaths. It has become apparent that, although COVID-19 predominately affects the respiratory system, many other organ systems can also be involved. Imaging plays an essential role in the diagnosis of all manifestations of the disease as well as its related complications, and proper utilization and interpretation of imaging studies is crucial. With the growing global COVID-19 outbreak, a comprehensive understanding of the diagnostic imaging hallmarks, imaging features, multisystem involvement, and evolution of imaging findings is essential for effective patient management and treatment. In this session the key imaging features of the varied pathological manifestations of this infection involving the abdomen and pelvis will be discussed.

SPSH54B Pediatric Manifestations

Participants
Edward Y. Lee, MD, Boston, MA (*Presenter*) Nothing to Disclose

SPSH55

Hot Topic Session: Neurological and Neuroimaging Manifestations of COVID-19

Monday, Nov. 30 10:00AM - 11:00AM Room: Channel 2

AMA PRA Category 1 Credit ™: 1.00

Participants
Mahmud Mossa-Basha, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Deborah R. Shatzkes, MD, New York, NY (*Moderator*) Nothing to Disclose

Sub-Events

SPSH55A Imaging Manifestations of COVID

Participants
Christopher G. Filippi, MD, Boston, MA (*Presenter*) Research Consultant, Syntactx, LLCStockholde, InnovacomAuthor, Wolters Kluwer nv

SPSH55B Operational Changes in Neuroimaging during COVID-19 and the Neuroradiologist's Role

Participants
Rajan Jain, MD, New York, NY (*Presenter*) Consultant, Cancer Panels; Royalties, Thieme Medical Publishers, Inc; Advisory Board, Neuvozen Inc

LEARNING OBJECTIVES

1) How Covid-19 pandemic affected radiology work volumes in New York city and how the neuro-radiologists adapted to these challenges including remote working in one of the most affected pandemic hot-spots in the country. 2) How the neuro-radiologists contributed to direct patient care and helped their clinical colleagues cope with sudden surge of Covid patients during the early phase of pandemic.3) How the neuro-radiologists adapted to a very sudden and dramatic change in clinical responsibilities including research as well as teaching and education.

SPSH55C Epidemiology of Stroke during COVID

Participants
Ajay Gupta, MD, New York, NY (*Presenter*) Support, Siemens AGSupport, General Electric Company

SPSH56

Hot Topic Session: Chest Findings of COVID-19

Wednesday, Dec. 2 10:00AM - 11:00AM Room: Channel 2

AMA PRA Category 1 Credit ™: 1.00

Participants
Jane P. Ko, MD, New York, NY (*Moderator*) Research collaboration, Siemens AGSpouse, Employee, ElevateBioSpouse, Stockholder, ElevateBioSpouse, Consultant, ElevateBio
Jeffrey P. Kanne, MD, Madison, WI (*Moderator*) Research Consultant, PAREXEL International Corporation;

For information about this presentation, contact:

jkanne@uwhealth.org

jane.ko@nyumc.org

Sub-Events

SPSH56A Role of Imaging and Imaging findings of COVID Pneumonia: Lessons Learned

Participants
Diana Litmanovich, MD, Boston, MA (*Presenter*) Nothing to Disclose

SPSH56B Value of Likelihood and Severity Scoring

Participants
Nicola Sverzellati, MD, Parma, Italy (*Presenter*) Consultant, PAREXEL International CorporationConsultant, Biomedic SystemConsultant, F. Hoffmann-La Roche LtdConsultant, Boehringer Ingelheim GmbHConsultant, GalapagosAdvisory Board, F. Hoffmann-La Roche LtdAdvisory Board, Boehringer Ingelheim GmbHSpeaker, F. Hoffmann-La Roche LtdSpeaker, Boehringer Ingelheim GmbH

SPSH56C Clinical Perspectives of Imaging in the COVID-19 Epidemic

Participants
Suhail Raoof, New York, NY (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1. Utilize abnormalities on CXR and CT scan to diagnose Covid-19 related lung conditions 2. Utilize patterns of CT abnormalities to decide about therapeutic options 3. Using imaging modalities to predict long term functional and exercise limitations in patients with Covid-19 related lung disease

ABSTRACT

Lung abnormalities are commonly seen in patients with Covid-19 who develop respiratory symptoms. It is important to be familiar with these patterns of disease, which include ground glass opacities, dense consolidation, reticulation and traction bronchiectasis. Upto 30 % of these patients may develop superadded bacterial or fungal infections. Since some patients with hypoxemic respiratory failure require intubation and mechanical ventilation, frequent review of these patients' CXR may help delineate the presence of barotrauma. These abnormalities may also help to decide if medications such as remdesivir and systemic steroids should be given. Assessing these abnormalities may also allow clinicians to decide what the long term prognosis may be. Finally, in some patients with hypoxemic respiratory failure and paucity of pulmonary opacities, thromboembolic disease may be suspected.

SPSH57

Hot Topic Session: Department Readiness for Disasters-Lessons Learned from COVID

Thursday, Dec. 3 3:30PM - 4:30PM Room: Channel 2

AMA PRA Category 1 Credit ™: 1.00

Participants
Mahmud Mossa-Basha, MD, Seattle, WA (*Moderator*) Nothing to Disclose
Bien Soo Tan, FRCR,MBBS, Singapore, Singapore (*Moderator*) Nothing to Disclose

Sub-Events

SPSH57A Department Considerations for the Inpatient Setting

Participants
Michael S. Gee, MD, PhD, Boston, MA (*Presenter*) Research Grant, Takeda Pharmaceutical Company LimitedResearcher, General Electric Company Researcher, Siemens AG

For information about this presentation, contact:

msgee@mgh.harvard.edu

SPSH57B Department Considerations for the Outpatient Setting

Participants
Kristopher W. Cummings, MD, Phoenix, AZ (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cummings.kristopher@mayo.edu

LEARNING OBJECTIVES

Identify key components to maintaining a successful and safe outpatient imaging practice during a pandemic

SPSH57C Department Readiness for the Next Pandemic/Surge

Participants
Brett W. Carter, MD, Houston, TX (*Presenter*) Nothing to Disclose

SPSH57D Department Infrastructure for Future Workflows

Participants
Dushyant Sahani, MD, Seattle, WA (*Presenter*) Research support, General Electric CompanyMedical Advisory Board, Allena Pharmaceuticals, Inc

SPSH58

Hot Topic Session: Impact of COVID on Workforce Resilience

Saturday, Dec. 5 10:00AM - 11:00AM Room: Channel 2

AMA PRA Category 1 Credit ™: 1.00

Participants
Carolyn C. Meltzer, MD, Atlanta, GA (*Moderator*) Nothing to Disclose
Jeffrey S. Klein, MD, Burlington, VT (*Moderator*) Editor with royalties, Wolters Kluwer nv

Sub-Events

SPSH58A Workforce Morale/Anxiety and Leadership Support during the COVID-19 Pandemic

Participants
Bien Soo Tan, FRCR,MBBS, Singapore, Singapore (*Presenter*) Nothing to Disclose

SPSH58B Equity Issues and Exacerbation during COVID-19

Participants
Carolyn C. Meltzer, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

SPSH58C Health Disparities in COVID-19

Participants
Efren J. Flores, MD, Boston, MA (*Presenter*) Nothing to Disclose

SPSH58D Workforce Wellness

Participants
Aarti Sekhar, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

aarti.sekhar@gmail.com

LEARNING OBJECTIVES

After this session on 'Workforce Wellness', the learner shoud: 1. Understand the scope and effects of radiologist burnout and the dual responsibility of the institution and the individual for radiologist wellness. 2. Learn institutional strategies for wellness including training emotionally intelligent leaders, cultivating community, and fostering work-life integration with flexible scheduling. 3. Learn personal strategies for wellness including gratitude and growth mindset, mindfulness, time affluence and sleep.

SPSI21

Special Interest Session: The Academy Imaging Shark Tank: Preparing Imaging Investigators to Dive Into the 'Shark Tank (Sponsored by the Academy for Radiology & Biomedical Imaging Research)

Monday, Nov. 30 3:30PM - 4:30PM Room: Channel 2

RS

AMA PRA Category 1 Credit ™: 1.00

Participants

Etta D. Pisano, MD, Boston, MA (*Presenter*) Researcher, Freenome Holdings IncResearcher, Real Imaging LtdResearcher, TherapixelResearcher, DeepHealth, IncResearcher, ToDos
Emir S. Sandhu, MD, Stanford, CA (*Presenter*) Vice President, BlueCross BlueShield Venture Fund
Scott A. Penner, JD, San Diego, CA (*Presenter*) Spouse, Consultant, Human Longevity Inc; Spouse, Research Grant, General Electric Company
Susan Harris, Wauwatosa, WI (*Presenter*) Employee, General Electric Company
Joseph J. Cavallo, MD, New Haven, CT (*Presenter*) Co-founder, Illumion, Inc
Harrison Kim, PhD, MBA, Birmingham, AL (*Presenter*) Nothing to Disclose
Franz E. Boas, MD,PhD, New York, NY (*Presenter*) Co-founder, Claripacs, LLCInvestor, LabdoorInvestor, Qventus, IncInvestor, CloudMedxInvestor, Notable LabsInvestor, XgenomesResearch support, Bayer AGResearch support, General Electric CompanySpeaker, Guerbet SAResearch Grant, Guerbet SAResearch support, Guerbet SA Research support, STEBA Biotech NVResearch support, Terumo Corporation

LEARNING OBJECTIVES

Three 'Pitch Teams' will present to the audience a five minute pitch about their idea/product. A panel of professionals with backgrounds in venture capital, industry and intellectual property will provide expert feedback and facilitate questions from the audience. 1) This session is meant to engage the early career investigator interested in learning how to talk about and market their ideas/products in a way that will attract outside investment sources, as well as provide some helpful expertise and give feedback in an interactive education forum.

SPSI22

Special Interest Session: Building a Diverse Radiology Workforce (Sponsored by the American Association for Women in Radiology)

Sunday, Nov. 29 3:30PM - 4:30PM Room: Channel 2

LM PR

AMA PRA Category 1 Credit ™: 1.00

Participants
Lucy B. Spalluto, MD,MPH, Nashville, TN (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Discuss the attitudes of radiology professionals toward diversity and radiology professionals' experiences with diversity in their work environments. 2) Discuss the impact of these attitudes and experiences on increasing of diversity in the radiology workplace. 3) Provide participants with a historical perspective on efforts to increase diversity in radiology. 4) Review recent national data on radiologist experiences in the workplace and the current culture of radiology workplaces. 5) Present perspectives from leadership on how to increase diversity in the workplace.

Sub-Events

SPSI22A Establishing the Need for Diversity in the Radiology Workforce

Participants
Katarzyna J. Macura, MD,PhD, Baltimore, MD (*Presenter*) Author with royalties, Reed ElsevierResearch Grant, Profound Medical IncResearch Grant, Siemens AG

For information about this presentation, contact:

kmacura@jhmi.edu

SPSI22B A Survey of ACR Membership to Identify Barriers to Building a Diverse Physician Workforce

Participants
Pari V. Pandharipande, MD, MPH, Chestnut Hill, MA (*Presenter*) Nothing to Disclose

SPSI22C Leadership Efforts to Increase Diversity in the Radiology Workforce

Participants
Carolyn C. Meltzer, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

cmeltze@emory.edu

SPSI23

Special Interest Session: Exposing Our Blindside and Overcoming Unconscious Bias (Sponsored by the RSNA Committee on Diversity, Equity & Inclusion)

Tuesday, Dec. 1 8:30AM - 9:30AM Room: Channel 2

LM PR

AMA PRA Category 1 Credit ™: 1.00

Participants
Maureen P. Kohi, MD, Chapel Hill, NC (*Moderator*) Advisory Board, Boston Scientific CorporationAdvisory Board, Medtronic plc Consultant, Medtronic plcConsultant, Koninklijke Philips NV
Jorge A. Soto, MD, Boston, MA (*Moderator*) Royalties, Reed Elsevier

LEARNING OBJECTIVES

1) Understand the pervasive nature of unconscious bias. 2) Discuss various tools to help overcome unconscious bias and educate the future generation. 3) Recognize the need for and importance of diversity and inclusiveness in the professional and social arena.

Sub-Events

SPSI23A What is an Unconscious Bias?

Participants
Jamlik-Omari Johnson, MD, Atlanta, GA (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

jamlik.johnson@emoryhealthcare.org

SPSI23B Girl Talk: Unconscious Bias through the Female Lens

Participants
Nishita Kothary, MD, Stanford, CA (*Presenter*) Research Grant, EchoPixel, Inc; Scientific Advisory Board, Quantum Surgical

SPSI23C Does Unconscious Bias Spare the Minority?

Participants
Javier Villanueva-Meyer, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

SPSI23D LGBTQ and Unconscious Bias: Let's Expose the Facts

Participants
David M. Naeger, MD, Denver, CO (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

d.naeger@outlook.com

LEARNING OBJECTIVES

1) Analyze how the concept of implicit bias can apply to LGBTQ patients and co-workers. 2) Describe how to use terms surrounding gender and sexual orientation in an inclusive way.

ABSTRACT

This short talk will describe the axes around which implicit biases may exist for LGBT individuals. Additionally, we will review the confusing language landscape surrounding gender, sexual orientation, and partner relationships and address how to use terminology in an inclusive manner.

SPSI23E The Role of Unconscious Bias in Recruitment

Participants
Vishal Kumar, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify disparities in medical applications and education. 2) Review principles of holistic review.

ABSTRACT

Educators in interventional radiology are tasked with the responsibility of shaping the future of the specialty by selecting the next generation of IR physicians, teaching trainees the skills needed to be successful, and transmitting the depth and nuance of clinical knowledge required to advance equitable delivery of image guided therapies. This course will cover issues pertaining inequities of pipeline programs, financial disparities for medical school and radiology applicants, and strategies for holistic review for residency applications.

SPSI23F Participants

How to Recognize and Overcome Unconscious Bias

Ronald L. Arenson, MD, Mill Valley, CA (*Presenter*) Clinical Advisory Board, Ziteo Medical; Consultant, Arterys Inc

For information about this presentation, contact:

ronald.arenson@ucsf

LEARNING OBJECTIVES

1) Learn how to best recognize unconscious bias. 2) Explore techniques to overcome unconscious bias.

SPSI23G **Audience Discussion**

Printed on: 05/05/21

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SPSI24

Special Interest Session: A Call to Action in Health Equity: An Interactive Session on Health Disparities and Health Equity in Radiology

Wednesday, Dec. 2 5:00PM - 6:00PM Room: Channel 2

LM

AMA PRA Category 1 Credit ™: 1.00

Participants
Efren J. Flores, MD, Boston, MA (*Moderator*) Nothing to Disclose
Lucy B. Spalluto, MD,MPH, Nashville, TN (*Moderator*) Nothing to Disclose
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) In-kind support, Reed ElsevierEditor, Reed Elsevier
Valerie L. Ward, MD, MPH, Boston, MA (*Presenter*) Nothing to Disclose
Jan M. Eberth, PhD, Columbia, SC (*Presenter*) Nothing to Disclose
Justin Stowell, MD, Jacksonville, FL (*Presenter*) Nothing to Disclose
Richard E. Heller III, MD, Chicago, IL (*Presenter*) Nothing to Disclose
Linda Dowling, RN, Chicago, IL (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

rcarlos@med.umich.edu

richard.heller@radpartners.com

valerie.ward@childrens.harvard.edu

LEARNING OBJECTIVES

1) Discuss the contribution of social determinants of health to health disparities in radiology. 2) Gain an in-depth understanding of barriers to radiology care that may widen the disparities gap. 3) Integrate this knowledge to inform the development of interventions and community-based outreach programming to promote health equity in radiology. 4) Demonstrate radiology's role in health equity and population health in different practice settings.

ABSTRACT

1. Transformational change in radiology education through the RSNA is necessary to address health disparities, increase access to high-quality radiology care, and achieve equity. However, educational curricula in health equity, social determinants of health, and disparities are lacking at national radiology meetings. Through the 'Health Equity Matters: An interactive session on health disparities and equity' the RSNA can continue to be the leader in innovative radiology education and address this radiology education gap. This course will be composed of renowned radiology leaders in health disparities and health equity. 2. This educational session offers a unique opportunity to improve the knowledge of the audience and improve access to radiology care to our increasingly diverse population through a series of innovative, short lectures and an interactive panel discussion about social determinants of health, health disparities and equity in radiology. The purpose of this course is to provide the audience with an educational primer to gain a deeper understanding of health disparities in radiology and to provide the audience with tools to increase access to radiology services and achieve health equity. 3. A series of short educational lectures (10 minutes each) will be followed by a 10-minute Q&A interactive panel discussion with the audience. This interactive panel discussion will engage the audience in active discussion of topics relevant to their practice, address specific questions that arise during the sessions, and discuss relevant topics not addressed during the lectures.

SPSI25

Special Interest Session: Improving Patient Experience through Human Design Thinking (Sponsored by the RSNA Public Information Committee)

Friday, Dec. 4 8:30AM - 9:30AM Room: Channel 2

LM

AMA PRA Category 1 Credit ™: 1.00

Participants
Susan D. John, MD, Houston, TX (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Apply human design thinking processes to create practical solutions to improve patient experience. 2) Use novel teaching methods to improve empathy and communication between physicians and patients. 3) Implement effective methods of providing equitable care and improving access to imaging.

ABSTRACT

As patients become increasingly engaged in their medical care, attention to the quality of the patient experience must become a priority in radiology departments and imaging facilities. Human centered design is an approach to problem-solving that uses the patient perspective through all phases of the process. This technique emphasizes human dignity, access, and abilities when developing solutions. Empathetic communication with patients is a key factor in designing patient-centered solutions. This course will introduce the concept of human design thinking and how it can be applied to improve patient experience, access, and communication in radiology.

Sub-Events

SPSI25A Human Design Thinking: What is it and How Can You Use it to Improve Patient Experience?

Participants
Achala S. Vagal, MD, Cincinnati, OH (*Presenter*) Research Grant, Cerovenus

SPSI25B Patient-centered Communication in Radiology

Participants
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Presenter*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

rcarlos@med.umich.edu

LEARNING OBJECTIVES

1) Review how we communicate about cost of care.

SPSI25C Equity and Access to Imaging

Participants
Lucy B. Spalluto, MD,MPH, Nashville, TN (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

lucy.b.spalluto@vumc.org

LEARNING OBJECTIVES

1) Review concepts of health equity. 2) Summarize current challenges in providing equitable care. 3) Discuss potential methods to improve access to care.

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SPSI26

Special Interest Session: Review of 2020: New Research that Should Impact Your Practice

Thursday, Dec. 3 8:30AM - 9:30AM Room: Channel 2

RS

AMA PRA Category 1 Credit ™: 1.00

FDA Discussions may include off-label uses.

Participants
David A. Bluemke, MD,PhD, Madison, WI (*Moderator*) Nothing to Disclose
David A. Bluemke, MD,PhD, Madison, WI (*Presenter*) Nothing to Disclose
Christopher P. Hess, MD, PhD, San Francisco, CA (*Presenter*) Research, Siemens AG; Consultant, General Electric Company;
Vicky J. Goh, MBBCh, Chalfont St Giles, United Kingdom (*Presenter*) Nothing to Disclose
Mark L. Schiebler, MD, Madison, WI (*Presenter*) Stockholder, Stemina Biomarker Discovery, IncStockholder, HealthMyne, IncStockholder, X-Vax, Inc

For information about this presentation, contact:

mschiebler@uwhealth.org

dbluemke@rsna.org

vicky.goh@kcl.ac.uk

LEARNING OBJECTIVES

1) Identify key publications over the past year that may affect your clinical practice. 2) Evaluate new research developments in the field of radiological imaging. 3) Describe new developments in radiology that may affect the management of your patients.

ABSTRACT

RADIOLOGY is the leading journal for publications leading to new, important and translatable discoveries in imaging research. In the past year, there continue to be basic developments in radiology, as well as new guidelines and clinical trials in imaging that affect your practice. Overall trends for new scientific studies reflect an increasing number of clinical trials being submitted from around the world in addition to those of North America. Publications from Europe have been prominent in recent years, but new research programs from countries such as Japan, South Korea and China are developing quickly. Large numbers of study subjects in clinical trials are now common, and tends to result in more robust demonstration of the efficacy of imaging interventions. Artificial intelligence applications are becoming commonplace in our publications, as are radiomics studies with increasing large numbers of study subjects. Publications assessing the COVID19 pandemic have resulted new knowledge regarding the use of imaging. This seminar will highlight the results of key publications in the past year that are most likely to affect your practice in the near future, as well as presenting novel topics that are likely to be important to the field over the next 5 years.

SPSP21

Inteligencia Artificial IA y Radiomica Donde estamos?-Sesión del Colegio Interamericano de Radiología (CIR) en Español/Artificial Intelligence AI and Radiomics. Where are we?-Session of the Interamerican College of Radiology (CIR) in Spanish

AMA PRA Category 1 Credits ™: 1.25

FDA Discussions may include off-label uses.

Participants
Jorge A. Soto, MD, Boston, MA (*Moderator*) Royalties, Reed Elsevier
Jose L. Criales, MD, Huixquilucan, Mexico (*Moderator*) Nothing to Disclose

LEARNING OBJECTIVES

1) Conocer las aplicaciones actuales y futuras de la IA en Imagenología. 2) Describir el rol de la Radiomica y su utilidad clínica. / 1) Review current applications and introduce future uses of AI in Imaging. 2) To describe the current role of Radiomics in clinical practice.

Sub-Events

SPSP21A Bienvenida/Welcome

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier
Jose L. Criales, MD, Huixquilucan, Mexico (*Presenter*) Nothing to Disclose

SPSP21B La Inteligencia Artifical y la Radiomica en Radiología Visión General/AI and Radiomics in Radiology-Overview

Participants
Luis Marti-Bonmati, MD, PhD, Godella, Spain (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

marti_lui@gva.es

LEARNING OBJECTIVES

To understand what is an Imaging Biomarkers and the concept of Radiomics To learn how AI can be applied to the extraction and analysis of radiomics and dynamic parameters. To learn how AI can also improve Imaging Biomarkers development and validation. To define the concept of AI with RWD/RWE and Imaging Biomarkers.

ABSTRACT

The reproducibility of Quantitative Imaging Biomarkers (QIBs) in Radiomics is of high importance in the context of secondary use of health imaging data. Scientific contributions towards the achievement of imaging data harmonization is crucial to untap the enormous potential of scientific reuse of retrospective imaging data from multicenter acquisition.

SPSP21C Aportes de la Radiomica en el diagnostico por Imagen en Oncología/Contributions of Radiomics in the Diagnosis of Oncologic Diseases

Participants
Margarita R. Garcia Fontes III, Montevideo, Uruguay (*Presenter*) Nothing to Disclose

SPSP21D Presentación del CIR/CIR Update

Participants
Beatriz E. Gonzalez, MD, Zapopan, Mexico (*Presenter*) Nothing to Disclose

SPSP21E La Inteligencia Artificial: Empoderamiento del Radiólogo/AI Radiologist´s Empowerment

Participants
Guillermo Elizondo-Riojas, MD, PhD, Monterrey, Mexico (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

Elizondoguillermo@hotmail.com

LEARNING OBJECTIVES

To understand how Artificial Intelligence is going to empower the radiologist to improve patient care.

ABSTRACT

We will discuss the implications of using AI in the daily radiologist workflow now but specially en the future. We also will comment

on how AI is not going to displace radiologist, but on the contrary, it is going to empoer our work and understanding of human patology.We will discuss why radiologist has to be involved in the implementation of AI in ou practice in order to lead the application of this tool in patient care.

SPSP21F La Radiología en 2025 con visión 2020: Inteligencia Artificial-Aplicaciones clínicas/Radiology 2025 with a 2020 Vision: AI-Clinical Applications

Participants
Pablo R. Ros, MD, PhD, Stony Brook, NY (*Presenter*) Nothing to Disclose

SPSP21G Clausura/Closing Remarks

Participants
Jorge A. Soto, MD, Boston, MA (*Presenter*) Royalties, Reed Elsevier
Jose L. Criales, MD, Huixquilucan, Mexico (*Presenter*) Nothing to Disclose

Printed on: 05/05/21

SSBR03

Breast Imaging (MRI)

Sunday, Nov. 29 10:00AM - 11:00AM Room: Channel 4

BR

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSBR03-01 Preoperative Breast MR Imaging in Young Age Breast Cancer: Benefits in Surgical Outcomes by Using Inverse Probability Weighting

Awards
Trainee Research Prize - Fellow

Participants
Ahreum Park, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Eun Young Chae, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joo Hee Cha, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hee Jung Shin, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Woo Jung Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hak Hee Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the association between preoperative breast magnetic resonance (MR) imaging and surgical outcomes in young age breast cancer patients.

METHOD AND MATERIALS

Following IRB approval, we identified 964 women diagnosed as breast cancer under the age of 35 between January 2007 and December 2017. Of the 964 patients, 665 (69.0 %) had undergone preoperative breast MR imaging (MR group) and 299 (31.0%) had not (No MR group). We calculated the MR detection rate of additional suspicious lesions that were occult at mammography and ultrasonography and analyzed any changes in surgical management. Surgical outcomes were compared with the use of inverse probability weighting (IPW) to adjust 19 possible confounding factors regarding to patient demographics, clinical features, and tumor characteristics and create a balance between groups with and without MR imaging.

RESULTS

Of the 665 patients who underwent MR imaging, additional suspicious lesions were detected in 178 patients (26.8 %), with 88 of the 178 (49.4 %) being malignant. Surgical plan was changed in 99 of the 665 patients (14.9 %) due to MR findings. According to pathologic results, this change was appropriate for 62 of the 99 patients (62.6 %). In the IPW analysis, breast MR imaging was associated with lower odds of repeat surgery (odds ratio= 0.126, $p<0.001$) and positive resection margin (odds ratio= 0.324, $p<0.001$). The MR group showed higher odds of initial mastectomy (odds ratio=1.615, $p=0.004$), but there was no difference in overall mastectomy (odds ratio=1.235, $p=0.173$) compared to the no MR group.

CONCLUSION

Preoperative MR imaging in young age breast cancer patients is useful for detecting additional synchronous malignancy and also improving the surgical outcomes by significantly reducing the rate of repeat surgery and positive resection margin, with a similar likelihood of overall mastectomy.

CLINICAL RELEVANCE/APPLICATION

Breast cancers in young women are rare, but known to have poor prognosis than older women. Preoperative MR imaging was associated with favorable surgical outcomes in these patients qualified for the surgical treatment.

SSBR03-02 Characterization of Breast Cancer Subtypes by Quantitative Assessment of Intratumoral Heterogeneity using Dynamic Contrast-enhanced and Diffusion-weighted MR Imaging

Participants
Jin Joo Kim, MD, Busan, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jin You Kim, MD, Busan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Suk Kim, MD, Pusan, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

youdosa@naver.com

PURPOSE

To investigate whether intratumoral heterogeneity assessed with dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) and diffusion-weighted imaging (DWI) provides information related to molecular subtypes of invasive breast cancers.

METHOD AND MATERIALS

Consecutive 221 women (mean age, 55.1 years) with invasive breast cancer who underwent preoperative DCE-MRI with DWI were

retrospectively evaluated between July 2019 and February 2020. To evaluate intratumoral heterogeneity of each breast cancer, the kinetic heterogeneity (a measure of heterogeneity in the proportions of tumor pixels with delayed washout, plateau, and persistent components within a tumor) was assessed with DCE-MRI using a commercially available CAD system. In addition, the apparent diffusion coefficients (ADC) were measured using a region of interest technique and the ADC heterogeneity index was calculated using the following formula; (ADC max -ADC min) / ADC mean. The possible associations between imaging-based heterogeneity values for breast cancer and tumor subtypes were analyzed using Mann-Whitney U test and receiver operating characteristic (ROC) curves.

RESULTS

Of the 221 breast cancers, 36 (16.3 %) were classified as luminal A tumors, 139 (62.9 %) as luminal B tumors, 24 (10.9 %) as HER2-enriched tumors, and 22 (10.0 %) as triple-negative tumors. Non-luminal tumors showed higher kinetic heterogeneity value than non-luminal tumors (median, 0.92 [interquartile range (IQR) 0.82, 0.97] versus 0.76 [0.38, 0.93], $P < 0.001$). The kinetic heterogeneity yielded area under the ROC (Az) of 0.70 (95% confidence interval [CI]: 0.63, 0.76) for differentiating luminal from non-luminal tumors. Triple-negative tumors exhibited both higher kinetic heterogeneity and higher ADC heterogeneity values than non-triple-negative tumors (0.90 [0.75, 0.98] vs. 0.80 [0.44, 0.94], $P = 0.011$; 0.99 [0.84, 1.19] vs. 0.75 [0.57, 1.01], $P = 0.003$; respectively). HER2-enriched tumors exhibited higher kinetic heterogeneity value, but lower ADC heterogeneity value as compared to non-HER2-enriched tumors (0.94 [0.83, 0.96] vs. 0.79 [0.43, 0.93], $P = 0.003$; 0.63 [0.45, 0.93] vs. 0.81 [0.61, 1.05], $P = 0.027$; respectively). However, no significant differences were noted in these values between luminal A and luminal B tumors ($P = 0.675$ and 0.567, respectively).

CONCLUSION

Assessment of heterogeneity of enhancement kinetics and ADC values might provide biological information related to molecular subtypes of breast cancers.

CLINICAL RELEVANCE/APPLICATION

Intratumoral heterogeneity assessment with DCE-MRI and DWI could help to characterize the molecular subtype of breast cancer.

SSBR03-03 Ultrafast Breast MRI Improves the Discrimination of Benign from Malignant Breast Lesions

Participants
Shalin Patel, MD, Hershey, PA (*Abstract Co-Author*) Nothing to Disclose
Linda H. Du, DO, MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Divya Awal, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
James Park, Lake Success, NY (*Abstract Co-Author*) Nothing to Disclose
Beatriu Reig, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Laura Heacock, MD, MS, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Yiming Gao, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Samantha L. Heller, MD, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Alana A. Lewin, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Hildegard B. Toth, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Linda Moy, MD, New York, NY (*Abstract Co-Author*) Grant, Siemens AG ; Advisory Board, Lunit Inc; Advisory Board, iCad, Inc
Ritse M. Mann, MD, PhD, Nijmegen, Netherlands (*Presenter*) Researcher, Siemens AG Researcher, Seno Medical Instruments, IncResearcher, Identification Solutions, IncResearcher, Micrima LimitedResearcher, Medtronic plcScientific Advisor, ScreenPoint Medical BVScientific Advisor, Transonic Imaging, IncStockholder, Transonic Imaging, Inc

For information about this presentation, contact:

linda.moy@nyumc.org

PURPOSE

To investigate whether ultrafast DCE-MRI can improve the differentiation between breast malignancies and benign lesions.

METHOD AND MATERIALS

After IRB approval, we retrospectively reviewed consecutive 3-T breast MRI, performed with a 16-channel breast coil, from May 2019 to February 2020. All patients underwent a bi-temporal MRI that included ultrafast time-resolved angiography with stochastic trajectory (TWIST) DCE-MRI followed by a conventional volumetric interpolated breath-hold examination (VIBE) DCE-MRI. Ultrafast imaging was continuously acquired over 70 secs (temporal resolution, 4.5 secs) beginning at the start of the contrast injection. Conventional post-contrast VIBE imaging was performed till approximately 6 minutes after the injection of gadolinium. Time-to-enhancement (TTE) derived from TWIST series along with conventional MRI features and clinicopathologic features to differentiate benign from malignant lesions. Statistical analysis was performed using Chi-square test and Mann-Whitney U-tests.

RESULTS

Among 392 patients, there were 430 biopsy-proven breast lesions [163 (37.9%) malignancies and 267 (62.1%) benign lesions]. The median TTE of malignancies was shorter than that of benign lesions ($p < 0.01$). The addition of ultrafast imaging led to a significantly higher specificity of conventional DCE-MRI (58.3% vs 74.7%, p=0.03) without significant difference in the sensitivity (96.2% vs 97.3%, $p = 0.67$) for all lesions that were assessed as BI-RADS 4 and 5. TTE had a significantly better discriminative ability than curve type for masses, NME and foci ($p<0.001$, $p<0.02$ and p=0.045, respectively). Sub-analysis demonstrated that compared with conventional DCE-MRI, ultrafast imaging had higher sensitivity in women less than 50 years old (98.1% vs. 93.4% p=0.42, and women with minimal to mild BPE, compared with moderate to marked BPE (97.8 vs. 90.2 p=0.38).p=.038).

CONCLUSION

Time-to-enhancement derived from ultrafast DCE-MRI was useful in differentiating between breast carcinomas and benign lesions. It had a higher diagnostic accuracy than conventional delayed kinetic curve types.

CLINICAL RELEVANCE/APPLICATION

Time-to-enhancement derived from ultrafast TWIST acquisitions allowed differentiation between malignant and benign breast lesions.

SSBR03-04 Performance of Preoperative MRI to Evaluate Ductal Carcinoma in Situ (DCIS) in the ECOG-ACRIN E4112 Multicenter Trial

Participants
Shinnhuey S. Chou, MD, Boston, MA (*Presenter*) Research Grant, General Electric Company
Justin Romanoff, MA, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Constantine Gatsonis, PhD, Providence, RI (*Abstract Co-Author*) Consultant, MedyMatch Technology, Ltd
Jennifer Xiao, MD , Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Seema A. Khan, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Joseph A. Sparano, MD, Bronx, NY (*Abstract Co-Author*) Consultant, F. Hoffmann-La Roche Ltd; Consultant, Eli Lilly and Company; Consultant, Celgene Corporation; Consultant, Celldex Therapeutics, Inc; Consultant, Seattle Genetics, Inc; Consultant, AstraZeneca PLC; Research Grant, Novartis AG; Research Grant, Deciphera Pharmaceuticals, LLC; Research Grant, Prescient Therapeutics Pty Ltd; Stockholder, MetaStat, Inc
Christopher E. Comstock, MD, New York, NY (*Abstract Co-Author*) Advisory Board, Bracco Group
Constance D. Lehman, MD,PhD, Boston, MA (*Abstract Co-Author*) Institutional Research Grant, General Electric Company
Habib Rahbar, MD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company

PURPOSE

Multicenter data on the use of preoperative MRI (pMRI) to evaluate extent of ductal carcinoma in situ (DCIS) are limited. In this prespecified secondary analysis of the ECOG-ACRIN E4112 trial, we report the relation between baseline clinical covariates (e.g., tumor grade, histologic type, mammographic size), MRI features, and the DCIS score and MRI accuracy to evaluate extent of disease.

METHOD AND MATERIALS

E4112 was a prospective, nonrandomized multicenter trial of women with core needle biopsy (CNB)-diagnosed pure DCIS who were candidates for breast conservation surgery (BCS). All women underwent pMRI, and site radiologists recorded BI-RADS features and size of index DCIS, background parenchymal enhancement (BPE) level, and need for additional biopsies. DCIS grade and ER status on CNB and surgical specimens, along with final surgical pathology, were recorded. Women with BCS-confirmed pure DCIS received a 12-gene DCIS score. This secondary analysis evaluated DCIS size on MRI vs. mammography, MRI performance to identify additional disease, and associations of imaging features (lesion size, morphology, MRI BPE) with final pathology and DCIS Score.

RESULTS

The analysis set included 339 women with CNB-diagnosed DCIS (54 low, 136 intermediate, 137 high grade, 12 unknown). Median MRI size of DCIS was larger than mammographic size (19 vs 12 mm, $p<0.001$). The majority of index DCIS were non-mass enhancement (195/339) on MRI with minimal/mild BPE (236/339). MRI prompted additional CNBs in 19.8% (66/333; 6 missing) of women and identified 5 additional contralateral cancers and 16 additional ipsilateral cancers for an exam-level additional cancer yield of 6.3% (21/333), PPV of 31.8% (21/66), and false positive rate (biopsy with no additional malignancy) of 13.5% (45/333). No qualitative imaging feature was associated with final nuclear grade, upgrade to invasive disease, or DCIS Score ($p>0.05$).

CONCLUSION

In this secondary analysis of data from a multicenter study, pMRI identified a larger DCIS span than mammography, prompted additional biopsies in 1 in 5 women, and identified additional malignancy in 6%. Qualitative MRI features provided little value for predicting final pathology and genomic outcomes.

CLINICAL RELEVANCE/APPLICATION

Preoperative MRI for DCIS often identifies a larger span of disease than mammography and additional malignancy in 6% of women. Qualitative MRI features had no association with pathology and genomic outcomes, suggesting a focus for radiomics.

SSBR03-05 Eliminating Gadolinium-based Contrast Agents in Breast MRI Follow-up of BIRADS-3 Lesions

Participants
Sarah Eskreis-Winkler, MD, New York, NY (*Presenter*) Nothing to Disclose
Jeffrey S. Reiner, MD, New York , NY (*Abstract Co-Author*) Nothing to Disclose
Varadan Sevilimedu, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Kristin Belen, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Jill Gluskin, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Nicole B. Saphier, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Danny F. Martinez, BSC,MSc, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Elizabeth A. Morris, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Katja Pinker-Domenig, MD, New York, NY (*Abstract Co-Author*) Speakers Bureau, Siemens AG Advisory Board, Merantix Healthcare GmbH

For information about this presentation, contact:

eskreiss@mskcc.org

PURPOSE

With concerns about the safety of gadolinium-based contrast agents (GBCA), there is a need to develop a non-contrast-enhanced breast MRI (NCB-MRI) technique for breast cancer detection. We hypothesize that if a lesion is unchanged/resolved on T2w, it will follow a similar pattern on DCE-MRI. The aim of this study is to evaluate whether GBCA can be eliminated from 6-month follow-up MRIs of BI-RADS 3 lesions without changing management recommendations.

METHOD AND MATERIALS

In this retrospective study, breast MRIs classified as BIRADS-3 during 2017 were reviewed. BIRADS-3 lesions with T2 correlates were included. Three readers independently reviewed the initial BIRADS 3 exam and the T2w from the 6-month follow-up. Readers recorded each lesion's size as increased or not increased and assigned a BIRADS-3 (short term imaging follow-up) or BIRADS-4 (suspicious--biopsy recommended). Readers were blinded to all MRI sequences on 6-month follow-up except T2w. After a 2-week washout period, readers independently reviewed the full MRI from the 6-month follow-up, recorded each lesion's size on DCE-MRI as

increased or not increased, and again assigned a BIRADS classification. Consensus readings were created by averaging the results of individual readers. The switch rate (i.e. how often BIRADS recommendations changed with DCE-MRI) and kappa statistic (to evaluate agreement between T2w and DCE-MRI) were calculated.

RESULTS

54 (20%) of 266 BIRADS-3 breast MRIs demonstrated a T2 correlate. Switch rate between BIRADS 3 and BIRADS 4 using T2w alone versus DCE-MRI was 1.96% (CI 0.05,10.44), which is less than the 2% malignancy rate of the BIRADS-3 category. There was excellent agreement between lesion size increase on T2w and DCE-MRI (κ=0.85; ρ<0.001).

CONCLUSION

For BIRADS-3 lesions with T2 correlates undergoing 6-month breast MRI follow-up, management recommendations made using NCB-MRI versus DCE-MRI were the same in >98%, suggesting that GBCA may be eliminated in this subset of exams.

CLINICAL RELEVANCE/APPLICATION

Preliminary data indicate 6-month follow-up with NCB-MRI for BIRADS-3 lesions with T2 correlates may be considered without clinically significant changes in management recommendations.

SSBR03-06 Clinical Utility of DWI for Detection of Clinically Occult Early Breast Cancer Including DCIS in the Asymptomatic Women

Awards
Trainee Research Prize - Fellow

Participants
Chae Woon Lee, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hee Jung Shin, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ki Chang Shin, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Woo Jung Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Young Chae, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joo Hee Cha, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hak Hee Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

docshin@amc.seoul.kr

PURPOSE

To investigate the clinical utility of diffusion-weighted imaging (DWI) to detect clinically occult early breast cancer (EBC) including ductal carcinoma in situ (DCIS) and to compare the performance of mammography, DWI, and dynamic contrast-enhanced breast MRI (DCE-MRI).

METHOD AND MATERIALS

From June 2018 to January 2019, a total of 169 lesions with clinically occult EBC less than 2 cm who underwent preoperative breast MRI including DWI and mammography were retrospectively included in this study. Lesion conspicuity, size, type, detection rate, level of suspicion on each modality were evaluated and ADC and CNR on DWI were also obtained. Tumor histopathologic features on surgical specimen were recorded. Chi-square and Wilcoxon signed-rank test were used to calculate P values.

RESULTS

Of 169 lesions, there were DCIS in 46 (27%), microinvasive ductal carcinoma in 17 (10%), invasive ductal carcinoma in 97 (57%), invasive lobular carcinoma in 3 (2%), and other invasive carcinoma in 6 (4%). According to size of invasive cancer, 64 (38%), were more than 1 cm, 42 (25%) were less than 1 cm, and the remaining 63 (37.3%) were noninvasive cancer. Detection rate of noninvasive cancer was 49% for mammography, 81% for DWI, 81% for DCE-MRI, whereas that of invasive cancer less than 1 cm was 57%, 86%, 83%, respectively. That of invasive cancer more than 1 cm was 72% for mammography, 92% for DWI, 97% for DCE-MRI. Cancer detection rate was significantly higher than mammography (P<0.05), but slightly lower than DCE-MRI (P>0.05), regardless of lesion size, histopathology and molecular subtype.

CONCLUSION

In asymptomatic women with newly diagnosed early breast cancer, DWI were more likely to detect cancer than mammography regardless of lesion size, histopathology, and molecular subtype.

CLINICAL RELEVANCE/APPLICATION

DWI could be a sensitive and practical alternative for screening women with clinically occult early breast cancer.

SSBR04

Breast Imaging (Artificial Intelligence)

Monday, Nov. 30 8:30AM - 9:30AM Room: Channel 4

GU MR OI BQ AI

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSBR04-01 Impact of an Artificial Intelligence (AI) Solution as a Reader in a National Breast Screening Programme

Participants
Nisha Sharma, MBChB, Leeds, United Kingdom (*Presenter*) Nothing to Disclose
Jonathan James, BMBS, Nottingham, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Galvin Khara, PhD, London, United Kingdom (*Abstract Co-Author*) Employee, Kheiron Medical Technologies Ltd
Peter D. Kecskemethy, PhD, London, United Kingdom (*Abstract Co-Author*) CEO, Kheiron Medical Technologies
Tobias Rijken, London, United Kingdom (*Abstract Co-Author*) Stockholder, Kheiron Medical Technologies Ltd

For information about this presentation, contact:

nisha.sharma2@nhs.net

PURPOSE

Double reading of screening mammography is standard of care in many countries. This approach is labour intensive and difficult to achieve due to ongoing workforce crisis. This retrospective study explores the role of an AI product to replace the 2nd human reader.

METHOD AND MATERIALS

3 Breast Screening Centres provided anonymised mammograms from Jan 2012-2019 for this IRB approved study. Each centre employed double reading with arbitration of discordant opinions by either a single third human reader or group of readers. The original human reading opinionsand outcomes at assessment for recalled cases with pathology were obtained from the National Breast Screening information system. The mammograms used in this study were a random sample from the entire data set which had not been used for algorithm development or training. The AI algorithms opinion (normal or cancer) was paired with the opinion of the 1st human reader to simulate double reading. Sensitivity, specificity and discordant opinion rate were calculated

RESULTS

40,588 mammograms were reviewed. All were read by two human readers with 1,216/40,588 (3%) having a discordant opinion requiring arbitration. Overall 40,230 had a normal outcome and 358 were biopsy proven cancers. The overall recall rate was 4%, with a cancer detection rate of 8.5 per 1000. When the AI algorithm was applied as the second reader to this test set, there was consensus in 33,255 (81.9%) of the reads to either recall or not recall the cases. This meant that 7,333 (18.1%) of reads were discordant between the 1st human reader and the AI algorithm. The AI algorithm had a sensitivity of 85.5% and specificity of 87.2% compared with the first human reader with a sensitivity of 89.4% and specificity 96%. Combining the AI algorithm with reader 1 gave a sensitivity 95.0% and specificity of 96.9%, cancer detection rate of 8.4 per 1000 and recall rate of 4%.

CONCLUSION

Using an AI algorithm to replace the 2nd human reader would have allowed 81.9% of the women to obtain a definitive diagnosis of normal or abnormal. Only 18.1% of cases would need the input of an additional human reader, providing a feasible solution to combat the workforce crisis within breast imaging.

CLINICAL RELEVANCE/APPLICATION

This study shows that an AI algorithm is a viable option to replace the second human reader in the double reading of screening mammograms.

SSBR04-02 Deep Learning Model Translates Imaging Biomarkers to Predict Future Breast Cancer Risk: Surpassing Traditional Methods of Risk Assessment

Participants
Leslie Lamb, MD, Boston, MA (*Presenter*) Nothing to Disclose
Adam Yala, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Peter Mikhael, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Regina Barzilay, PhD, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose
Constance D. Lehman, MD,PhD, Boston, MA (*Abstract Co-Author*) Institutional Research Grant, General Electric Company

For information about this presentation, contact:

lrlamb@mgh.harvard.edu

PURPOSE

A new deep learning (DL) algorithm was designed to predict a patient's risk of developing breast cancer at multiple time points using mammographic image biomarkers alone. The purpose of this study was to compare the predictive accuracy of the DL image-only model to that of Tyrer Cuzick version 8 (TC8), a traditional risk model that incorporates patient history and breast density to predict future breast cancer risk.

METHOD AND MATERIALS

The DL risk assessment model was developed using consecutive bilateral screening mammograms from 80818 patients between 2009 to 2016. Mammograms were randomly assigned to training, validation, or testing, resulting in 210819 examinations in 56831 patients, 25644 in 7021 patients, and 9290 in 3961 patients, respectively. No patients were excluded for model training and validation. For comparison of our 5-year DL model performance to TC8, women with a personal history of breast cancer, those who developed cancer within 3 months of the index screening mammogram, and those who lacked 5-year imaging follow-up were excluded. Cancer outcomes were obtained through linkage to a regional tumor registry. DL model vs TC8 model performance was compared using areas under the receiver operating characteristic curve (AUCs) with DeLong test ($p< 0.05$).

RESULTS

Mean patient age was 56.4 years (range 35 to 91). 6554/9290 (70.5%) were in post-menopausal patients and 2736/9290 (29.5%) were in pre-menopausal patients. 5170/9290 (55.7%) of patients had non-dense breasts (fatty/scattered fibroglandular) and 4116/9290 (44.3%) had dense breasts (heterogeneously dense/extremely dense). 7563/9290 (81.4%) were in white patients, 444/9290 (4.8%) in african american and 442/9290 (4.8%) in asian/pacific islander races. Race was unknown in 841/9290 (9.1%). The AUC of DL model was 0.71 (95% confidence interval [CI]: 0.676, 0.749) compared to 0.61 (95% CI: 0.572, 0.658) by TC8 model ($p<0.001$).

CONCLUSION

Mammograms contain highly predictive biomarkers of future cancer risk, not identified by traditional risk models. A DL model using screening mammography alone can improve risk discriminatory accuracy compared to traditional modern risk models which rely on clinical history and mammographic breast density.

CLINICAL RELEVANCE/APPLICATION

Traditional risk models can be time-consuming to acquire and rely on inconsistent or missing data. A DL image-only risk model can provide increased access to more accurate, less costly risk assessment.

SSBR04-03 What Impact Could AI Based Computer Aided Detection Have on the Number and Biological Relevance of Interval Cancers in a Population Based Screening Programme?

Participants
Sarah J. Vinnicombe, FRCR,MRCP, Cheltenham, United Kingdom (*Presenter*) Nothing to Disclose
Olivia Parr, Cheltenham, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Richard Sidebottom, MSc,FRCR, Oxford, United Kingdom (*Abstract Co-Author*) Research Consultant, Alphabet Inc; Research Grant, Micrima Limited
Dagmar Godden, MBChB, Cheltenham, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Eleanor Cornford, MBBS, Cheltenham, United Kingdom (*Abstract Co-Author*) Nothing to Disclose
Iain D. Lyburn, MBChB, Cheltenham, United Kingdom (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

sarah.vinnicombe@nhs.net

PURPOSE

Interval cancers (IC) feature in all mammographic screening programmes, and are classified in the UK NHS Breast Screening Programme as a key component of quality assurance. The aims of this study were: 1) to assess whether an AI-based computer aided detection software (CAD) could identify relevant findings on prior screens 2) to compare CAD with reader categorisation of IC and 3) to ascertain the histologic subtype of CAD-detected ICs.

METHOD AND MATERIALS

Necessity for informed consent was waived in this retrospective study of anonymised images. Consecutive ICs with available diagnostic and prior screening mammograms (PS) and controls with subsequent normal screens were identified from NHS BSP records. Exclusion criteria were: incomplete mammography, IC outside the field of view and unavailable pathology. BI-RADS density, CAD global scores and prompts were recorded. Prompts were deemed true positive (TP) if they corresponded to the site of the subsequent IC. CAD specificity was set at 96% to match the UK screening recall rate of 4%. CAD scores and prompts on PS were compared with prior NHS BSP categorization of IC (true interval, occult, minimal signs or false negative). Proportions of TP prompts on PS were calculated and correlated with grade and receptor status of ICs. ROC curve analysis and Chi2 tests were used at 95% significance level.

RESULTS

852 controls and 300 ICs were analyzable. Median CAD scores were: controls, 4.22; PS, 7.53; IC, 9.69. By NHS BSP categorization, 149 (50%) were true intervals, 42 (14%) mammographically occult, 49 (16%) minimal signs and 60 (20%) false negative. ROC area under the curve (AUC) for the entire IC cohort was 0.72 (95% C.I. 0.68-0.75). Of 109 false negative/minimal sign cases, CAD correctly identified 21 at a recall rate of 4%. 15 (71%) were grade 1/2 and 20/21 were ER positive. In the true interval group, CAD would have recalled 14/149 (9%); 9 were grade 3 (p. 0.097). For the occult group diagnosed within 12 months of PS (n=45), the AUC was 0.73 (95% C.I. 0.66-0.81); for BIRADS density alone it was 0.59 (95% C.I. 0.5 - 0.99).

CONCLUSION

AI-based CAD localised some cancers on prior screens that were missed by readers, mostly low/intermediate grade ER positive cancers.

CLINICAL RELEVANCE/APPLICATION

In a 3-yearly breast screening programme, AI CAD may improve detection of subtle cancers, and might have a role in triage of

cases considered imperceptible to human readers for enhanced screening.

SSBR04-04 Retrospective Evaluation of Three Commercial AI Cad Algorithms for Independent Assessment of Screening Mammograms - Standalone and in Combination With Radiologists

Participants
Mattie Salim, MD, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Erik Wahlin, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Karin Dembrower, MD, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Martin Eklund, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Kevin Smith, Stockholm, Sweden (*Abstract Co-Author*) Nothing to Disclose
Fredrik Strand, MD,PhD, Solna, Sweden (*Presenter*) Consultant, Collective Minds Radiology AB

For information about this presentation, contact:

fredrik.strand@ki.se

PURPOSE

To determine whether commercial AI CAD algorithms for screening mammography have reached a performance level on par with radiologists, and to examine the results of combining independent assessments by algorithms and radiologists.

METHOD AND MATERIALS

The study sample was derived from a population-based screening cohort from 2008 to 2015. There were 739 women diagnosed with breast cancer at screening or within 12 months thereafter, and 8,066 women who remained healthy for at least 2 years. The digital mammograms were processed by three commercial AI algorithms (AI-1, AI-2 and AI-3). The area under the ROC curve was calculated. For comparisons, the operating points of algorithms were determined by the specificity of first-reader radiologists (96.6%). Diagnostic metrics, including sensitivity, were calculated based on a simulated screening cohort for which each observation of healthy women were duplicated 14 times. The study was approved by the Ethical Review Board.

RESULTS

The area under the ROC was 0.956 (95%CI: 0.948 to 0.965), 0.922 (95%CI: 0.910 to 0.934) and 0.920 (95%CI: 0.909 to 0.931) for AI-1, AI-2, and AI-3 respectively. For algorithms at first-reader radiologists' specificity level, the sensitivity was 81.9%, 67.0%, 67.4%, 77.4% and 80.1% for AI-1, AI-2, AI-3, first-readers and second-readers respectively. The differences between AI-1 and all others, except second readers, were significant. In a simulated screening cohort of 113,663 exams with independent double-reading, first readers made 4408 abnormal assessments, which increased by 78%, 81%, 78% and 24% when adding AI-1, AI-2, AI-3 and second readers respectively. First readers made 572 true positive assessments (among 739 diagnosed women), which increased by 15%, 8%, 9% and 12% when adding the assessments of AI-1, AI-2, AI-3 and second readers respectively.

CONCLUSION

One commercial CAD algorithm performed better than first-reader radiologists and on par with second-reader radiologists in independent reading of screening mammograms. When combining algorithms with radiologists, more cancers were detected but abnormal assessments increased disproportionally. In two-reader settings, future studies should focus on reducing the total number of abnormal interpretations when combining one radiologist with one algorithm.

CLINICAL RELEVANCE/APPLICATION

It is time for prospective clinical studies of AI CAD as independent second readers, in controlled settings.

SSBR04-05 The Potential of AI for Improving Early Detection in Breast Cancer Screening to Reduce Interval Cancer Rates

Participants
Alexander Wanders, MMedSc, Voorhout, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Alejandro Rodriguez-Ruiz, Nijmegen, Netherlands (*Abstract Co-Author*) Employee, ScreenPoint Medical BV
Willem J. Mees, MD, Leiden, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Nico Karssemeijer, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Director, ScreenPoint Medical BVShareholder, ScreenPoint Medical BVShareholder, Volpara Health Technologies LimitedConsultant, QView Medical, IncShareholder, QView Medical, Inc
Ioannis Sechopoulos, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Research Grant, Siemens AGSpeakers Bureau, Siemens AGResearch Grant, Canon Medical Systems CorporationScientific Advisory Board, Fischer Medical
Cornelis J. van Rooden, MD, The Hague, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Ritse M. Mann, MD, PhD, Nijmegen, Netherlands (*Presenter*) Researcher, Siemens AG Researcher, Seno Medical Instruments, IncResearcher, Identification Solutions, IncResearcher, Micrima LimitedResearcher, Medtronic plcScientific Advisor, ScreenPoint Medical BVScientific Advisor, Transonic Imaging, IncStockholder, Transonic Imaging, Inc

PURPOSE

To determine the accuracy of an artificial intelligence (AI) system to detect signs of cancer in screening mammograms of interval cancer (IC) cases.

METHOD AND MATERIALS

A retrospective case-control study was performed. The last screening mammograms of all IC cases diagnosed in the region South West of the Dutch Breast Screening Program between 2011 and 2015 were consecutively collected. During this period, recall, cancer detection, and interval cancer rates varied per year between 2.1-2.5%, 5.9-6.9/1000 and 2.2-2.6/1000, respectively.The histopathology, pTNM Pathological Classification, and treatment information were retrieved when available. For each IC case, two control cases (normal mammograms verified by at least 2-year follow-up) were collected from the same screening program, matched by age and year of examination.All mammograms were processed by an AI cancer detection system (Transpara, ScreenPoint Medical). Breast density was computed using automated software (LIBRA, Univ. of Pennsylvania). The performance of the AI system for detection of cancer in IC cases at screening prior to diagnosis was estimated in terms of the area under the receiver operating characteristic curve (AUC).

RESULTS

In total 2332 IC cases (median 15 months from negative screening until IC diagnosis, interquartile range 9-20 months) and 4664 controls were included.The AUC of AI to detect IC in screening was 0.73 (95% CI = 0.72-0.74). The sensitivity was 37.1% and 18.5% at specificity of 90% and 97.5%, respectively. In comparison, the AUC of breast density was 0.70 (95% CI = 0.68-0.73), with sensitivity of 23.3% and 6.5% at specificity of 90% and 97.5%.No difference in AI AUC was found when stratifying by DCIS/invasive IC. A small trend towards higher AI AUC was found for IC diagnosed after an incident round (0.74 vs 0.70 after a prevalent round), as well as for IC treated with breast amputation (0.75 vs 0.72 for IC that received breast-conserving treatments).

CONCLUSION

AI has the potential to reduce interval cancer rates, whether by being used as an independent reader or as a pre-selection tool to determine which cases could benefit from additional screening imaging.

CLINICAL RELEVANCE/APPLICATION

There is still a stable rate of interval cancers (often with worse prognosis than screening-detected cancers) in screening programs. New AI-based strategies could help to reduce interval cancer rates.

SSBR04-06 The Effect of Breast Density on a Neural Network Classifier in Breast Cancer Screening

Participants
Eric Kim, MD, New York, NY (*Presenter*) Nothing to Disclose
Ujas N. Parikh, MD, San Francisco , CA (*Abstract Co-Author*) Nothing to Disclose
Yiqiu Shen, New York City, NY (*Abstract Co-Author*) Nothing to Disclose
Nan Wu, New York City, NY (*Abstract Co-Author*) Nothing to Disclose
S. Gene Kim, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Kyunghyun Cho, New York City, NY (*Abstract Co-Author*) Nothing to Disclose
Laura Heacock, MD, MS, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Linda Moy, MD, New York, NY (*Abstract Co-Author*) Grant, Siemens AG ; Advisory Board, Lunit Inc; Advisory Board, iCad, Inc
Krzysztof J. Geras, New York City, NY (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Eric.Kim@nyulangone.org

PURPOSE

To determine the effect of breast density on the performance of a globally-aware multiple instance classifier to predict malignancy on screening mammography.

METHOD AND MATERIALS

In this retrospective study, we trained a globally-aware multiple instance classifier (GMIC) on over 200,000 digital screening mammograms performed at our institution from 2010-2017. The GMIC is a neural network model that aggregates both global and local information to make predictions of malignancy for each breast of a screening mammogram. The breast density was determined by the original interpreting radiologist using the BI-RADS classification for breast density. The reference standard for determining the presence of malignancy was the pathology reports. Once the model was trained, a non-enriched reader study was performed to compare the performance of the model to 14 radiologists. Each reader independently provided probability estimates of malignancy for each breast in 720 screening exams (1,440 breasts). Among the 1,440 breasts, 61 breasts were associated with biopsy-proven malignant findings, 30 in non-dense breasts and 31 in dense breasts. Performance of the model and the radiologists was assessed using area under the ROC curve (AUC) analysis. The ability of the model and the radiologists to detect biopsy-proven malignancy was compared using the Fisher's Exact Test.

RESULTS

The model achieved an overall AUC of 0.925, performing better in non-dense breasts than dense breasts (AUC 0.941 vs AUC 0.908). In the reader study, the model achieved an AUC of 0.897 (non-dense: 0.908, dense: 0.885) while the average of radiologists achieved an AUC of 0.895 (non-dense: 0.935, dense: 0.856). Both the model and average of radiologists correctly identified 28/30 (93.3%) malignancies in non-dense breasts. The model identified 29/31 (93.5%) and the average of radiologists identified 26/31 (83.9%) malignancies in dense breasts (p=0.42).

CONCLUSION

The performance of our model is superior in non-dense breasts versus dense breasts for predicting malignancy on screening mammogram, and is similar to that of radiologists.

CLINICAL RELEVANCE/APPLICATION

The classifier predicts malignancy on screening mammogram at the level of radiologists in both non-dense and dense breasts.

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SSBR07

Science Session with Keynote: Breast Imaging (Artificial Intelligence)

Friday, Dec. 4 2:00PM - 3:00PM Room: Channel 4

GU MR OI

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSBR07-01 Breast Imaging Keynote Speaker: Assessing the Value of AI in Breast Imaging

Participants
Fiona J. Gilbert, MD, Cambridge, United Kingdom (*Presenter*) Research Grant, Hologic, IncResearch Grant, General Electric Company Research Consultant, Alphabet IncResearch support, Bayer AGResearch collaboration, Volpara Health Technologies Limited

SSBR07-03 Prediction of Breast Cancer Molecular Subtypes on DCE-MRI Using Convolutional Neural Network with Transfer Learning between Two Centers

Awards
Trainee Research Prize - Medical Student

Participants
Yang Zhang, Irvine, CA (*Presenter*) Nothing to Disclose
Jeon-Hor Chen, MD, Kaohsiung City, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Yezhi Lin, Wenzhou, China (*Abstract Co-Author*) Nothing to Disclose
Siwa Chan JR, MD, Taichung City, Taiwan (*Abstract Co-Author*) Nothing to Disclose
Jiejie Zhou, Wenzhou, China (*Abstract Co-Author*) Nothing to Disclose
Daniel S. Chow, MD, Orange, CA (*Abstract Co-Author*) Nothing to Disclose
Peter Chang, MD, Irvine, CA (*Abstract Co-Author*) Nothing to Disclose
Tiffany Kwong, Irvine, CA (*Abstract Co-Author*) Nothing to Disclose
Xinxin Wang, Irvine, CA (*Abstract Co-Author*) Nothing to Disclose
Ritesh Parajuli, Irvine, CA (*Abstract Co-Author*) Nothing to Disclose
Rita Mehta, Irvine, CA (*Abstract Co-Author*) Nothing to Disclose
Meihao Wang, MD, Wenzhou, China (*Abstract Co-Author*) Nothing to Disclose
Min-Ying Su, PhD, Irvine, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Breast cancer molecular subtypes are very important for choosing the optimal treatments. In this study we applied deep learning to predict subtypes based on ER, PR and HER2. A conventional convolutional neural network (CNN) and a recurrent CNN using convolutional long short term memory (CLSTM) were used to compare their performance.

METHOD AND MATERIALS

A total of 244 patients were analyzed, 99 in training dataset scanned on a Siemens 1.5T system. The independent testing dataset was collected from a different hospital with a total of 145 patients, scanned on a GE 3T system. Patients were classified into 3 subtypes based on hormonal receptor (HR) and HER2 receptor: (HR+/HER2-), HER2+ and triple negative (TN). Only DCE images were used. The smallest bounding box covering tumor ROI was used as the input for deep learning to develop the first model in the Training dataset. Then, transfer learning was applied to re-tune the model for the testing dataset, by splitting it based on the time of MRI into 83 patients in Testing-1 and 62 patients in Testing-2.

RESULTS

In the training dataset, the mean accuracy was higher by using CLSTM (0.91) than CNN (0.79). When the developed model was applied to the independent testing datasets, the accuracy was only 0.4-0.5, suggesting that the developed model cannot be directly applied. With transfer learning by re-tuning parameters using one part of the testing dataset (Testing-1), the mean accuracy reached 0.91 by CNN and 0.83 by CLSTM. The re-trained model improved accuracy in the other part of the testing dataset (Testing-2) from 0.47 to 0.78 by CNN, and from 0.39 to 0.74 by CLSTM. Overall, transfer learning could improve the classification accuracy by greater than 30%. When the re-tuning was performed using Testing-2 and evaluated in Testing-1, the results were similar, supporting the robustness of the transfer learning approach.

CONCLUSION

The recurrent network using CLSTM could track changes in signal intensity during DCE acquisition, and achieved a higher accuracy compared to conventional CNN. For datasets acquired using different settings, transfer learning can be applied to generate dataset-specific model.

CLINICAL RELEVANCE/APPLICATION

This study elaborates how the developed AI methods using a training dataset can be implemented in a different clinical setting by transfer learning, to predict different molecular subtype of breast cancer.

SSBR07-04 Development and Validation of an Artificial Intelligence Algorithm for Breast Density Assessment in 2D and Synthetic 2D Mammography

Participants
Jaehwan Lee, Seoul, Korea, Republic Of (*Presenter*) Employee, Lunit Inc
Ki Hwan Kim, MD,PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Lunit Inc
Hyunsuk Yoo, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Lunit Inc
Hyo-Eun Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Lunit Inc
Hak Hee Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun-Kyung Kim, MD, Gyeonggi-do, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Boo-Kyung Han, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop an Artificial Intelligence (AI) algorithm for assessing breast density using 2D mammography and validate it on 2D and synthetic 2D mammography images.

METHOD AND MATERIALS

A total of 283,122 2D mammograms and original reports collected from multiple hospitals were used to develop an AI algorithm for assessing mammographic breast density. The AI algorithm was validated us-ing 800 2D mammography exams collected from two countries, all with corresponding original radiologic reports. Three breast radiologists individually re-evaluated the breast density and a majority vote was used to determine the ground truth (GT). The agreement between AI and GT was compared with that be-tween the original reports and GT using linear-weighted Cohen's kappa value. The performance for binary categorization of dense (density= c,d) and nondense (density=a,b) tissue was also quantified with McNemar's test. Finally, to demonstrate that AI can be applied to synthetic 2D images, a separate dataset was collected from a total of 300 patients who underwent both traditional 2D and synthetic 2D images in combo mode, and the agreement between AI and GT was calculated.

RESULTS

Agreement between AI and GT (kappa=0.84, 95% CI: 0.82-0.86) was higher than that between radiologic report sand GT (kappa=0.77, 95% CI: 0.74-0.80). For binary categorization, the proportion of dense breast density that matched GT was significantly higher for AI (97%[400/413]) vs. radiologic reports (92%[378/413], p<0.001), while the proportion of non-dense breast that matched GT was not significantly different for AI (93%[361/387]) vs. radiologic reports (94%[364/387, p=0.58]). Finally, for synthetic 2D images, there was good agreement between AI and GT (kappa=0.74, 95% CI: 0.69-0.79) and between re-port and GT (kappa=0.73, 95% CI: 0.67-0.78), with strong linear correlation between AI score obtained for 2D and synthetic 2D images (r2 = 0.906, p<0.001).

CONCLUSION

The AI algorithm, developed using large-scale mammography data, assessed mammographic breast density at the level of radiologists for both 2D and synthetic 2D mammograms.

CLINICAL RELEVANCE/APPLICATION

An AI algorithm can reliably be applied to assess mammographic breast density in clinical practice.

SSBR07-05 Using AI to Triage Which Screening Mammograms Benefit from a Double Reading Strategy

Participants
Christiana Balta, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Employee, ScreenPoint Medical BV
Alejandro Rodriguez-Ruiz, Nijmegen, Netherlands (*Presenter*) Employee, ScreenPoint Medical BV
Christophs Mieskes, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Nico Karssemeijer, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Director, ScreenPoint Medical BVShareholder, ScreenPoint Medical BVShareholder, Volpara Health Technologies LimitedConsultant, QView Medical, IncShareholder, QView Medical, Inc
Sylvia H. Heywang-Koebrunner, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine if an artificial intelligence (AI) system can be used to triage which screening digital mammography (DM) exams benefit from a double reading strategy from those exams were single reading could be sufficient.

METHOD AND MATERIALS

A consecutive sample of 17886 screening digital mammograms with 114 biopsy-proven cancers was retrospectively collected. Exams were acquired with Siemens and Hologic DM systems in one screening unit that invites women for biennial screening and uses independent double reading of mammograms. An AI system (Transpara version 1.6.0, ScreenPoint Medical) automatically analyzed each mammogram and assigned an 'AI-Score' 1-10. The higher the AI-Score the higher the likelihood of malignancy within the DM exam. The AI-Score is calibrated such that in a screening population approximately 10% of mammograms are assigned to each category. The hypothesis was that in DM exams with an AI-Score lower or equal than a threshold, single-reading would have been sufficient, while those exams with higher AI-Score, double-reading would be beneficial. All AI-Scores (1-9) were investigated as potential thresholds. Cancer detection rate (CDR), recall rate and positive predictive value (PPV) of the simulated triaging screening strategy were compared to the original outcomes, using a McNemar's test to analyze paired data.

RESULTS

The original double reading resulted in a CDR of 6.4/1000, recall rate of 5.4% and PPV of 11.9%. By selecting an AI-Score threshold of 7 to triage double reading, the number of exams (n=6229) to be double read could be reduced by 65% without having an impact on sensitivity. CDR would have remained unchanged (6.4/1000), recall rate would have been reduced by 11.8% (down to 4.8%, P<0.001) and PPV would have been increased by 10.5% (up to 13.3%, P<0.001), compared to double reading of all mammograms.

CONCLUSION

AI can be used to triage screening mammograms that would benefit most from double reading, reducing workload and improving screening performance.

CLINICAL RELEVANCE/APPLICATION

AI-based triaging of screening mammograms for single or double reading can potentially improve the quality of screening and lead to more effective use of radiologists' reading time on mammograms.

SSBR07-06 Deep Learning to Reduce Unnecessary Biopsy in Breast Cancer Screening

Participants
Chang Liu, Pittsburgh, PA (*Presenter*) Nothing to Disclose
Min Sun, MD,PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Dooman Arefan, PhD, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose
Margarita L. Zuley, MD, Pittsburgh, PA (*Abstract Co-Author*) Investigator, Hologic, Inc
Wendie A. Berg, MD, PhD, Gibsonia, PA (*Abstract Co-Author*) Grant, Koios Medical, Inc
Jules H. Sumkin, DO, Pittsburgh, PA (*Abstract Co-Author*) Research Grant, Hologic, IncResearch Grant, General Electric Company
Shandong Wu, PhD, MSc, Pittsburgh, PA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

wus3@upmc.edu

PURPOSE

Most patients with a screening Breast Imaging Reporting and Data System (BI-RADS) 4 digital mammogram would be recommended for biopsy. However, 70-80% of the biopsies are negative. In this study we developed an artificial intelligence (AI) classification algorithm using deep learning on mammogram images to precisely triage BI-RADS 4 suspicious lesions aiming to avoid unnecessary biopsies.

METHOD AND MATERIALS

This retrospective study included 847 patients identified in the general population breast cancer screening at a single institution. All patients had a BI-RADS 4 diagnosis and underwent biopsy with pathology-confirmed outcomes, consisting of 200 invasive breast cancer cases, 200 DCIS cases, 198 pure atypia cases, 194 benign cases, and 55 atypia cases that were upstaged to invasive cancer or DCIS after excisional biopsy. Each patient had digital mammogram images with both CC and MLO views. We employed convolutional neural network model VGG-16 to perform 4 binary classification tasks: (I) benign vs. all atypia+invasive+DCIS, aiming to identity the benign cases whose biopsy can be avoided; (II) benign+pure atypia vs. atypia-upstaged+invasive+DCIS, aiming to conservatively reduce biopsy for patients who are not candidates for chemoprevention of atypia; (III) benign vs. each of the other 3 classes individually, aiming for a precise diagnosis; and (IV) pure atypia vs. atypia-upstaged, aiming to reduce unnecessary excisional biopsy on atypia patients. 10-fold cross-validation was performed and AUC and sensitivity were reported.

RESULTS

A 95% sensitivity in the 'higher stage disease' class was ensured for all tasks. The sensitivity of benign was 29% in task I and 25% in task II, respectively. In task III, the respective sensitivity of benign was 30% (vs atypia), 46% (vs DCIS), and 41% (vs invasive tumor). In task IV, the sensitivity of pure atypia was 35%. The AUC values for the 4 tasks were 0.64, 0.67, 0.70/0.72/0.76, and 0.67, respectively.

CONCLUSION

Deep learning of digital mammograms from BI-RADS 4 patients can identify 25%-35% patients who may potentially avoid unnecessary biopsies while ensuring 95% sensitivity of the "higher stage disease" (atypia, DCIS, and invasive breast cancer).

CLINICAL RELEVANCE/APPLICATION

Applying AI models to stratify BI-RADS 4 patients may better inform clinical decisions to reduce unnecessary biopsies, thus alleviate clinical procedures, financial cost, and patients' anxiety/stress.

SSBR08

Breast Imaging (MRI)

Wednesday, Dec. 2 3:30PM - 4:30PM Room: Channel 4

CT MK MR AI

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSBR08-01 The Fat-Tumor Interface on Magnetic Resonance Imaging: Novel Imaging Biomarker in Breast Cancer Patients Treated with Neoadjuvant Chemotherapy

Participants
Eun Sook Ko, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyoung Lan Ko, MD, Goyang, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Boo-Kyung Han, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Young Ko, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ji Soo Choi, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ko Woon Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the clinical significance of the fat-tumor interface based on pretreatment MRI to predict the pathologic complete response (pCR) in patients treated with neoadjuvant chemotherapy (NAC) and to validate the effect of this new quantitative imaging biomarker on pCR using external cohort.

METHOD AND MATERIALS

A total of 1140 patients who were treated with NAC were retrospectively enrolled from two hospitals (development cohort [n = 1004] and external validation cohort [n = 136]). Using pretreatment MRI, the fat-tumor interface was quantitatively calculated based on k-means clustering algorithm and the cutoff point of the fat-tumor interface to divide the patients into interface-rich and interface-poor groups was determined using receiver operating characteristic curve analysis. Univariable and multivariable logistic regression analyses and subgroup analysis were performed to determine the association of the fat-tumor interface and clinicopathological variables with pCR.

RESULTS

Patients classified into interface-rich group were less likely to have a pCR ($P < 0.001$). Higher fat-tumor interface were significantly associated with worse pathologic outcome in both the development and validation sets ($P = 0.030$ and 0.002, respectively). In subgroup analyses, higher fat-tumor interface was significant prognostic factor in obese ($P < 0.001$), higher Ki-67 level ($P = 0.041$), HR-/HER2+ cancer ($P = 0.038$), and the biggest tertile for tumor volume group ($P = 0.045$).

CONCLUSION

Higher fat-tumor interface is significant prognostic factor in patients treated with NAC. This correlation is optimally defined and displayed in obese patients, patients with HER2-positive cancers, and patients with larger tumor volume. The fat-tumor interface may potentially be useful for precision medicine and it affect patients' treatment strategies.

CLINICAL RELEVANCE/APPLICATION

Contrary to extensive research about the biologic mechanisms between obesity and cancer, just a few studies have been performed to evaluate the role of the fat environment in breast cancer patients with imaging modalities.

SSBR08-03 Heterogeneity in Intratumoral Perfusion on MRI Prior to Neoadjuvant Chemotherapy Predicts Pathologic Complete Response in Breast Cancer

Participants
Bethany L. Niell, MD,PhD, Tampa, FL (*Presenter*) Nothing to Disclose
Mahmoud Abdalah, PhD, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
Olya Stringfield, PhD, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
Jia Wu, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Ruijiang Li, PHD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Dana Ataya, MD, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
Bruna Victorasso Jardim Perassi, PhD, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
Natarajan Raghunand, PhD, Tampa, FL (*Abstract Co-Author*) Nothing to Disclose
Robert J. Gillies, PhD, Tampa, FL (*Abstract Co-Author*) Consultant, HealthMyne, Inc; Investor, HealthMyne, Inc; Research support, HealthMyne, Inc; Consultant, Helix Biopharma, Inc; Research support, Helix Biopharma, Inc;

For information about this presentation, contact:

bethany.niell@moffitt.org

PURPOSE

Pathologic complete response (pCR) is associated with longer recurrence free survival in women undergoing neoadjuvant chemotherapy (NAC) for breast cancer. Heterogeneous tumors are less likely to have durable therapeutic responses, and

heterogeneous perfusion is a primary driver of intratumoral heterogeneity. Using dynamic contrast-enhanced (DCE) breast MRI, tumor voxels with similar DCE characteristics may be segmented into sub-regions (habitats) to quantify heterogeneity. In this study, we investigated whether intratumoral heterogeneity quantified on DCE-MRI was predictive of pCR.

METHOD AND MATERIALS

In this retrospective study, 61 women were divided into training (43) and validation (18) cohorts after matching for age and tumor hormone receptor status. Tumor were segmented by two radiologists on the pre-NAC DCE-MRI. Voxel multi-parametric maps were computed from four perfusion parameters: wash-in and washout slopes, percentage enhancement, and signal enhancement ratio. Using consensus clustering, superpixel maps divided each tumor into low, moderate, and high perfusion habitats. The process was repeated across the training set. A fourth habitat included the breast parenchyma bordering the tumor. For each patient, a 4x4 multiregional spatial interaction matrix generated 22 features. Feature similarities between patients within the training cohort were explored with a network-based strategy, and a spectral clustering algorithm was used to divide patients by pCR status. A multinomial model was built to cluster multiparametric maps into tumor habitats. The ability of the model to predict pCR was tested in the validation cohort.

RESULTS

Patient age (years) was similar in the training (51±10) and validation (50±10) cohorts. Tumor characteristics were similar between the training and validation cohorts, with ER positivity in 58% and 56%, PR positivity in 53% and 56%, and Her2 positivity in 33% and 28%, respectively. In each group, 28% achieved pCR. The model predicted pCR with 95% accuracy in training and 83% in the validation cohort.

CONCLUSION

Intratumoral perfusion heterogeneity on dynamic contrast-enhanced breast MRI is predictive of pCR.

CLINICAL RELEVANCE/APPLICATION

An extension of radiomics, called habitat imaging, can predict pCR on pre-neoadjuvant chemotherapy breast MRI in women diagnosed with breast cancer.

SSBR08-04 Inversion of Transport Equation for Automatic Postprocessing of Dynamic Contrast Enhanced MRI Without Arterial Input Function: Application in Breast Tumors

Participants
Qihao Zhang, BS, New York, NY (*Presenter*) Nothing to Disclose
Pascal Spincemaille, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Michele B. Drotman, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Sarah Eskreis-Winkler, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Weiyuan Huang, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Liangdong Zhou, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Thanh D. Nguyen, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Martin R. Prince, MD,PhD, New York, NY (*Abstract Co-Author*) Patent agreement, General Electric Company
Yi Wang, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

qz288@cornell.edu

PURPOSE

To develop a new perfusion quantification method, quantitative transport mapping (QTM), based on the inversion of transport equation without the usage of arterial input function and test QTM feasibility in automatic postprocessing dynamic contrast enhanced magnetic resonance imaging (DCE-MRI) data for differentiating malignant and benign breast tumors.

METHOD AND MATERIALS

In this retrospective study, DCE-MRI data of 25 female patients with biopsy confirmed breast tumors, consisting of 16 malignant ones (BIRADS>=4) and 9 benign ones (BIRADS=2), was processed using the QTM method and the traditional Kety's method. Region of interest (ROI) analysis on tumors was performed to assess QTM velocity, QTM diffusion and Kety's flow for distinguishing benign and malignant tumors. Mann-Whitney U test and receiver operating characteristic curve (ROC) analysis were performed to assess the diagnostic performance.

RESULTS

Between malignant and benign tumors, there was a significant difference in QTM velocity (0.12±0.05 mm/s vs 0.06±0.04 mm/s, p=0.006), but not in QTM diffusion coefficient (0.023±0.017 mm2/s vs 0.014±0.009 mm2/s, p=0.150) or Kety's flow (51.25±25.83mL/100g/min vs 32.37±22.18 mL/100g/min, p=0.13). The area under the curve of receiver operating characteristic was 0.84 (95% confidence interval 0.56-0.96) for QTM velocity, 0.68 (95% confidence interval 0.40-0.88) for QTM diffusion coefficient, and 0.69 (95% confidence interval 0.42-0.88) for Kety's flow.

CONCLUSION

QTM postprocessing of DCE-MRI data solves the inverse problem of the transport equation, does not require an AIF or user input, and distinguished between benign and malignant breast tumors in our cohort.

CLINICAL RELEVANCE/APPLICATION

QTM method can be coupled into breast malignant lesion diagnosis.

SSBR08-05 Are MRI-Only Detected Breast Cancers Similar to the Other Cancers?

Participants
Patricia Malmierca, Pamplona, Spain (*Presenter*) Nothing to Disclose
Alberto Paternain, MD, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose
Ignacio Gonzalez de la Huebra Rodriguez, MD, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose

Carolina Sobrido Sampedro, Madrid, Spain (*Abstract Co-Author*) Nothing to Disclose
Arlette Elizalde, Pamplona, Spain (*Abstract Co-Author*) Nothing to Disclose
Luis Pina, PhD,MD, Pamplona, Spain (*Abstract Co-Author*) Speaker, Siemens AG

For information about this presentation, contact:

pmalmierca@unav.es

PURPOSE

To investigate if the MRI-only detected cancers are similar or not to the cancers detected by the remaining imaging modalities (DM, DBT, US).

METHOD AND MATERIALS

We retrospectively evaluated 356 patients with 506 malignant lesions, confirmed on surgery. All of the patients underwent DM, DBT and US as a first step and preoperative MRI after the confirmation of malignancy. Second look US was routinely performed to study additional lesions detected by MRI. For this study we reviewed the cancers detected by the conventional modalities (DM, DBT and US) (Group A) and the additional cancers only detected by MRI (group B). The studied features were: Pathology (morphological and immunohistochemical patterns), size and rate of mastectomies. Chi-square and t-Student tests were used.

RESULTS

There were 444 cancers in group A (70 DCIS, 326 IDC, 48 ILC) and 48 additional cancers in group B (13 DCIS, 30 IDC, 5 ILC). According to the immunohistochemical patterns of invasive cancers, the distribution in group A was: 194 Luminal A; 120 Luminal B; 14 Pure Her 2; 46 Triple negative; In group B: 14 Luminal A, 13 luminal B, 1 pure Her 2 and 7 Triple negative. The comparison between both groups regarding pathology and immunohistochemical patterns showed no significant statistical differences (p=0.5). Regarding the size of the cancers, the mean size of Group A was 14.88 mm while in group B was 11.69mm (p=0.135). In group A the rate of mastectomies was 17.8% and in group B 33.3% (p=0.118).

CONCLUSION

According to our results, the MRI-only detected cancers were not different than the remaining cancers detected by conventional techniques, regarding pathology, immunohistochemical patterns and size, and did not significantly increase the mastectomy rate. Thus, MRI-only cancers should not be considered as overdiagnosis or clinically irrelevant.

CLINICAL RELEVANCE/APPLICATION

The use of preoperative MRI remains still controversial. Some authors argue that MRI-only detected cancers are not of clinical relevance regarding the prognosis and unnecessarily contribute to increase the rate of mastectomies.

SSBR08-06 Breast Cancer in Young Women: Correlation of MR Imaging Features With Recurrence-Free Survival

Participants
Mi Ran Jung, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Eun Young Chae, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joo Hee Cha, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hee Jung Shin, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Woo Jung Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hak Hee Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

mrj12@hanmail.net

PURPOSE

To investigate preoperative breast magnetic resonance (MR) imaging and clinicopathological features associated with recurrence in patients with young age breast cancer.

METHOD AND MATERIALS

This retrospective study analyzed 259 patients with breast cancer under the age of 35 between January 2011 and December 2014. All patients underwent breast MR imaging, followed by surgery. Breast MR images prior to surgery were independently reviewed by dedicated breast radiologists who were blinded to patient outcomes. The clinicopathological data including patient demographics, clinical features, and tumor characteristics were also reviewed. The Cox proportional hazards regression model was used for univariate and multivariate analyses to identify independent predictors of recurrence-free survival (RFS).

RESULTS

Of the 259 patients, 44 patients (17.0%) developed recurrences after a median follow-up of 69 months (range, 2-106 months). At univariate analysis, progesterone receptor negativity, type of surgery, adjuvant radiation therapy, T3 tumor size at MR, multifocal or multicentric disease, intratumoral high signal intensity and peritumoral edema on T2-weighted image (T2WI) were associated with RFS. According to multivariate analysis, T3 tumor size at MR (hazard ratio, 2.416) and the presence of peritumoral edema on T2WI (hazard ratio, 2.749) remained significant independent predictors associated with worse RFS.

CONCLUSION

The tumor size over 5 cm and the presence of peritumoral edema at preoperative breast MR were independent variables that predict recurrences in young age breast cancer patients.

CLINICAL RELEVANCE/APPLICATION

Breast cancer in young women are known to have worse survival outcomes than older patients. Preoperative breast MR imaging features may help predict an increased risk of recurrence in patients with young age breast cancer.

RSNA 2020
HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SSCA01

Cardiac (Coronary Artery Imaging Technical Advances)

Sunday, Nov. 29 2:00PM - 3:00PM Room: Channel 4

CA CT

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSCA01-01 Advanced Coronary Plaque Characterization: A Pilot Study Comparing Plaque Entities Determined by OCT to Iodine Uptake Measured with a Dual-layer Spectral CT

Participants
Jonathan Nadjiri, MD, Munich, Germany (*Presenter*) Nothing to Disclose
Florian Weis, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Andre Kafka, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Tobias Koppara, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Christina Muller-Leisse, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Felix Gassert, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Claudio E. Von Schacky, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Daniela Pfeiffer, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Karl-Ludwig Laugwitz, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Marcus R. Makowski, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Rasper, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Tareq Ibrahim, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

This pilot study seeks to evaluate whether Spectral CT allows for determination of the plaque entity on coronary arteries by measuring absolute iodine content and therefore distinguish high risk plaques from low risk plaques.

METHOD AND MATERIALS

All patients with an indication for Spectral CT-coronary angiography (SCCTA) were administered 50ml of iodine containing contrast agent 2min before the regularly conducted contrast enhanced SCCTA with a second bolus according to standard protocol. Hounsfield Units (HU) as well as iodine content (mg/ml) in each detectable non-calcified plaque were determined. In patients with an indication for invasive coronary angiography (ICA) additional optical coherence tomography (OCT) was conducted. The findings of CCTA und OCT were carefully matched and compared.

RESULTS

In 68 patients 50 non-calcified plaques were detected by SCCTA. Mean density was 70 ± 56 HU. Mean Iodine uptake was 2.4 ± 2.1mg/ml, respectively. There was significant correlation between iodine uptake and density of coronary plaques; $r = 0.67$, $p < 0.001$. Eighteen patients had an indication for ICA and underwent additional OCT. Thirty-five plaques could by matched by both modalities. All plaques detected by SCCTA had a correlate on OCT while only 86% of the plaques detected by OCT could be detected in SCCTA. OCT detected 31 (67%) high risk plaques: Six Thin cab fibroatheromas (13%), 25 fibroatheromas (54%). Further 15 (33%) low risk plaques were detected by OCT: Three fibrocalcific lesions (7%), eleven cases of pathological intima thickening (24%) and one Early-onset fibroatheroma (2%). Mean iodine uptake in SCCTA was lower in high risk plaques (2.5mg/ml vs. 3.3mg/ml, $p = 0.06$). Minimal iodine uptake in SCCTA was significantly lower in high risk plaques (1.0mg/ml vs. 2.0mg/ml, $p = 0.019$). ROC analysis with high risk plaque defined by OCT as reference showed an AUC for minimal iodine uptake of 71%. All plaques showed similar HU's and could not be distinguished by conventional technique.

CONCLUSION

Iodine uptake in plaques measured by SCCTA is feasible and seems to provide additional information about plaques beyond conventional CT plaque characterization based on plaque density.

CLINICAL RELEVANCE/APPLICATION

SCCTA seems to be able to distinguish high risk plaques from plaques with lower risk by measuring iodine uptake. Spectral-CT might provide additional prognostic value which should be confirmed in larger outcome studies.

SSCA01-02 Qualitative Evaluation of Coronary Plaques and Stents With Energy Integrating and Photon-Counting Computed Tomography: A Phantom Study

Awards
Trainee Research Prize - Medical Student

Participants
Faraz Farhadi, Bethesda, MD (*Presenter*) Nothing to Disclose
Jayasai R. Rajagopal, BA, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Moozhan Nikpanah, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Pooyan Sahbaee, Bethesda, MD (*Abstract Co-Author*) Employee, Siemens AG

Sujata M. Shanbhag, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
W. Patricia Bandettini, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Babak Saboury, MD, MPH, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Ashkan A. Malayeri, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
William F. Pritchard JR, MD,PhD, Bethesda, MD (*Abstract Co-Author*) Research collaboration, Koninklijke Philips NVResearch collaboration, Boston ScientificResearch collaboration, BTG International LtdResearch collaboration, Siemens AGResearch collaboration, XACT RoboticsResearch collaboration, W. L. Gore & Associates, IncResearch collaboration, Celsion Corporation
Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric CompanyResearch Grant, Siemens AGAdvisory Board, medInt Holdings, LLCLicense agreement, 12 Sigma TechnologiesLicense agreement, Gammex, Inc
Elizabeth C. Jones, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Marcus Y. Chen, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

faraz.farhadi@nih.gov

PURPOSE

To evaluate the performance of high-resolution photon-counting CT (PCCT) for visualization of coronary plaques with and without stents compared to energy integrating detector (EID) CT.

METHOD AND MATERIALS

An investigational scanner (Somatom CounT, Siemens) with PCCT and EID CT subsystems with 48×0.25 and 64×0.6 mm collimations, respectively, was used to image a custom phantom consisting of a series of coronary artery mimicking rods, simulating different degrees of stenosis (15-75%) with varying plaque compositions (fatty, fibro-fatty, calcified). Stented (n=8) and non-stented (n=10) plaques covering different types of plaque composition were selected for the study. Images were acquired at matched parameters (120 kV, 118 mAs) for PCCT and EID CT systems with 5 repetitions and reconstructed with a routine clinical protocol. PCCT images were also reconstructed with a specialized high-resolution kernel (PCCT-HR). Rectangular regions of interest were placed at the central slice of the plaques and extracted from all three image groups, to create three-alternative forced rank tasks of stented (n=40) and non-stented (n=50) plaque images. Three physicians with expertise in coronary CT interpretation were asked to rank non-stented image groups based on plaque conspicuity and stented images for those least affected by blooming.

RESULTS

For both tasks, all three observers ranked the high-resolution PCCT images first in every case. In non-stented plaques, two readers favored standard PCCT over EID CT images with PCCT ranked second in 62% and 92% of cases, while the third reader ranked PCCT second in 50% of cases. For the stented plaques, two readers favored EID CT over standard PCCT with EID ranking second in 58% and 78% of cases, while the third reader ranked standard PCCT second in 63% of cases.

CONCLUSION

High-resolution PCCT images had superior plaque conspicuity and were less affected by blooming effect in the stented images than either EID CT or standard PCCT data. Standard PCCT images offered better plaque conspicuity but performed worse in the presence of stents when compared to clinical EID images.

CLINICAL RELEVANCE/APPLICATION

High-resolution photon-counting CT images can improve visualization of coronary plaques and reduce the impact of metallic stent blooming when compared to the EID CT.

SSCA01-03 Calcium Scoring using Virtual Non-Contrast Images from a Dual-layer Spectral CT: Comparison to Real Non-Contrast Data and Evaluation of Proportionality Factor in a Large Patient Collective

Participants
Felix Gassert, MD, Munich, Germany (*Presenter*) Nothing to Disclose
Christina Mueller-Leisse, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Claudio E. Von Schacky, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Marcus R. Makowski, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Jonathan Nadjiri, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Determination of Calcium Scoring (CACS) in non-contrast images has been shown to be an essential prognostic factor in Coronary Artery Disease (CAD). In an initial approach our own group demonstrated reliable determination of CACS from contrast enhanced Coronary Computed Tomography Angiography (CCTA). However, the previous data was non-clinical and the sample size was small. Our objective was to evaluate the accuracy of CACS from virtual non-contrast imaging computed from spectral data in comparison to standard non-contrast imaging in a large patient collective with clinically approved software.

METHOD AND MATERIALS

We investigated 103 patients referred to CCTA with suspicion of CAD on a Philips IQon Spectral CT scanner. Virtual non-contrast images were generated in Philips Intellispace Portal. CACS was calculated from both, real- and virtual non-contrast images by certified software for medical use. Patients with a CACS of 0 were excluded from analysis.

RESULTS

Mean age was 61±11 years. 48 patients (67%) were male. Inter-quartile-range of clinical CACS was 22-282. Correlation of measured CACS from real- and virtual non-contrast images was very high (0.95); $p < 0.001$. The slope was 3,83 indicating an underestimation of virtual non-contrast CACS compared to real CACS by that factor. Visual analysis of Bland-Altman-Plot:of CACS showed good accordance of both methods after correction of virtual non-contrast CACS by the above mentioned factor.

CONCLUSION

In clinical diagnostic of CAD, determination of CACS is feasible using virtual non-contrast images generated from spectral imaging with a dual layer detector. When multiplied by a correction factor results show good agreement with the standard technique.

CLINICAL RELEVANCE/APPLICATION

In future clinical diagnostics of CAD, CACS can be calculated from virtual non-contrast images using dual layer spectral imaging. Therefore, radiation exposure will be reduced through omitting native scans.

SSCA01-04 Pericoronary Fat Attenuation Index Using Dual-layer Spectral Detector CT - A Sensitive Imaging Marker of High-risk Plaques

Participants
Xujiao Chen, Shenyang, China (*Presenter*) Nothing to Disclose
Yuxue Dang, Shenyang, China, China (*Abstract Co-Author*) Nothing to Disclose
Quanmei Ma, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Yue Ma, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Xiao Mei Lu, MMed, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose
Yang Hou, MD, Shenyang, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

1464753732@qq.com

PURPOSE

This study sought to assess the association between pericoronary adipose tissue (PCAT) attenuation derived from spectral CT and atherosclerotic plaque and explore the imaging marker to improve high-risk plaque identification in patients with coronary atherosclerosis.

METHOD AND MATERIALS

We prospectively analyzed 402 plaques including high-risk plaques in 151 consecutive patients who underwent coronary CT angiography based on dual-layer spectral detector spectral CT (SDCT). The plaque anatomical characteristics and PCAT attenuation around the lesion were measured. PCAT attenuation indicators including FAI derived from conventional CT images (FAIcon), virtual mono-energetic images at 40 keV (FAI40keV), the slope of spectral HU curve (λHU) and effective atomic number (Zeff). This study aimed to explore: (i) the relationship between PCAT attenuation changes and atherosclerotic plaque progression; (ii) the ability of FAI derived from SDCT to detect high-risk plaques.

RESULTS

In Part 1, PCAT attenuation increased gradually as the increment of high-attenuation percentage in plaque, and FAI indicators derived from SDCT could better detect that change especially FAI40keV but FAIcon can not. Additionally, FAI40keV was more positively correlated with high-attenuation percentage in plaques ($r=0.513$, $P<0.05$). In Part 2, PCAT attenuation indicators around high-risk plaques was higher than those around stable plaques especially FAI40keV. FAI40keV was a predictive factor of high-risk plaques and higher FAI40keV (>= -120.60 HU) could help identify high-risk plaques with an accuracy of 90.00%.

CONCLUSION

As the atherosclerotic plaque continues to advance, PCAT attenuation increases gradually. FAI40keV derived from SDCT may be a novel surrogate imaging marker helpful for detecting the PCAT attenuation change as well as identifying high-risk plaques and may be a valuable tool to guide future prevention strategies

CLINICAL RELEVANCE/APPLICATION

SDCT-based coronary CTA can provide not only routine coronary CTA images but also VMI. PCAT attenuation using VMI at 40keV-FAI40keV, having the potential to more sensitively capture the PCAT density changes caused by coronary inflammation and identify high-risk plaque, may be a valuable tool to guide future prevention strategies and play complementary roles in prognostic stratification

SSCA01-05 Histology-validated Coronary Plaque Assessment by CT Angiography Effectively Estimates Fractional Flow Reserve

Participants
Tilman S. Emrich, MD, Charleston, SC (*Presenter*) Speaker, Siemens AGTravel support, Siemens AG
Akos Varga-Szemes, MD, PhD, Charleston, SC (*Abstract Co-Author*) Research Grant, Siemens AGTravel support, Siemens AGResearch Consultant, Elucid Bioimaging Inc
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Astellas Group Research Grant, Bayer AG Research Grant, Bracco Group Research Grant, Siemens AG Research Grant, Heartflow, Inc Research support, Bayer AG Consultant, Elucid BioImaging Inc Research Grant, Guerbet SA Consultant, HeartFlow, Inc Consultant, Bayer AG Consultant, Siemens AG
Pal Maurovich-Horvat, MD, PhD, Pecs, Hungary (*Abstract Co-Author*) Nothing to Disclose
Richard Bayer, Charleston, SC (*Abstract Co-Author*) Institutional Research support, Bayer AG Institutional Research support, HeartFlow, Inc Institutional Research support, Siemens AG
Rui Wang, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Lei Xu, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Basel Yacoub, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Danielle Dargis, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Andrew J. Buckler, MS, Boston, MA (*Abstract Co-Author*) Stockholder, vascuVis IncPresident, vascuVis IncCEO, vascuVis IncStockholder, Elucid Bioimaging IncPresident, Elucid Bioimaging IncCTO, Elucid Bioimaging Inc

For information about this presentation, contact:

schoepf@musc.edu

PURPOSE

Increasing evidence is showing that coronary CTA (CCTA)-based computational fluid dynamics (CFD) has the potential to determine fractional flow reserve (FFR) non-invasively. CFD-based FFR determination, however, considers the lumen only. Characterizing the tissue within the walls may have advantages over lumen-based simulations, as it is a direct rather than indirect measure of the vasodilative capacity of the vessel. The purpose of this study was to assess the feasibility of non-invasive FFR estimation using

histologically-validated assessment of plaque morphology on CCTA.

METHOD AND MATERIALS

The study protocol was approved by the Institutional Review Board and a waiver of informed consent was granted. Patients (n=113) with suspected coronary artery disease who had undergone clinically indicated CCTA and invasive FFR were retrospectively included. Commercially available plaque quantification software was used to extract quantitative plaque morphology. Vessel structure measurements included the degree of stenosis, wall thickness, and remodeling index. An optimized artificial neural network was used to assess he prognostic value of morphological measurements and stenosis relative to physical FFR as ground truth.

RESULTS

A total of 122 lesions were considered, 59 (48%) had low FFR values. Plaque morphology-based FFR assessment achieved an area under the curve, sensitivity and specificity of 0.94, 0.90 and 0.81, respectively, versus 0.71, 0.71, and 0.50, respectively, for an optimized threshold applied to measurement of stenosis by diameter. The optimized ridge regression model for continuous value estimation of FFR was able to achieve a cross-correlation coefficient of 0.56 and regression slope of 0.56 using cross validation in the training set, versus 0.18 and 0.10 for an optimized threshold applied to measurement of stenosis by diameter.

CONCLUSION

Our results show that morphology-based FFR assessment substantially improves the diagnosis of lesion specific ischemia over CCTA stenosis interpretation and has a comparable or superior level of sensitivity and specificity relative to CFD-based approaches.

CLINICAL RELEVANCE/APPLICATION

In this study, we showed that CCTA plaque morphology-based FFR measurements derived by an artificial neural network have superior diagnostic accuracy compared to stenosis-based CCTA assessment and CFD-based FFR evaluation.

SSCA01-06 Contrast to Noise Ratio Between Energy Integrating and Photon Counting Detector on a Phantom Used for Coronary Artery Calcium Score

Participants
Pierre-Antoine Rodesch, Lyon, France (*Presenter*) Nothing to Disclose
Niels R. Van der Werf, MSc, Rotterdam, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Salim Si-Mohamed, Bron, France (*Abstract Co-Author*) Nothing to Disclose
Thomas Broussaud, MS, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Martin J. Willemink, MD,PhD, Mountain View, CA (*Abstract Co-Author*) Research Grant, Koninklijke Philips NVConsultant, Arterys IncCo-founder, Segmed IncStockholder, Segmed Inc
Marcel Greuter, PhD, Groningen, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Tim Leiner, MD, PhD, Utrecht, Netherlands (*Abstract Co-Author*) Speakers Bureau, Koninklijke Philips NVResearch Grant, Bayer AGCo-founder, Quantib BV
Robbert W. van Hamersvelt, MD, Utrecht, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Loic Boussel, MD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose
Philippe C. Douek, MD, PhD, Lyon, France (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

pierre-antoine.rodesch@creatis.insa-lyon.fr

PURPOSE

Compare the Contrast-to-Noise Ratio (CNR) in conventional CT images with two different X-ray detection techniques: Energy Integrating Detectors (EIDs) and Photon Counting Detectors (PCDs).

METHOD AND MATERIALS

An anthropomorphic thorax phantom with HydroxyApatite (HA) inserts (QRM Cardio Calcification Insert-CCI) was acquired on two CTs: the commercially available dual-layer IQon (Philips) and the PCDs prototype SPCCT (Philips). Both scanners are fitted with the same X-ray source (filtration and focal spot) and source-to-detector distance. They differ by the detector type and the collimation *x* pixel pitch at iso-center: 32*x*0.65mm for the IQon and 64*x*0.270mm for the SPCCT. Axial scans were performed with a 120kVp source and several exposures: 10, 20, 30, 40, 60mAs. Images were reconstructed with filtered-back projection, iterative reconstruction level 0 and the same kernel, matrix (512), voxel size (0.43x0.43x1mm). Calcifications were detected with 130 Hounsfield Unit (HU) threshold. A 2cm2 area was used for HU and noise background levels. CNR was measured in large (5mm) and medium (3mm) calcifications for three densities: 200, 400 and 800 HA mg/ml. Simple simulated data were used to estimate the expected HU difference between EIDs and PCDs: a spectrum modeling the source was weighted by the detector sensitivity *D* to obtain (virtual) measured spectra. For EIDs, D was set to a linear energy weighting: *D(E)=E* and for PCDs to a constant one: *D(E)=1*. HU was then computed from the NIST database as the average attenuation weighted by measured spectrum.

RESULTS

Simulation (cf Table) anticipates greater HU difference as HA density increases. Higher noise levels were measured with the EIDs (difference: 5HU at 60mAs and 10HU at 10mAs). Partial volume effect lowers the mean HU. Despite this effect, the HU values are higher with the PCDs. Combined with lower noise, it led to significant improvement in CNR. These results imply the HU threshold used for calcification detection has a different impact on each system. A HA density threshold (set by reference to the QRM CCI calibration inserts) could solve this issue.

CONCLUSION

The PCD system provides higher CNR for calcification detection in the QRM cardio CT phantom.

CLINICAL RELEVANCE/APPLICATION

PCD is an emerging technique with improved spatial resolution and contrast to noise ratio, which may improve coronary artery calcium quantification, especially detection of small calcifications.

SSCA05

Cardiac (Cardiac Imaging and Outcomes)

Thursday, Dec. 3 3:30PM - 4:30PM Room: Channel 4

CA CT MR BQ

AMA PRA Category 1 Credit ™: .75

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Sub-Events

SSCA05-02 Cardiovascular Risk in the Lung Cancer Screening Population: A Multicenter Study Evaluating the Effects of Coronary Artery Calcification on Statin Delivery

Participants
Tina D. Tailor, MD, Durham, NC (*Presenter*) Nothing to Disclose
Caroline Chiles, MD, Winston-salem, NC (*Abstract Co-Author*) Advisory Board, AstraZeneca PLC
Joseph Yeboah, MD, Winston-Salem, NC (*Abstract Co-Author*) Nothing to Disclose
M. Patricia Rivera, MD, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Betty Tong, MD,MS, Durham, NC (*Abstract Co-Author*) Spouse, Consultant, Integra LifeSciences Holdings Corporation; Spouse, Consultant, TissueLink Medical, Inc;
Thad Benefield, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Fides Schwartz, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Lindsay Lane, MPH, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose
Ilona Stashko, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Samantha Thomas, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Louise M. Henderson, Chapel Hill, NC (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

tina.tailor@duke.edu

PURPOSE

Atherosclerotic cardiovascular disease (ASCVD) is the leading cause of death in individuals receiving lung cancer screening (LCS). Our purpose was to determine the proportion of LCS individuals eligible for statin therapy for primary prevention, as per American College of Cardiology (ACC)/American Heart Association (AHA) guidelines, assess the rate of statin prescription amongst statin-eligible patients, and determine the impact of LCS-reported coronary artery calcification (CAC) on downstream statin initiation.

METHOD AND MATERIALS

We performed a retrospective review of electronic health record (EHR) data at three academic institutions and their affiliated hospitals in individuals undergoing baseline LCS from 1/1/16-12/31/18. Statin eligibility in individuals without preexisting ASCVD was determined by the 2013 ACC/AHA guidelines: (1) LDL >/=190 mg/dl, (2) diabetes, or (3) ASCVD 10-year risk score >/=7.5% (determined by the pooled cohort equation (PCE), a validated clinical risk calculator). The presence and severity (mild, moderate, heavy) of CAC was abstracted from LCS reports. The effect of reported CAC on statin initiation within 90 days of the LCS was estimated via multivariable regression adjusted for patient sociodemographic/clinical characteristics.

RESULTS

A total of 5,495 individuals received LCS during the study span. Of 3,771 individuals without known ASCVD, the majority were statin-eligible (73.6%, 2,777/3,771). However, most statin-eligible individuals were not prescribed a statin (60.5%, 1096/2777). LCS-reported CAC was significantly associated with downstream statin initiation (adjusted odds ratio (aOR) 2.60; 95% confidence interval (95%CI): 1.12-6.02). Amongst those with CAC, there was a higher likelihood of statin initiation with increasing CAC severity (aOR 2.21; 95%CI: 1.35-3.60)).

CONCLUSION

The majority of the LCS population is at high ASCVD risk and eligible for guideline-directed statin therapy. Reporting CAC and severity at LCS exam increases statin prescribing in eligible individuals.

CLINICAL RELEVANCE/APPLICATION

The 2019 ACC/AHA guidelines include CAC as a risk-enhancing factor for ASCVD preventative care decisions. CAC at LCS may prompt preventative therapy for ASCVD, the leading cause of death in LCS patients.

SSCA05-03 Epicardial Fat CT Attenuation in the HIV Population and Its Association to Coronary Atherosclerosis - Results from the BLIND HIV and Aging Cohort Study

Participants
Manel Sadouni, MD, Montreal, QC (*Presenter*) Nothing to Disclose
Mhd Ghaiss Alkeddeh, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Cecile Tremblay, MD, Montreal, QC (*Abstract Co-Author*) Advisory Board, Merck & Co, Inc; Research Grant, Merck & Co, Inc; Speaker, Merck & Co, Inc; Advisory Board, Gilead Sciences, Inc; Research Grant, Gilead Sciences, Inc; Speaker, Gilead Sciences, Inc; Advisory Board, GlaxoSmithKline plc; Research Grant, GlaxoSmithKline plc; Speaker, GlaxoSmithKline plc; ;
Madeleine Durand, MD,MSc, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose

Carl Chartrand-Lefebvre, MD, Montreal, QC (*Abstract Co-Author*) Research collaboration, TeraRecon, IncResearch collaboration, Siemens AGResearch collaboration, Imagia Cybernetics Inc

PURPOSE

HIV patients have a higher risk of coronary artery disease (CAD) compared to non-infected patients. Chronic inflammation secondary to the infection and/or the antiretroviral therapy and mediated by adipose tissue may play a role in this increased risk. In this study, we measured the computed tomography (CT) attenuation of epicardial fat, a potential surrogate of the inflammatory activity of fat, in HIV+ and HIV- individuals and assessed its association with coronary plaque burden.

METHOD AND MATERIALS

This is a cross sectional study, nested in the BLIND HIV and Aging Cohort Study, a large prospective cohort following more than 1000 HIV+ and HIV- patients. Consecutive participants with low to intermediate cardiovascular risk were invited to undergo cardiac CT. Assessment of volume and CT attenuation of epicardial fat, as well as volume of total atherosclerotic plaque were performed. Comparison of epicardial fat attenuation indexed to epicardial fat volume (EFAi) between HIV+ and HIV- participants was performed using t-test. Association between EFAi and coronary plaque volume was assessed using zero-inflated Poisson regression.

RESULTS

A total of 265 participants underwent cardiac CT scans. 181 were HIV+ and 84 were HIV-. HIV+ participants had a higher EFAi than HIV- participants (HIV+: -0.62 HU/cm3 [-0.76, -0.49], HIV-: -0.69 HU/cm3 [-0.90, -0.54], p = 0.007). Using multivariate analysis, EFAi was associated to HDL-cholesterol (ß=-0.2, p<0.05), BMI (ß =-0.15, p= 0.013) and to duration of antiretroviral therapy (ß=0.01, p=0.02). After adjustment for significant cardiovascular risk factors, EFAi was significantly associated with total coronary plaque volume (OR=0.26, p=0.04).

CONCLUSION

Indexed CT attenuation of epicardial fat is significantly higher for HIV+ individuals. The association of epicardial fat CT attenuation with antiretroviral therapy duration and subclinical coronary artery plaque may suggest a potential mechanism that could explain the increased risk for CAD in the HIV population.

CLINICAL RELEVANCE/APPLICATION

Indexed epicardial fat CT attenuation is increased in HIV+ patients and correlates with duration of antiretroviral therapy and total coronary plaque volume.

SSCA05-04 Characteristics of Coronary Artery Disease in Patients with Subclinical Hypothyroidism: Evaluation with Coronary CT Angiography (CTA)

Participants
Xinzhu Zhou, Chengdu, China (*Presenter*) Nothing to Disclose
Rui Shi, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Ke Shi, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose
Zhigang Yang, MD, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Subclinical hypothyroidism(SCH) has recently been acknowledged as an independent risk factor for coronary artery disease (CAD).However, there are few studies about the characteristics of CAD in SCH patients. The aim of the study is to evaluate the features of CAD in SCH patients using coronary artery CT angiography (CTA).

METHOD AND MATERIALS

From 1 April 2018 to 28 February 2020,206 consecutive patients(104 men,102 women; mean age, 71.2 ± 9.9 years) with SCH were found coronary plaques on coronary CTA. Different grades of SCH were defined by serum TSH level. The distribution and types of plaques, luminal narrowing, segment involvement scores (SIS), segment stenosis scores (SSS)were evaluated and compared between different grades of SCH and different sexes.

RESULTS

Patients with grade3 SCH have less calcified plaques than grade1 SCH(0.7±0.9 vs 1.9±1.8,p=0.001),and more non-calcified plaques(0.8±1.0 vs 0.4±0.8,p=0.002). As the condition of SCH aggravated, the proportion of non-calcified plaques in total plaques increased(9.3% vs 14.7% vs 27.5%, all p<0.001). The grade3 SCH has less minimal stenosis and more mild stenosis than other grades SCH(p<0.05), while SIS and SSS between different grades of SCH have no significant discrepancies(p>0.05). Multivariate logistic regression analysis demonstrated that TSH>10mU/L(OR: 8.11; 95% CI 2.89-22.75, p<0.001) and current smoking(OR: 2.77; 95% CI 1.02-7.52, p=0.045) were independent risk factors for the prevalence of non-calcified plaques. In different sexes groups, Men with SCH had higher SIS and SSS than women(4.0±2.3 vs 3.0±2.3,p=0.004; 8.1±6.6 vs 5.5±5.1,p=0.002).

CONCLUSION

High serum TSH level is associated with the incidence of non-calcified plaques in CAD patients with SCH. This may be the cause of poor prognosis in patients with grade3 SCH and CAD. In addition, SCH may increase the sex differential in CAD,which also deserves the attention of clinicians.

CLINICAL RELEVANCE/APPLICATION

These findings suggested the instability and vulnerability of coronary plaques in grade3 SCH with CAD , and influence clinical prognosis of such patients. Thus, hormone replacement therapy is indicated for patients with grade3 SCH to reduce the risk of cardiovascular disease. Additionally, men had larger number of diseased segments and total plaque burden than women in SCH patients. Further studies are warranted to confirm the sex differential in SCH with CAD.

SSCA05-05 Association of Clinical Outcome Following Ventricular Tachycardia Ablation with Extent of Unablated CMR Detected Conducting Corridors on CMR-EAM Merge on Electrophysiology Navigation Platform

Participants
Avanti Gulhane, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose

Harold I. Litt, MD, PhD, Philadelphia, PA (*Abstract Co-Author*) Research Grant, Siemens AG

For information about this presentation, contact:

avy.cutie@gmail.com

PURPOSE

Although the gold standard for detection of post myocardial infarction (MI) ventricular tachycardia (VT) substrate, electro anatomic mapping (EAM) has limitations due to sampling density, catheter contact, and deep substrates. Late gadolinium enhancement CMR may enhance ablation targeting by identification of viable conducting corridors (CC) in scar tissue. In our experience, CMR has high sensitivity but poor specificity for identification of EAM target sites during a first post MI VT ablation. Objective: To evaluate a) the association of clinical outcomes of post MI VT ablation with additional CCs not targeted (aCC) during the index VT ablation, and b) the geographic association of aCC sites on index ablation with repeat procedure EAM target sites.

METHOD AND MATERIALS

The cohort included 50 patients retrospectively with prior MI, out of whom 14 required repeat VT ablations, for ICD shocks (n=33), inducible clinical or non-clinical VT on non-invasive programmed electrical stimulation (NIPS) (n=28), deaths (2) due to VT and had continued need for antiarrhythmic therapy for VT suppression (n=46). Preprocedural CMR were processed using ADAS software to identify CCs, odds ratio was calculated for adverse clinical events in patients with aCC sites recorded on merging CMR with EAM on Carto navigation system after the initial ablations on a per-patient and per-channel site basis .

RESULTS

The median follow up duration following index ablation was 2.75 years (IQR:1.41years). Out of 50 patients, 32(64%) had aCC sites on CMR-EAM merge. Of those with aCC sites, 37.5% required repeat ablations compared to 11.1% of those without aCC sites,{OR 4.8 (95% CI 0.93-24.6)}. Of those with aCC sites, 62.50% showed inducible VTs on NIPS as compared to 44.40% without aCCsites, {OR 2.08 (95% CI 0.64 to 6.7)}. Of those with aCC, 70% had VT or NSVT episodes recorded on ICDs as compared to 50% patients without aCC sites,{OR 3 (95% CI 0.88 to 10.1)}. 3 patients died, 2 had recurrent VT and aCC sites on CMR. On a per site basis, 14 of 24 (58%) repeat ablation sites matched with aCC sites on CMR.

CONCLUSION

CMR may identify patients with higher odds for post ablation recurrent VT episodes, need for repeat ablations, and inducibility on NIPS.

CLINICAL RELEVANCE/APPLICATION

Ablation of unmatched LGE-CMR predicted conducting corridors on registration with EAM in heterogeneous scar of MI may have improved clinical outcome post RF ablation with fewer VT recurrence.

SSCA05-06 Association of Pro-B-Type Natriuretic Peptide with Cardiac Magnetic Resonance Measured Global and Regional Cardiac Function and Structure over 10 Years: The MESA Study

Participants
Amir Ali Rahsepar, MD, Shelton, CT (*Presenter*) Nothing to Disclose
Mohammadali Habibi, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Kiang Liu, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Nadine Kawel-Boehm, MD, Seewis, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Bharath Ambale Venkatesh, PhD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation Co-founder, Third Eye Knowledge
Veronica R. Fernandes, MD, PhD , New York, NY (*Abstract Co-Author*) Nothing to Disclose
Boaz D. Rosen, MD, Annapolis, MD (*Abstract Co-Author*) Nothing to Disclose
David A. Bluemke, MD,PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Joao A. Lima, MD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation
James C. Carr, MD, Chicago, IL (*Abstract Co-Author*) Research Grant, Siemens AGAdvisory Board, Siemens AGTravel support, Siemens AGResearch Grant, Bayer AGAdvisory Board, Bayer AGTravel support, Bayer AGSpeaker, Bayer AGResearch Grant, Guerbet SAAdvisory Board, Bracco Group

For information about this presentation, contact:

amir.rahsepar@northwestern.edu

PURPOSE

To investigate associations between N-terminal-pro hormone BNP (NT-proBNP) levels and progression of global and regional myocardial function, dyssynchrony, and risk of developing myocardial scar tissue in the Multi-Ethnic Study of Atherosclerosis (MESA).

METHOD AND MATERIALS

2416 African American, Caucasian, Chinese, and Hispanic adults (45-84 years) without clinical cardiovascular disease (CVD) at enrollment (2000-2002, baseline) who had NT-proBNP measured at baseline and CMR measured left ventricular (LV) parameters at baseline and year 10 (2010-2012, follow-up) were included. Tagged CMR was used to calculate circumferential strain (ECC). Myocardial dyssynchrony was calculated as the standard deviation of time to peak systolic strain and strain rate in all 12 segments. Change in LV parameters was characterized by changes over 10 years from baseline to follow-up (year 10 - baseline). NT-proBNP values were natural log transformed prior to modeling. Linear regression models were used to determine the relationships between log NT-proBNP and each global and regional myocardial function, extent of dyssynchrony, and 10-year change in each LV parameter. Logistic regression models were used to quantify associations between log NT-proBNP and presence of myocardial scar tissue at follow-up.

RESULTS

Of the 2416 included participants (mean age 59 years, 49% male) the median NT-proBNP value was 46.9 pg/ml. In fully adjusted models, 1-SD increase in baseline Log NTproBNP (1.18 pg/mL), was significantly associated with reduced LV ejection fraction

function and increased LV end-systolic volume index over 10 years. Higher baseline log NTproBNP remained independently associated with more severe global and regional (mid and apical) dyssynchronies over time after adjusting for potential risk factors. 1-SD increase in baseline Log NT-proBNP was also independently associated with higher odds of having myocardial scar at year 10 (Table).

CONCLUSION

Among persons without CVD, higher plasma NT-proBNP levels were associated with subclinical changes in developing myocardial dysfunction, more severe cardiac dyssynchrony and higher odds of having myocardial scar over a 10-year period independent of traditional CVD risk factors.

CLINICAL RELEVANCE/APPLICATION

These results suggest that NT-proBNP concentration assessment could have important clinical implications in detecting persons with early subclinical CVD who might benefit from measures for CVD prevention.

SSCA07

Cardiac (Artificial Intelligence in Cardiac Imaging)

Tuesday, Dec. 1 8:30AM - 9:30AM Room: Channel 4

CA BQ AI

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSCA07-01 Improved Prognostic Value of Coronary CT Angiography-derived Plaque Information and Clinical Parameter on Adverse Cardiac Outcome Using Machine Learning

Participants
Christian Tesche, MD , Dortmund, Germany (*Presenter*) Nothing to Disclose
Maximilian J. Bauer, MEd, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Verena Brandt, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Moritz Baquet, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Florian Straube, MD, Munich, Germany (*Abstract Co-Author*) Speaker, Medtronic plc Speaker, AstraZeneca PLC Speaker, Bristol-Myers Squibb Company Speaker, I.Med.Pro Support, Pfizer Inc Advisory Board, Boehringer Ingelheim GmbH
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Astellas Group Research Grant, Bayer AG Research Grant, Bracco Group Research Grant, Siemens AG Research Grant, Heartflow, Inc Research support, Bayer AG Consultant, Elucid BioImaging Inc Research Grant, Guerbet SA Consultant, HeartFlow, Inc Consultant, Bayer AG Consultant, Siemens AG
Benedikt Hedels, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan Hartl, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Hunter Gray, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Steffen Massberg, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Ellen Hoffmann, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Ullrich Ebersberger, MD, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

tesche.christian@gmail.com

PURPOSE

To evaluate the prognostic value of coronary CT angiography (cCTA)-derived plaque information and clinical parameter on adverse cardiac outcome using machine learning (ML).

METHOD AND MATERIALS

Datasets of 361 patients (61.9±10.3 years,65% male) with suspected coronary artery disease (CAD) who underwent cCTA were retrospectively analyzed. Major adverse cardiac events (MACE) more than 90 days after cCTA were recorded. Several cCTA-derived plaque measures and conventional CT risk scores together with cardiovascular risk factors were provided to a ML model to predict MACE. A boosted ensemble algorithm (RUSBoost) utilizing decision trees as weak learners with repeated nested cross-validation to train and validate the model was used. Performance of the ML model was calculated using the area under the receiver operating characteristic curve (AUC).

RESULTS

MACE was observed in 31 patients (8.6%) after a median follow-up of 5.4 years. Discriminatory power was significantly higher for the ML model (AUC 0.96[95%CI 0.93-0.98]) compared to conventional CT risk scores including Agatston calcium score (AUC 0.84 (95%CI 0.80-0.87)), segment involvement score (AUC 0.88(95%CI 0.84-0.91)), and segment stenosis score (AUC 0.89(95%CI 0.86-0.92),all $p<0.05$). Similar results were shown for plaque measures (AUCs 0.72-0.82, all $p<0.05$) and clinical parameters including the Framingham risk score (AUCs 0.71-0.76, all $p<0.05$). The ML model yielded significantly higher diagnostic performance when compared to logistic regression analysis (AUC 0.96vs.0.92, $p=0.024$).

CONCLUSION

Integration of a ML model improves the prediction of MACE when compared to conventional CT risk scores, plaque measures and clinical information. ML algorithms may improve the integration of patient's information to improve risk stratification.

CLINICAL RELEVANCE/APPLICATION

ML based cCTA-derived plaque quantification and characterization may have utility in risk-stratifying the vulnerability of coronary lesions for the prediction of future major adverse cardiac events.

SSCA07-02 A Machine Learning Pipeline for Segmentation and Classification of Coronary Artery Calcium Lesions in Lung Cancer Screening CT's

Awards
Trainee Research Prize - Resident

Participants
Jordan Fuhrman, Chicago, IL (*Presenter*) Nothing to Disclose
Rowena Yip, MPH, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Artit C. Jirapatnakul, PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

Claudia I. Henschke, MD,PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
David F. Yankelevitz, MD, New York, NY (*Abstract Co-Author*) Royalties, General Electric CompanyStockholder, Accumetra, LLCAdvisory Board, GRAIL, Inc
Maryellen L. Giger, PhD, Chicago, IL (*Abstract Co-Author*) Advisor, Qlarity ImagingStockholder, Hologic, IncShareholder, Quantitative Insights, IncCo-founder, Quantitative Insights, IncShareholder, QView Medical, IncRoyalties, Hologic, IncRoyalties, General Electric CompanyRoyalties, MEDIAN TechnologiesRoyalties, Riverain Technologies, LLCRoyalties, Canon Medical Systems Corporation

PURPOSE

To develop a rapid, efficient deep learning pipeline for segmenting coronary artery calcifications (CACs) on low-dose thoracic CT (LDCT) lung cancer screening scans and extract useful clinical information from the segmentations.

METHOD AND MATERIALS

814 LDCT scans acquired as part of the International-Early Lung Cancer Action Program were retrospectively analyzed in this study. A trained radiologist evaluated each of the LDCT scans to provide a CAC score based on the volume of CAC within each of the four major coronary arteries: left main (LMA), right (RCA), left anterior descending (LAD), and circumflex (CFX). Each artery was assigned a score from 0 to 3, and the four scores are summed to produce a scan CAC score which serves as the gold standard for the deep learning algorithm.The U-Net architecture, a common biomedical segmentation network, is modified to simultaneously segment and classify CAC lesions by 1) extracting features from the expanding path of the network and 2) using feature sharing to assign each lesion to one of the four arteries. CAC volume approximations are then extracted from each scan to produce a CAC score for each artery, and the scores were combined and compared to the radiologist-produced score.The diagnostic performance of this approach is assessed by comparison to the radiologist-produced volume score. Further, comparison to standard U-Net performance is assessed by comparing intra-class variance for different volume score classes as well as between clinically relevant subclasses (no, mild, moderate, and severe CAC).

RESULTS

Initial testing of the novel U-Net variant using an independent test set is promising (ROC - AUC > 0.98), showing comparable segmentation performance and comparison to the radiologist score (Kendall rank correlation coefficient = 0.76).

CONCLUSION

This novel approach to CAC segmentation and lesion classification demonstrates potential for improved diagnostic performance with minimally increased computational expense. With the added benefit of classification information, additional relevant information can be extracted to better inform clinical decision-making.

CLINICAL RELEVANCE/APPLICATION

With rapidly increasing international adoption of lung cancer screening technology, the importance of incidental disease detection and diagnose is critical.

SSCA07-03 Different Risk Factors Result in Unique Coronary Plaque Morphologies - a Longitudinal Radiomic Analysis

Participants
Marton Kolossvary, MD, Boston, MA (*Presenter*) Developer, Radiomics Image Analysis Software
David A. Bluemke, MD,PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Elliot K. Fishman, MD, Owings Mills, MD (*Abstract Co-Author*) Co-founder, HipGraphics, IncStockholder, HipGraphics, IncInstitutional Grant support, Siemens AGInstitutional Grant support, General Electric Company
Gary Gerstenblith, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Raul N. Mandler, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Thomas S. Kickler, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Shaoguang Chen, MPH, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Sandeepan Bhatia, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Shenghan Lai, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Hong C. Lai, MPH, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

marton.kolossvary@gmail.com

PURPOSE

Conventional cardiovascular risk factors, illicit drugs and human immunodeficiency virus (HIV)-infection all modify CAD similarly, by increasing the magnitude of the disease. However, clinical and volume-based imaging markers may not be sensitive enough to identify differences in CAD phenotypes, and therefore may misleadingly imply that different factors result in comparable CAD morphologies and therefore propagate CAD similarly.

METHOD AND MATERIALS

In our prospective longitudinal observational study of 300 asymptomatic individuals with coronary CT angiography (CCTA)-confirmed atherosclerosis (210 male, age: 48±7 years) of whom 161 were cocaine users at baseline with or without HIV-infection (226 HIV-infected), underwent CCTA at two time points (mean follow-up: 4.0±2.3 years). Precision phenotyping of CAD was done by calculating 1276 radiomic features on the 861 plaques. Linear mixed models corrected for plaque volume, high-sensitivity CRP, statin use and positive family history were used to assess the effects of cocaine use, HIV-infection and elevated atherosclerotic cardiovascular disease risk (ASCVD□7.5%). Hierarchical clustering was used to assess potential clusters among significant radiomic features. Bonferroni corrected p<0.00004 (0.05/1276) was considered significant.

RESULTS

Overall, 32.0% (409/1276) of the radiomic features showed significant association, of which 74.1% (303/409), 4.2% (17/409) and 25.4% (104/409) were affected by cocaine use, HIV-infection and elevated ASCVD risk, respectively. There was no overlap among radiomic features significantly associated with increased ASCVD risk and cocaine use or HIV-infection, while 88,2% (15/17) of HIV-infection associated parameters were also affected by cocaine use. Cluster analysis indicated 13 different structural components among significant features, of which eight were unique to cocaine use, three unique to ASCVD risk, and two contained parameters

associated with cocaine use, elevated ASCVD risk and/or HIV-infection.

CONCLUSION

Cocaine use and HIV-infection modify different CAD morphological components than conventional cardiovascular risk factors, potentially implying independent pathological pathways of disease progression.

CLINICAL RELEVANCE/APPLICATION

Different cardiovascular risk factors may modify coronary plaque structural progression differently, potentially implying unique pathological pathways of disease progression.

SSCA07-04 Deep Neural Network Provides Expert Level Accuracy in Quantifying Thoracic Aortic Dilatation on Contrast and Non-contrast Chest CT Scans

Participants
Basel Yacoub, MD, Charleston, SC (*Presenter*) Nothing to Disclose
Tilman S. Emrich, MD, Charleston, SC (*Abstract Co-Author*) Speaker, Siemens AGTravel support, Siemens AG
Andres Abadia, PhD, Charleston , SC (*Abstract Co-Author*) Nothing to Disclose
Gilberto J. Aquino, MD, Charleston, SC (*Abstract Co-Author*) Nothing to Disclose
Akos Varga-Szemes, MD, PhD, Charleston, SC (*Abstract Co-Author*) Research Grant, Siemens AGTravel support, Siemens AGResearch Consultant, Elucid Bioimaging Inc
Pooyan Sahbaee, Bethesda, MD (*Abstract Co-Author*) Employee, Siemens AG
Puneet Sharma, Princeton, NJ (*Abstract Co-Author*) Employee, Siemens AG; Stockholder, Siemens AG
Jonathan I. Sperl, Forchheim, Germany (*Abstract Co-Author*) Employee, Siemens AG
Saikiran Rapaka, PhD, Princeton, NJ (*Abstract Co-Author*) Employee, Siemens AG
Jeremy R. Burt, MD, Charleston, SC (*Abstract Co-Author*) Owner, YellowDot Innovations, LLC; Medical Consultant, Hyland Healthcare
Richard Bayer, Charleston, SC (*Abstract Co-Author*) Institutional Research support, Bayer AG Institutional Research support, HeartFlow, Inc Institutional Research support, Siemens AG
U. Joseph Schoepf, MD, Charleston, SC (*Abstract Co-Author*) Research Grant, Astellas Group Research Grant, Bayer AG Research Grant, Bracco Group Research Grant, Siemens AG Research Grant, Heartflow, Inc Research support, Bayer AG Consultant, Elucid BioImaging Inc Research Grant, Guerbet SA Consultant, HeartFlow, Inc Consultant, Bayer AG Consultant, Siemens AG

For information about this presentation, contact:

schoepf@musc.edu

PURPOSE

To evaluate the efficacy of a novel deep neural network (DNN) for automated segmentation and quantification of the thoracic aorta on contrast and non-contrast chest CT scans in patients with various pathologies of the thoracic aorta.

METHOD AND MATERIALS

50 chest CT scans (24 non-contrasted and 26 contrasted) from patients with known thoracic aortic disease were retrospectively evaluated. A DNN based on a U-Net architecture was developed using 1400 annotated chest CT datasets to automatically segment the thoracic aorta, compute its centerline and report the maximal diameters in the ascending (AA) and descending (DA) aorta on planes orthogonal to the centerline. These measurements were compared to those obtained by two expert readers on multi-planar reformats using a semi-automated aortic edge detection tool. Patients' age, sex and abnormal aortic findings were recorded for each CT scan. Inter-reader reliability and the concordance of the DNN's output with the mean readers' measurements were determined by using interclass correlations (ICC; single rater and absolute agreements).

RESULTS

Mean age was 62.3 years (SD: 11.6) with 30.0% females. 94% of the scans had ectasias/aneurysms; 24% had dissections; 8% had intramural thrombi and 8% had postoperative changes such as aortic stents or valves. There was excellent inter-reader agreement on diameter measurements; ICC of 0.951 (95% CI: 0.870 to 0.976). The mean of readers' maximal diameters was 47.5 mm and 37.7 mm in the AA and DA respectively. Dice coefficients, comparing output to ground truth segmentations, were 0.926 and 0.921 on the contrast and non-contrast scans, respectively. Analysis of the concordance of the DNN's results with the readers' means on contrast CT scans showed ICC of 0.969 (95% CI: 0.965 - 0.993) in the AA and ICC of 0.882 (95% CI: 0.756 - 0.945) in the DA. On non-contrast CT scans, we obtained an ICC of 0.780 (95% CI: 0.547 - 0.901) in the AA and 0.908 (95% CI: 0.561 - 0.970) in the DA.

CONCLUSION

This DNN algorithm offers expert level accuracy for automated segmentation and quantification of thoracic aortic dilatation on contrast and non-contrast CT scans with challenging pathologies.

CLINICAL RELEVANCE/APPLICATION

A DNN algorithm offers accurate automated measurements of thoracic aortic dilatations on contrast and non-contrast CT scans in patients with complicated findings on CT imaging such as ectasia/aneurysm, dissections, aortic stents and mural thrombi.

SSCA07-05 Radiomics Differentiate Left Atrial Appendage Thrombi and Mixing Artifacts on Dynamic CT Angiography Images

Participants
Shadi Ebrahimian, Boston, MA (*Presenter*) Nothing to Disclose
Fatemeh Homayounieh, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Andrew Primak, PhD, Cleveland, OH (*Abstract Co-Author*) Employee, Siemens AG
Felix Lades, Forchheim, Germany (*Abstract Co-Author*) Employee, Siemens AG
Sandeep S. Hedgire, MD, Lexington, MA (*Abstract Co-Author*) Nothing to Disclose
Mannudeep K. Kalra, MD, Lexington, MA (*Abstract Co-Author*) Research Grant, Siemens AGResearch Grant, Riverain Technologies, LLCConsultant, Globus Medical, Inc

For information about this presentation, contact:

sebrahimian@mgh.harvard.edu

PURPOSE

Presence of filling defect in left atrial appendage (LAA) on contrast-enhanced CT (CECT) requires acquisition of delayed images to differentiate contrast mixing artifact from thrombus. We assessed if radiomics can differentiate between LAA contrast mixing artifact and thrombus without the need for delayed images.

METHOD AND MATERIALS

Our IRB-approved retrospective study included 89 patients who underwent dynamic contrast-enhanced, ECG-gated cardiac or pulmonary vein CT. Of these, 59 patients had filling defects in the LAA consistent with thrombi (n= 29, mean age: 70.10 ± 12.61 years, M: F 14:15) or LAA contrast-mixing artifacts (n= 30, mean age: 70.56 ± 12.01 years, M: F 19:11) on the 1-minute delayed phase CT images through the heart. The remaining 30 patients (mean age: 65.9 ± 10.44 years, M: F 18:12) had homogeneous opacification without filling defects of LAA (normal). LAA on dynamic CECT images was manually segmented to obtain first and higher order radiomics (eXamine, Siemens) for all 89 patients. Mean HU values with in the LAA was also recorded. The data were analyzed using multivariate logistic regression with receiver operator characteristics area under the curve (AUC) to determine the accuracy of features.

RESULTS

The second order radiomics such as gray level run length matrix (GLRLM), gray level dependence matrix (GLDM), gray level co-occurrence matrix (GLCM), and gray level size zone matrix (GLSZM) enabled differentiation of LAA artifacts and thrombus in patients with LAA filling defects on dynamic CCECT images (AUC=0.88). The best differentiators of artifacts from normal LAA second-order radiomics feature (GLCM) with an AUC of 0.98 ($p<0.0001$). Kurtosis, GLCM, and GLDM were identified as the best differentiators of normal LAA from thrombus with an AUC of 0.99.

CONCLUSION

Radiomics can differentiate between LAA thrombi and contrast mixing artifacts on dynamic contrast-enhanced CT images without need for delayed phase images.

CLINICAL RELEVANCE/APPLICATION

Radiomics can help reduce radiation dose by avoiding need for delayed phase CT images in patients with LAA filling defects on dynamic contrast-enhanced CT images.

SSCA07-06 Automatic Prediction of Left Cardiac Chamber Enlargement on Chest Radiographs Using Convolutional Neural Network

Participants
Ju G. Nam, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Keonwoo Noh, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Chang Min Park, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research funded, Lunit Inc
Min-Soo Kim, Daejeon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyewon Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Da Som Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Seung-Jin Yoo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyun-Lim Yang, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eui Jin Hwang, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Lunit IncResearch Grant, Coreline Soft, Co Ltd
Eun-Ah Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jin Mo Goo, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, INFINITT Healthcare Co, Ltd; Research Grant, DONGKOOK Pharmaceutical Co, Ltd;
Hye-Young Sun, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

dyuing89@gmail.com

PURPOSE

To develop and validate deep learning-based cardiac chamber enlargement-detection algorithms for left atrial (DLCE-LAE) and ventricular enlargement (DLCE-LVE) on chest radiographs (CRs).

METHOD AND MATERIALS

Inception-v3 and ResNet50 architectures were selected for DLCE-LAE and -LVE, respectively, with output layer modified to have one neuron with sigmoid activation. For training and internal validation, 630 CRs (349 normal and 281 LAE-radiographs) and 460 CRs (286 normal and 174 LVE-radiographs) matched with the same day-echocardiography were collected from 791 individuals from June 2018 to May 2019, respectively. External validation was performed using 94 temporally independent CRs (26 normal, 51 with LAE, 12 with LVE, and 5 with both). Reader performance test was conducted using the external validation dataset by three cardiothoracic radiologists, without and with the results of DLCE in a 4 week-interval. Classification performance of DLCE was evaluated and compared with those of the readers and conventional radiographic features, including cardiothoracic ratio, carinal angle, and double contour. In addition, DLCE-LAE was tested on 5,277 CRs from a healthcare screening program cohort.

RESULTS

DLCE-LAE showed area-under-the receiver-operating characteristics curve (AUROC) of 0.862 and 0.823 on internal and external validation, respectively. On reader performance test, DLCE-LAE showed better results than pooled radiologists (AUROC 0.823 vs. 0.691; P<.001) and significantly increased their performance when used as a second reader (pooled AUROC 0.691 vs. 0.752; P=.004). DLCE-LAE also showed significantly higher AUROC than conventional radiographic findings (AUROC 0.823 vs. 0.537-0.742; all Ps<.05). In the healthcare screening cohort, DLCE-LAE successfully detected 71.0% (22/31) radiographs with severe LAE, while yielding a minor 0.6% (26/4184) false-positive rate. DLCE-LVE showed AUROCs of 0.946 and 0.639 on internal and external validation datasets, respectively.

CONCLUSION

DLCE-LAE outperformed cardiothoracic radiologists in detecting LAE and showed promise in screening individuals with severe LAE in an annual healthcare screening cohort. DLCE-LVE failed to show clinically significant performance.

CLINICAL RELEVANCE/APPLICATION

Left atrial enlargement is well known factor related to patients' survival, and thus automatic detection of LAE can facilitate patients' diagnosis of cardiac diseases and improve their prognosis.

Printed on: 05/05/21

SSCH03

Science Session with Keynote: Chest (COVID-19 Imaging and Lung Infection)

Sunday, Nov. 29 3:30PM - 4:30PM Room: Channel 4

CH CT NM AI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSCH03-01 Chest Keynote Speaker: COVID-19 Imaging

Participants
Michael Chung, MD, New York, NY (*Presenter*) Nothing to Disclose

SSCH03-02 Transfer Deep Learning for Tuberculosis Detection on Chest X-Ray Images Captured by Phone Camera

Participants
Po-Chih Kuo, Hsinchu City, Taiwan (*Presenter*) Nothing to Disclose
Cheng-Che Tsai, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Leo Anthony Celi, Cambridge, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

kuopc@mit.edu

PURPOSE

An early diagnosis of tuberculosis (TB) is crucial but is challenging for resource-poor countries with a shortage of radiologists. An approach to solve this obstacle is to take photographs on chest X-ray (CXR) and interpret them using smartphones. We developed a transfer deep learning-based TB detection model (TBShoNet) for CXR photographs taken by a phone camera.

METHOD AND MATERIALS

Three publicly available datasets, MIMIC-CXR, Montgomery, and Shenzhen were used for model pretraining, transferring, and evaluation, respectively. The 121-layer neural network was pretrained on MIMIC-CXR database containing 250,044 CXRs with 14 pulmonary labels, which did not include TB. The model was then recalibrated for CXR photographs by using simulation methods to augment the dataset. Finally, the TBShoNet was built by connecting the pretrained model to an additional 2-layer neural network trained on augmented CXR images in Montgomery dataset (TB: 58; normal: 80). The photographs taken by five different phones from the CXRs in Shenzhen dataset (TB: 336; normal: 326) were used to test the model performance. Diagnostic performance was measured using area under the receiver operating characteristic curves (AUC) for image-wise classification.

RESULTS

TBShoNet demonstrated an AUC of 0.89 (confidence interval: 0.87-0.91) for TB detection. With optimal cutoff, sensitivity and specificity for classification were 81% and 84%, respectively.

CONCLUSION

Based on transfer learning and data augmentation, TBShoNet was built without training on TB CXR photographs. TBShoNet can detect TB on phone-captured CXR photographs and generalize across different datasets.

CLINICAL RELEVANCE/APPLICATION

TBShoNet provides a method to develop an algorithm that can be deployed on phones to assist healthcare providers in areas where radiologists and high-resolution digital images are unavailable.

SSCH03-04 Artificial Intelligence Deep Learning with Chest CT to Predict Outcomes Such as ICU Admission in COVID-19: A Multinational Study

Participants
Ziyue Xu, PhD, Reston, VA (*Presenter*) Researcher, NVIDIA Corporation
Sheng Xu, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Stephanie A. Harmon, PhD , Bethesda, MD (*Abstract Co-Author*) Research collaboration, NVIDIA Corporation
Evrim B. Turkbey, MD, Rockville, MD (*Abstract Co-Author*) Nothing to Disclose
Holger R. Roth, PhD, Bethesda, MD (*Abstract Co-Author*) Employee, NVIDIA Corporation Researcher, NVIDIA Corporation
Daguang Xu, Princeton, NJ (*Abstract Co-Author*) Employee, AI-Infra; Employee, NVIDIA Corporation
Peng An, Xiangyang, China (*Abstract Co-Author*) Nothing to Disclose
Thomas H. Sanford, Bethesda, MD (*Abstract Co-Author*) Research collaboration, NVIDIA Corporation
Francesca Patella, MD, Cassina de Pecchi, Italy (*Abstract Co-Author*) Nothing to Disclose
Dong Yang, Bethesda, MD (*Abstract Co-Author*) Scientist, NVIDIA Corporation
Wentao Zhu, Santa Clara, CA (*Abstract Co-Author*) Nothing to Disclose
Andriy Myronenko, Bethesda, MD (*Abstract Co-Author*) Scientist, NVIDIA Corporation
Amel Amalou, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose

Dilara J. Long, BA, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Mike Kassin, Bethesda, MD (*Abstract Co-Author*) Co-founder, Florence Healthcare
Maxime Blain, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Ashkan A. Malayeri, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Elizabeth C. Jones, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Dima A. Hammoud, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Gianpaolo Carrafiello, PhD, Varese, Italy (*Abstract Co-Author*) Nothing to Disclose
Hirofumi Obinata, Toyko, Japan (*Abstract Co-Author*) Nothing to Disclose
Hitoshi Mori, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Maurizio Cariati, MD, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Hayet Amalou, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Haydar Celik, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Anna Maria Ierardi, MD, Roma, Italy (*Abstract Co-Author*) Nothing to Disclose
Elvira Stellato, MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Guido Plensich, MD,MD, Milan, Italy (*Abstract Co-Author*) Nothing to Disclose
Giuseppe Franceschelli, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Cristiano Girlando, MD, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Giovanni Irmici, MD, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Mona Flores, MD,MBA, Santa Clara, CA (*Abstract Co-Author*) Employee, NVIDIA Corporation
Baris Turkbey, MD, Rockville, MD (*Abstract Co-Author*) Research support, Koninklijke Philips NVRoyalties, Koninklijke Philips NVInvestigator, NVIDIA Corporation
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NVRoyalties, Koninklijke Philips NVIntellectual property, Koninklijke Philips NVResearcher, Celsion CorporationResearcher, BTG International LtdIntellectual property, BTG International LtdResearcher, Siemens AGResearcher, XAct Robotics LtdResearcher, NVIDIA CorporationEquipment support, AngioDynamics, IncResearcher, Profound Medical IncResearcher, Canon Medical Systems CorporationResearcher, AstraZeneca PLCResearcher, Exact Imaging Inc

For information about this presentation, contact:

dlongg@vt.edu

PURPOSE

Chest CT is an accurate tool for assessment and monitoring the pulmonary status of hospitalized patients with COVID-19 associated lung disease. Artificial Intelligence (AI) deep learning has the potential to aid in automated and standardized evaluation of CT scans. This work aims to investigate the potential of 3D deep learning method to predict clinical outcomes of patients with COVID-19, based on chest CT.

METHOD AND MATERIALS

632 chest CTs in patients with PCR-proven COVID-19 were correlated with the clinical outcome of admission to an ICU (N=69) or no admission to an ICU (N=563). An automated whole lung segmentation algorithm was developed and used to localize whole lung. Based on the local region-of-interest around the lung (a bounding box), a 3D deep learning-based algorithm for classification of clinical outcome labels were trained with 5-fold cross validation. Model performance for classification on chest CT was evaluated by overall accuracy, sensitivity, and specificity.

RESULTS

Classification models achieved overall accuracy of 92%, sensitivity 73%, and specificity 93.9%, despite an imbalanced dataset weighted towards no ICU admission. The positive predictive value for predicting ICU admission was only 53%, but the negative predictive value was 97%. Such a model might alert the clinician to the enhanced potential of ICU admission, when combined with other clinical features.

CONCLUSION

Based upon Chest CT alone, AI-based deep learning algorithms can reasonably predict clinical outcomes such as ICU admission, in patients with COVID-19 who underwent CT and PCR on the day of admission. The model is feasible with reasonable accuracy and specificity of prediction. The current study should be interpreted with caution and is preliminary and limited in its unbalanced data, small number of positive cases, single site, and lack of inclusion of standard clinical metrics, all of which have significant impact on statistical interpretation.

CLINICAL RELEVANCE/APPLICATION

It is possible for an AI algorithm (based upon an initial admission chest CT alone) to predict clinical outcome measures such as later ICU admission.

SSCH03-05 Diagnostic Performance of CT for COVID-19 Pneumonia in High-prevalence versus Low-prevalence Disease Scenarios

Participants
Marcello Petrini, Piacenza, Italy (*Presenter*) Nothing to Disclose
Davide Colombi, MD, Piacenza, Italy (*Abstract Co-Author*) Nothing to Disclose
Gabriele Maffi, Milano, Italy (*Abstract Co-Author*) Nothing to Disclose
Gabriele D. Villani, Piacenza, Italy (*Abstract Co-Author*) Nothing to Disclose
Flavio C. Bodini, Piacenza, Italy (*Abstract Co-Author*) Nothing to Disclose
Emanuele Michieletti, Piacenza, Italy (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

m.petrini@ausl.pc.it

PURPOSE

To evaluate the diagnostic performance of computed tomography (CT) for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) disease (COVID-19) pneumonia, comparing the first outbreak phase with a subsequent period of lower disease prevalence.

METHOD AND MATERIALS

We retrospectively analyzed admission chest CT scans of patients suspected for COVID-19 pneumonia who underwent reverse transcriptase-polymerase chain reaction (RT-PCR) of nasal-pharyngeal swab. We evaluated two different epidemic phases that occurred in our hospital localized in Italy: the first period of high prevalence disease (High prevalence group, HPG), from 21st February to 7th March; a second period with reduced prevalence (low prevalence group, LPG) from 6th to 13th April, after 28 days of lockdown. RT-PCR result was used as reference standard to calculate CT sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) in two periods.

RESULTS

The HPG included 198 patients (females 63/198, 32%; median age, 69) while LPG included 146 patients (females 76/146, 52%; median age, 70), without significative difference for age but with significative male predominance in the first group. Positive RT-PCR rate was 89% (177/198) in HPG and 31% (45/146) in LPG. In HPG, CT sensitivity for COVID-19 pneumonia was 94% (95%CI, 90-97%), specificity 63% (40-82%), PPV 95% (92-97%), NPV 58% (41-73%). In the LPG, CT sensitivity was 93% (82-98%), specificity 73% (64-82%), PPV 61% (53-68%), NPV 96% (89-99%).

CONCLUSION

For COVID-19 pneumonia CT sensitivity is high (93-94%), whilst specificity is low (73-63%). However, given a negative CT, the likelihood to have COVID-19 pneumonia is 42% (NPV, 58%) during the high prevalence phase of the disease while it is 4% (NPV, 96%) in the low prevalence period.

CLINICAL RELEVANCE/APPLICATION

Clinicians faced different clinical scenario in few days, due to pandemic spread of COVID-19. PPV and NPV of chest CT should drive clinical management of patient suspected for COVID-19.

SSCH03-06 Quantification of Airspace Disease Associated with COVID-19: Proposal of a Novel Method Correlating Chest CT and Chest X-Ray Quantification through Digitally Reconstructed Radiographs

Participants
Eduardo J. Mortani Barbosa JR, MD, Philadelphia, PA (*Presenter*) Research Consultant, FluiddaResearch Grant, Siemens AG
Warren B. Gefter, MD, Philadelphia, PA (*Abstract Co-Author*) Research Grant, Siemens AG
Siqi Liu, PhD, Princeton, NJ (*Abstract Co-Author*) Employee, Siemens AG
Florin C. Ghesu, PhD, Princeton, NJ (*Abstract Co-Author*) Employee, Siemens AG
Steffen Kappler, PhD,DIPLPHYS, Forchheim, Germany (*Abstract Co-Author*) Researcher, Siemens AGStockholder, Siemens AG
Sasa Grbic, Princeton, NJ (*Abstract Co-Author*) Employee, Siemens AG
Sebastian Vogt, PhD, Malvern, PA (*Abstract Co-Author*) Director, Siemens AGStockholder, Siemens AG
Dorin Comaniciu, PhD, Princeton, NJ (*Abstract Co-Author*) Employee, Siemens AG

PURPOSE

Chest X-Rays are widely utilized in the evaluation of suspected COVID-19 associated airspace disease (AD), however have limited sensitivity. Chest CT is more accurate, but not performed routinely. We developed a novel method to quantify AD in chest X-ray based on chest CT.

METHOD AND MATERIALS

Our reference standard is CT derived 3D quantification of percentage of lung volume involved by AD (ground glass opacities and consolidations), via a neural network algorithm trained on 1000 chest CTs in patients with COVID-19 (%volCT). Our method generates digitally reconstructed radiographs (DRRs) by forward projections through the CT volume along the AP axis, processed via a super-resolution neural network. Our test data comprised 24 patients with positive RT-PCR for COVID-19 who underwent chest CT and chest X-ray less than 24 hours apart. CT derived 3D total lung and airspace disease segmentation was projected on the DRRs using quantitative maps of cumulative thickness of both lung tissue and AD through the anterior-posterior axis, adjusted to minimize the mean squared error between %volCT and the percentage area of AD (%areaDRR) computed in DRRs. Finally, 2 expert thoracic radiologists with over 10 years' experience independently manually segmented AD in the paired chest x-rays, whose results were averaged to generate a consensus percentage area of AD (%areaCXR).

RESULTS

CT derived volumetric AD quantification (%volCT) mean was 24.3%, median 13.8% (range 0 - 77.3%); DRR derived area AD quantification (%areaDRR) mean was 24.4%, median 8.9% (range 0 - 81.8%); expert consensus on chest x-rays (%areaCXR) mean was 12.3%, median 8.3% (range 0 - 53.0%). Pearson correlation between %volCT and %areaDRR was 0.99 ($p < .00001$), between the 2 expert readers was 0.86 ($p < .00001$), between %volCT and %areaCXR was 0.70 ($p < .001$), and between %areaDRR and %areaCXR was 0.69 ($p < .001$). Figure 1 illustrates results in 3 representative patients.

CONCLUSION

The correlation between %volCT and %areaDRR was excellent. Expert readers underestimated the extent of AD on chest x-rays when compared to CT based volumetric and DRR based area quantification of AD, with moderate correlation between %areaDRR and %areaCXR.

CLINICAL RELEVANCE/APPLICATION

Our novel method may allow more accurate assessment of AD extent in chest x-rays, better correlating with the reference standard of chest CT, impacting diagnostic and prognostic evaluation of suspected COVID-19 patients.

SSCH04

Science Session with Keynote: Chest (Applications of AI and Radiomics in Lung Imaging)

Tuesday, Dec. 1 10:00AM - 11:00AM Room: Channel 4

CH CT OI AI

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSCH04-01 Chest Keynote Speaker: The Role of Artificial Intelligence in Lung Cancer Screening

Participants
Colin Jacobs, PhD, Nijmegen, Netherlands (*Presenter*) Research Grant, MeVis Medical Solutions AGRoyalties, MeVis Medical Solutions AGResearch Grant, Thirona

SSCH04-02 Deep Learning for Lung Nodule Malignancy Prediction: Comparison With Clinicians and the Brock Model on an Independent Dataset From a Large Lung Screening Trial

Participants
Kiran Vaidhya Venkadesh, MSc, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Arnaud A. Setio, MSc, Nijmegen, Netherlands (*Abstract Co-Author*) Nothing to Disclose
Zaigham Saghir, Copenhagen, Denmark (*Abstract Co-Author*) Nothing to Disclose
Bram van Ginneken, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Stockholder, Thirona Co-founder, Thirona Royalties, Thirona Research Grant, Varian Medical Systems, Inc Royalties, Varian Medical Systems, Inc Research Grant, Canon Medical Systems Corporation Royalties, Canon Medical Systems Corporation Research Grant, Siemens AG
Colin Jacobs, PhD, Nijmegen, Netherlands (*Abstract Co-Author*) Research Grant, MeVis Medical Solutions AGRoyalties, MeVis Medical Solutions AGResearch Grant, Thirona

For information about this presentation, contact:

kiranvaidhya.venkadesh@radboudumc.nl

PURPOSE

The majority of studies on automated lung nodule malignancy prediction utilize subjective labels provided by radiologists instead of using a histopathological reference standard. The aim of this study was to investigate the performance of a deep learning system that was trained using subjective labels from LIDC-IDRI by testing it on two independent datasets of nodules from the Danish Lung Cancer Screening Trial (DLCST) with histopathological proof or follow-up over a period of at least 2 years, and comparing performance with a panel of 11 clinicians and the clinically established Brock risk model.

METHOD AND MATERIALS

We considered nodules annotated by at least 3 out of 4 radiologists from the LIDC-IDRI dataset. The malignancy ratings were averaged and indeterminate nodules were excluded resulting in 680 nodules (352 benign and 328 malignant) for development. We trained a deep learning system based on 2D multi-view CNN and 3D extension of VGGNet on the development set. We tested the system on two sets of nodules from DLCST. The first set, dataset A, consisted of 62 cancers and 120 random benign nodules and the second set, dataset B, consisted of the same 62 cancers and a size-matched group of 118 benign nodules. A group of 11 clinicians, consisting of 4 radiologists, 5 radiology residents, and 2 pulmonologists, were tasked with grading the nodules on a continuous scale from 0 to 100. Finally, the Brock risk model was also applied to all nodules.

RESULTS

On dataset A, the deep learning system produced an AUC of 0.941, which is better than the average clinician (0.892, $p = 0.02$) and comparable to the Brock model (0.924, $p = 0.35$). On dataset B, the system produced an AUC of 0.737, which is comparable to the Brock model (0.70, $p = 0.268$) but worse than the average clinician (0.80, $p = 0.034$).

CONCLUSION

The deep learning system trained with subjective labels performed comparably with humans and the Brock model but showed certain vulnerabilities when presented with large benign nodules. It is important to recognize the challenges involved in classifying indeterminate lung nodules and we think the field would benefit from publicly available datasets with a reference standard set by histopathological proof or follow-up.

CLINICAL RELEVANCE/APPLICATION

Algorithms for nodule malignancy prediction may improve clinical follow-up decisions in lung cancer screening and clinical work-up.

SSCH04-03 Development of Deep Learning Algorithm Detecting Nine Common Abnormalities on Chest Radiographs: Validation compared with Radiologists and Simulation Study to Evaluate Reading Time in Emergency Radiology

Participants
Ju G. Nam, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Chang Min Park, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research funded, Lunit Inc

Eui Jin Hwang, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, Lunit IncResearch Grant, Coreline Soft, Co Ltd
Jung Hee Hong, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jong Hyuk Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jongchan Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Lunit Inc
Minchul Kim, MS, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Lunit Inc
Jin Mo Goo, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research Grant, INFINITT Healthcare Co, Ltd; Research Grant, DONGKOOK Pharmaceutical Co, Ltd;

For information about this presentation, contact:

dyuing89@gmail.com

PURPOSE

To develop a deep learning-algorithm detecting common abnormalities (DLAD) on chest radiographs (CRs) and evaluate its performance and effectiveness.

METHOD AND MATERIALS

DLAD was trained with 146,717 CRs taken from 108,053 patients using a ResNet34-based neural network with 9 different lesion-specific channels for different abnormalities: pneumothorax (Ptx), mediastinal widening (MW), pneumoperitoneum (Ppm), nodule (Ndl), consolidation (Csn), pleural effusion (Pef), atelectasis, fibrosis, and calcification. External validation was performed using an open dataset (PadChest, n=673) and a same day CT-confirmed dataset (n=190; normal:abnormal=53:147) independent from training set, and compared with three thoracic radiologists. Simulation test was conducted on another independent dataset, of which the disease-distribution was matched to emergency room setting: 146 nonurgent, 52 urgent (20 pneumonia, 11 malignancy, 7 pleural effusion, 6 pulmonary edema, 4 tuberculosis, 3 interstitial lung disease, and 1 rib fracture), and 4 critical (2 pneumothorax, 1 aortic dissection, and 1 pneumoperitoneum) cases. Six radiologists (2 thoracic, 2 general, and 2 residents) interpreted the images twice, with and without DLAD, in a 4-week interval. Time consumed for interpretation of each CR was recorded.

RESULTS

DLAD exhibited AUROCs of 0.913-0.997 on PadChest dataset and 0.911-1.00 on CT-confirmed dataset for nine abnormalities. When abnormalities were classified into critical (Ptx, MW, and Ppm), urgent (Ndl, Csn, and Pef), and nonurgent (others) findings, DLAD successfully classified significantly more cases with critical or urgent findings (97.3%[107/110] vs. 89.7%[296/330]; P=.02) than pooled three radiologists. On the simulation test, pooled radiologists detected significantly more critical (29.2%[7/24] vs. 70.8% [17/24]; P=.006) and urgent (78.2%[244/312] vs. 83.3%[260/312]; P=.03) diseases aided by DLAD. All readers decreased time consumed for nonurgent CR-interpretation (P<.001), and most (4/6) readers decreased total interpretation time.

CONCLUSION

DLAD showed better performance than radiologists in detecting critical or urgent findings from CRs, and radiologists improved their performance and reading time aided by DLAD.

CLINICAL RELEVANCE/APPLICATION

DLAD, as an interpretation-assistance covering most radiographic findings, could vastly help radiologists in routine practice not only for detection performance but also by reducing reading-time.

SSCH04-04 Aiding Diagnosis of Interstitial Lung Disease Applying Content-Based Image Retrieval (CBIR) of Similar CTs With Confirmed Diagnosis Based on Extent and Distribution of Regional Disease Pattern

Participants
Jooae Choe, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hye Jeon Hwang, MD,PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joon Beom Seo, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sang Min Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jihye Yun, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Rohee Park, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jihoon Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kiok Jin, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Youngsoo Lee, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jewon Jeong, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Howook Jeon, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Namkug Kim, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Stockholder, Anymedi, Inc
Jaeyoun Yi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Officer, Coreline Soft, Co Ltd; Stockholder, Coreline Soft, Co Ltd
Donghoon Yu, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Coreline Soft, Co Ltd
Byeongsoo Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, Coreline Soft, Co Ltd

For information about this presentation, contact:

umttette@hanmail.net

PURPOSE

To investigate whether content-based image retrieval (CBIR) of similar chest CT images can aid the diagnosis of interstitial lung disease (ILD) in readers with different levels of experience.

METHOD AND MATERIALS

A total of 296 cases of ILD CT were included in the database of the proposed CBIR system. Data consisted of four disease classes: usual interstitial pneumonia (UIP, n=100), nonspecific interstitial pneumonia (NSIP, n=101), cryptogenic organizing pneumonia (COP, n=45) and chronic hypersensitivity pneumonitis (CHP, n=50). Eighty cases (30 UIP, 30 NSIP, 10 COP and 10 CHP) were selected as query from the CBIR system. The top three similar chest CTs were retrieved from the database by assessing and comparing the extent and distribution of six different regional disease patterns (normal looking lung, ground glass opacity, reticulation, honeycombing, consolidation and emphysema), which were automatically quantified and classified by convolutional neural network. Eight readers including two residents, three pulmonologists, and three radiologists interpreted CT images of query cases and

provided their most probable diagnosis among five diseases (UIP, NSIP, COP, CHP and smoking-related ILD) and rated the confidence level of diagnosis (high, intermediate and low) on two different session of reading before and after applying CBIR. Diagnostic accuracy (rate of correct diagnosis), inter-reader agreement and confidence level were analyzed.

RESULTS

After applying CBIR, the accuracy of probable diagnosis increased in all eight readers (rate of correct diagnosis: pre-CBIR, mean 46%[range 38-58%]; post-CBIR, 61%[69-93%]) and the improvement was significant in five readers including one resident, two pulmonologists, and two radiologists (*P*=0.001-0.049). The improvement of accuracy was significant in UIP and NSIP cases (*P*=0.001-0.031). Inter-reader agreement increased after using CBIR (Fleiss' kappa: pre-CBIR, 0.32; post-CBIR, 0.47). Confidence level increased after using CBIR (percentage of high confidence level: pre-CBIR, 15.1%; post-CBIR, 27.6%, *P*=0.05).

CONCLUSION

Usage of CBIR system of ILD CT improved the diagnostic accuracy of ILD and inter-reader agreement in readers with different levels of experience.

CLINICAL RELEVANCE/APPLICATION

The proposed CBIR system may assist the diagnosis of ILD in clinical practice regardless of the level of experience.

SSCH04-05 Deep Learning-Based Assessment of Body Composition in Patients With Lung Cancer

Participants
Jakob Weiss, MD, Boston, MA (*Presenter*) Nothing to Disclose
Christopher Bridge, Boston, MA (*Abstract Co-Author*) Institutional support, NVIDIA CorporationInstitutional support, General Electric CompanyInstitutional support, Nuance Communications, Inc
Junwei Lu, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Camden P. Bay, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Andrea Shafer, MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nancy Diao, DSc, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Katherine P. Andriole, PhD, Chestnut Hill, MA (*Abstract Co-Author*) Research funded, NVIDIA CorporationResearch funded, General Electric CompanyResearch funded, Nuance Communications, Inc
David Christiani, MD, Boston,, MA (*Abstract Co-Author*) Nothing to Disclose
Michael H. Rosenthal, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Raymond H. Mak, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Hugo Aerts, PhD, Boston, MA (*Abstract Co-Author*) Consultant, Onc.AI

For information about this presentation, contact:

Jakob_Weiss@dfci.harvard.edu

PURPOSE

To investigate deep learning-based assessment of body composition in patients with lung cancer and to evaluate its association with overall survival.

METHOD AND MATERIALS

In 1,287 patients (median age: 64.9±10.8 years old; 48.6% male), body composition (defined as muscle mass and total adipose tissue (TAT) at level L3) was automatically quantified on routine abdominopelvic CT scans at time of lung cancer diagnosis using a deep learning system. To account for demographic differences, body composition measures were normalized with respect to race, age and sex based on z-scores calculated in a general outpatient population of >12,000 individuals. To investigate the association of body composition with overall survival, the lowest tertile of the normalized measures was used to define patients as having low muscle mass or low TAT. Cox proportional hazard models were adjusted for demographics, body mass index, cancer and treatment characteristics.

RESULTS

Body composition was successfully quantified in all patients. Over a median follow-up of 1.8 years (event rate: 68.1% (877/1,287)), overall survival was significantly associated with a higher mortality in patients with low muscle mass (HR: 1.32; 95% CI, 1.13-1.54; p<0.001) and patients with low TAT (HR: 1.27; 95% CI, 1.07-1.50; p=0.005) compared to the reference groups. Stratified analyses suggest that these associations are driven by younger patients (<65-years-old; p<=0.004), early stages of disease (I/II; p<=0.005) and patients with adenocarcinoma (p<=0.04).

CONCLUSION

In patients with lung cancer, low muscle mass and low TAT quantified on CT at time of diagnosis are independently associated with overall survival, especially in younger patients with early stage disease. Deep learning allows for a reliable and automatic extraction of these currently unused information, which may offer an approach to guide clinical decision-making and improve patient management in large cohorts.

CLINICAL RELEVANCE/APPLICATION

Automatic quantification of body composition on routine abdominal CT scans identifies patients with lung cancer at high risk beyond established markers and may help to optimize patient care.

SSCH04-06 Impact of Real-time Implementation of Artificial Intelligence Bone Processing on Chest Radiographs in a Large Academic Practice

Participants
Reece J. Goiffon, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose
Rajdeep Kapoor, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Maryann Tateosian, MS, RT, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jo-Anne O. Shepard, MD, Boston, MA (*Abstract Co-Author*) Editor with royalties, Reed Elsevier
Subba R. Digumarthy, MD, Boston, MA (*Abstract Co-Author*) Speaker, Siemens AGResearch Grant, Lunit IncResearcher, Merck & Co,

IncResearcher, Pfizer IncResearcher, Bristol-Myers Squibb CompanyResearcher, Novartis AGResearcher, F. Hoffmann-La Roche LtdResearcher, Polaris Pharmaceuticals, IncResearcher, Cascadia Healthcare, LLCResearcher, AbbVie IncResearcher, Gradalis, IncResearcher, Clinical BayResearcher, Zai Lab

PURPOSE

To determine the impact of artificial intelligence bone processing with on image interpretation in a large academic radiology practice.

METHOD AND MATERIALS

During a 3-month implementation of commercially available artificial intelligence bone processing, 13,638 standard two-view upright chest radiographs (S-CXR) were performed. Of these, 5,779 (42%) were also processed (P-CXR) with bone suppression (BS) and bone isolation (BI) software prior clinical interpretation. Reports by 32 attending radiologists working in thoracic and emergency radiology were blindly reviewed for findings (opacities >6 mm) and specific imaging recommendations. Test metrics for novel findings were calculated for CXRs in the study period without prior thoracic imaging within one year and with following chest computed tomography (CT) within 3 weeks as the gold standard (n=554, 4%). Statistics from generalized linear modeling are presented as parameter estimate [95% confidence interval], $p<0.05$ considered statistically significant.

RESULTS

Mean patient age ± standard deviation was 63 ± 16 years; 55% male. The recommendation rate was 7 [6-8]% with no significant difference between S-CXR and P-CXR, odds ratio (OR) 0.9 [0.7-1.1], p=0.32. In CXRs with no recent prior comparison, there was no difference in sensitivity (49 [44-54]%, p=0.95), specificity (51 [43-58]%, p=0.6), negative predictive value (NPV) (29 [24-34]%, p=0.13), or accuracy (49 [45-53]%, p=0.8). S-CXR positive predictive value (PPV) was 65 [58-43]% compared to P-CXR 77 [69-84]%; OR 1.8 [1.1-3.2] (p=0.031). The false positive rate was lower in P-CXR (11 [7-15]%) compared to S-CXR (17 [14-22]%), OR 0.6 [0.3-0.9], p=0.02. The effect was most pronounced for emergency radiologists with a P-CXR PPV 93 [83-98]% compared to S-CXR 77 [65-87]%, OR 1.2 [1.0-1.3] (p=0.023).

CONCLUSION

Digitally processing chest radiographs (BS and BI) increased positive predictive value compared to unprocessed radiographs by decreasing the rate of false positive findings without affecting follow-up imaging recommendations or other test metrics including sensitivity, specificity, NPV, or accuracy. The effect is more pronounced in emergency radiology compared to thoracic radiology.

CLINICAL RELEVANCE/APPLICATION

Artificial intelligence bone processing can be used to increase true positive findings in chest radiography without affecting other test metrics or increasing recommendation rate for follow-up imaging

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SSCH05

Chest (Lung Cancer Screening)

Thursday, Dec. 3 2:00PM - 3:00PM Room: Channel 4

CH CT OI

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSCH05-01 Lung Cancer Screening Among Screening Mammography Patients: Bicoastal Eligibility, Knowledge and Interest at Two Urban Academic Centers

Participants
Eitan Novogrodsky, MD, Kew Gardens, NY (*Presenter*) Nothing to Disclose
Hannah Milch, MD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Geraldine M. Villasana Gomez, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Jessica Goldman, MD, Bronx, NY (*Abstract Co-Author*) Nothing to Disclose
Jessica Rosenblum, MD, White Plains, NY (*Abstract Co-Author*) Nothing to Disclose
James W. Sayre, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Anne C. Hoyt, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Jonathan G. Goldin, MBChB, PhD, Santa Monica, CA (*Abstract Co-Author*) Nothing to Disclose
Linda B. Haramati, MD, MS, New Rochelle, NY (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

hmilch@mednet.ucla.edu

PURPOSE

Adoption rates of lung cancer screening (LCS) with low dose CT (LDCT) are low, ranging from 3.9-12.5%, despite Medicare coverage and a recommendation by the United States Preventative Services Task Force. The purpose of this study is to determine LCS eligibility, knowledge, and interest among women presenting for screening mammography (SM).

METHOD AND MATERIALS

A single-page survey (English or Spanish) was distributed to all patients presenting for SM from January-March 2020 at 6 sites within two urban academic medical centers on the East and West Coasts. The East Coast general patient population has a higher poverty rate, greater ethnic and racial diversity, and higher Medicare and Medicaid rates compared to the West Coast population. Survey questions included: age, smoking history, LCS knowledge, compliance, and interest. LCS eligibility was determined based on USPSTF guidelines. Descriptive statistics were calculated for cumulative responses, as well as Student's t-tests and chi-square tests for comparing data between the two medical centers.

RESULTS

Of 1000 completed surveys, 233 (23.3%) women reported a history of smoking (25 current, 199 former, 9 undetermined). Of those with a smoking history, 12 (5.2%) met LCS criteria and 23 (9.9%) were borderline eligible or would become eligible upon turning 55 years old. Of the 35 eligible or borderline eligible women, 22 (62.9%) had never heard of LCS, and 28 (80%) expressed interest in LCS. Among eligible patients, 4 (33%) had received a screening LDCT. Among all current and former smokers, 44 (18.9%) had heard of LCS. The East Coast medical center demonstrated a significantly higher rate of current smokers and LCS eligibility. Among LCS eligible and borderline eligible patients, there was no significant difference in LCS knowledge, compliance, or interest between the two centers.

CONCLUSION

A quarter of women presenting for screening mammography had a history of smoking, 1 in 7 were eligible or borderline/soon-to-be eligible for LCS, yet the majority (62.9%) had never heard of LCS. The SM population represents a promising yet untapped opportunity to educate and screen female smokers and save lives from lung cancer.

CLINICAL RELEVANCE/APPLICATION

Given their interest in cancer screening, the approximately 30 million women per year who undergo mammography represent an important yet untapped opportunity to expand lung cancer screening.

SSCH05-02 The Impact of Social Determinants of Health on Lung Cancer Screening Utilization

Awards
Trainee Research Prize - Resident

Participants
Donghoon Shin, MD, Boston, MA (*Presenter*) Nothing to Disclose
Michael Ngo, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jeffrey Wang, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michael D. Fishman, MD, Boston, MA (*Abstract Co-Author*) Consultant, Zebra Medical Vision LtdScientific Advisory Board, Hologic, Inc

Christina A. LeBedis, MD, Newton, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

donghoon.shin@bmc.org

PURPOSE

To evaluate the association among missed lung cancer screening CT appointments and social determinants of health (SDH).

METHOD AND MATERIALS

This retrospective study was IRB approved and HIPAA compliant with informed consent waived. All lung cancer screening CT appointments scheduled at the Boston Medical Center and its affiliates between Jan 1, 2015 and Dec 31, 2018 were identified from the Electronic Medical Records (EMR). Missed vs. completed status for the appointments were obtained Radiology Information Systems. Demographics, insurance type, and SDH information were obtained from the EMR. SDH variables included housing, food, medication, transportation, and employment insecurities, difficulty arranging child/elder care, or paying for utilities, and interest in more education. Fisher's exact test was used for the evaluation of unadjusted association between the SDHs and visit status. Multivariate logistic regression was used for multivariate analyses.

RESULTS

A total of 4755 lung cancer screening CT appointments for 1365 patients were identified. Insurance payors at each appointment were 27.0% Medicare, 20.7% Medicaid, and 21.7% private or other kind of insurance. In unadjusted analysis, insurance type and housing insecurity were associated with missed appointments with statistical significance ($p < 0.0001$ and 0.014, respectively).Multivariate analysis showed that the significant association between housing and missed appointments disappeared when adjusted for the insurance type. Transportation insecurity and insurance type were significantly associated with missed appointments in multivariate analysis. The odds of missing the appointment was 47.5% higher in patients with transport insecurity ($p = 0.045$). The odds of missing the appointment was 5.68 times higher in patients with Medicaid when compared to those with private insurance ($p < 0.0001$) and 4.01 times higher when compared to those with Medicare ($p < 0.0001$). There was no significant difference between Medicare and private insurance patients.

CONCLUSION

Transportation insecurity and Medicaid insurance type were associated with missed lung cancer screening CT appointments with statistical significance.

CLINICAL RELEVANCE/APPLICATION

Identifying social determinants of health associated with missed imaging opportunities, such as lung cancer screening CT, may assist in targeted interventions that could improve healthcare utilization and positive clinical outcomes.

SSCH05-03 Cost-effectiveness of Treatment Thresholds for Subsolid Pulmonary Nodules in a Lung Cancer Screening Program

Participants
Mark M. Hammer, MD, Boston, MA (*Presenter*) Nothing to Disclose
Andrew Eckel, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Chung Yin Kong, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

mmhammer@bwh.harvard.edu

PURPOSE

To evaluate the cost-effectiveness of thresholds for treatment of subsolid pulmonary nodules in a lung cancer screening program.

METHOD AND MATERIALS

We used a previously developed simulation model informed by data from the literature to simulate patients with a ground glass nodule detected at baseline CT undergoing follow-up per American College of Radiology Lung-RADS. Nodules would grow and develop solid components over time. We varied the thresholds for Lung-RADS 4B/4X nodules, specifically the thresholds of (a) growth rate for pure ground-glass nodules (GGNs) > 30 mm and (b) solid component size within a growing part-solid nodule (PSN). For each threshold, we computed average costs and quality-adjusted life-years (QALYs) per patient and identified the incremental cost-effectiveness ratios (ICERs) of those on the efficient frontier.

RESULTS

For growing GGNs, the efficient frontier (Figure 1) included a threshold of ☐ 3 mm/year growth and a strategy of never treating such nodules; for growing PSNs, the efficient frontier included solid component size thresholds of 4 mm, 5 mm, 8 mm, and 10 mm. The strategy that was most cost-effective at a willingness-to-pay threshold of $100,000/QALY was an 8 mm threshold for PSN solid component and never treating growing GGNs, with an ICER of $67,150. These findings were stable across a range of sensitivity analyses.

CONCLUSION

Therapy for pure GGN is likely not cost effective. Increasing the threshold of treatment for PSNs to require larger solid component sizes improves cost effectiveness of a lung cancer screening program.

CLINICAL RELEVANCE/APPLICATION

Existing Lung-RADS thresholds for treating growing GGNs and PSNs may be too low and result in overtreatment of these lesions.

SSCH05-04 Management of Nodules Attached to the Costal Pleura on LDCT Lung Cancer Screening

Awards
Trainee Research Prize - Fellow

Participants
Ye Qing Zhu, New York, NY (*Presenter*) Nothing to Disclose
Rowena Yip, MPH, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Nan You, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Claudia I. Henschke, MD,PhD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
David F. Yankelevitz, MD, New York, NY (*Abstract Co-Author*) Royalties, General Electric CompanyStockholder, Accumetra, LLCAdvisory Board, GRAIL, Inc

PURPOSE

Determine the frequency of malignancy in costal juxtapleural noncalcified nodules (cP-NCN) and identify key distinguishing features of benign and malignant nodules.

METHOD AND MATERIALS

8730 participants enrolled in low-dose computed tomography (LDCT) lung cancer screening at Mount Sinai from 1992 to 2019, in which any participants with at least one noncalcified nodules (NCNs) abutting the costal pleura were included. Total 575 participants with 951 solid cP-NCNs with average diameter>=3.0mm were identified. Retrospective review documented the following features: nodule size, location, margin (smooth or non-smooth), shape (round, oval/hemisphere, geometric or other), nodule-pleura interface (broad or narrow), peri-nodular emphysema and fibrosis.

RESULTS

Of the 575 participants, most (n=351, 61.0%) had a single cP-NCN, 136 (23.7%) had 2 cP-NCNs, and 88 (15.3%) had 3 to 14 cP-NCNs. After follow-up for median 7 years, 11 cases with lung cancer in cP-NCNs were found; The average diameter was <10.0mm for 4 (36.4%), 10.0-14.9mm for 4 (36.4%), and >- 15.0 for 3 (27.3%). No lung cancer was found in solid cP-NCNs had smooth margin and oval or hemisphere shape in size group <10mm. All 4 lung cancers in baseline cP-NCNs with average diameter less than 10.0 mm were diagnosed years later (range of 1.5 to 4.9 years) and were still in stage I when diagnosed. All 4 lung cancers were diagnosed within 1 year of baseline LDCT were larger than 10.0 mm and had non-smooth margin, shape rather than round, oval/hemisphere or geometric, and had peri-nodular emphysema. Features of cP-NCN associated with a higher risk of lung cancer were nodule location (p=0.01), increasing nodule size (p<0.0001), narrow nodule-pleura attachment (p=0.02), non-smooth margin (p<0.0001), other shape (p<0.0001) and peri-nodular emphysema (p<0.0001).

CONCLUSION

On baseline LDCT, cP-NCNs with an average diameter < 10.0 mm, smooth margin and oval or hemisphere shape were significantly more likely to be benign and for them annual follow-up is recommended.

CLINICAL RELEVANCE/APPLICATION

Solid costal juxtapleural nodules with smooth margin, an oval or hemisphere shape and an average diameter less than 10 mm are significantly more likely to be benign and for them annual follow-up is recommended.

SSCH05-05 Review of Lung-RADS 4A and 4B Nodules on Lung Cancer Screening CTs at an Urban Safety-net Hospital: Is There a Role for Further Risk Stratification?

Participants
Neha Khemani, MD, Boston, MA (*Presenter*) Nothing to Disclose
Katrina Steiling, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Hristina Natcheva, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Kei Suzuki, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anuradha Rebello, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Lung Screening Reporting and Data System (Lung-RADS) estimates that the risk of cancer ranges from 5-15% for RADS 4A nodules and >15 % for RADS 4B nodules. Per guidelines, RADS 4 nodules are downgraded to RADS 2 if 3 month stability is demonstrated. This study aims to assess the long-term behavior and proportion of malignancy in Lung-RADS 4A and 4B nodules in the racially and socioeconomically diverse population of a safety-net hospital.

METHOD AND MATERIALS

Retrospective analysis was performed on patients at our institution with a Lung-RADS 4 finding from 2015 to 2019 (n=313). Lesions greater than 3 cm were excluded. Cases without pathology and/or 2-year follow up imaging were excluded. Features of the index nodule were recorded including location, size, margin, and density. Behavior of the index nodule was assessed on 3-month diagnostic CT, PET-CT scan, 1 and 2-year screening CT when available. Nodules with positive biopsy results were deemed cancerous. Nodules that demonstrated decrease in size/resolution or 2-year stability were deemed noncancerous.

RESULTS

182 scans met inclusion criteria. 109 had 4A findings and 73 had 4B findings.43/109 (39%) 4A findings resolved at 24 months follow up. All 43 nodules resolved at 3 month follow up CT. 24/109 (22%) 4A cases were subsequently diagnosed with cancer (68% had a positive PET scan) 22/73 (30%) 4B findings resolved at 24 months follow up. 20/22 (91%) 4B nodules resolved at 3 months. 43/73 (59%) 4B cases were diagnosed as cancer (79% had a positive PET scan).

CONCLUSION

Our findings suggest that the rate of lung cancer for LungRADS 4A findings is higher at our urban safety-net hospital. These findings also suggests a need to evaluate the utility of further stratifying 4A nodules into lower-risk nodules that can be downgraded to RADS 2 and safely return to screening in 12 months, and higher-risk nodules that should not be downgraded to RADS 2 despite stability on 3 month imaging. The observation that 30% of 4B findings resolved, the vast majority within 3 months, suggests that short interval follow up, rather than biopsy may be reasonable for a subset of 4B lesions.

CLINICAL RELEVANCE/APPLICATION

Further risk stratification of Lung RADS 4A and 4B nodules may increase the effectiveness of lung cancer screening and decrease

the need for invasive diagnostic testing.

SSCH05-06 Comparison of Lung-RADS v1.0 with Lung-RADS v1.1 Categories Using CT Nodules from the National Lung Screening Trial

Participants
Julia Kastner, BS, Fairfax Station, VA (*Presenter*) Nothing to Disclose
Rydhwana Hossain, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Jean Jeudy JR, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Farouk Dako, MD,MPH, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Varun Mehta, MD, Brooklyn, NY (*Abstract Co-Author*) Nothing to Disclose
Sandeep Dalal, Cambridge, MA (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Ekta N. Shah, MS, Highland Hgts, OH (*Abstract Co-Author*) Employee, Koninklijke Philips NV
Charles S. White, MD, Reisterstown, MD (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To determine the percentage of nodules that are re-classified from Category 3 and 4A to the more benign Category 2 in the updated Lung-RADS v1.1 as compared to Lung-RADS v1.0 using CT scans from the National Lung Screening Trial (NLST).

METHOD AND MATERIALS

The updated LungRADS v1.1 downgrades categorization of prevalence screening CT scans in two ways: 1) Perifissural nodules <10mm are considered category 2 (previously 3A or 4), 2) Ground glass nodules (GGN) are considered category 2 if between 20mm-<30mm (previously category 3). We randomly selected 4,408 nodules (4078 solid, 82 mixed and 248 GGN) among 2,813 patients who underwent low dose CT in the NLST. 1100 patients whose largest solid nodule was >= 6mm to < 10mm in diameter were further reviewed on the prevalence NLST CT scans to determine if they were perifissural or non-perifissural according to the de Hoop et al classification system, enabling downgrading to category 2. GGNs were assessed for size between 20mm-<30mm also enabling downgrading to category 2. This project received an IRB exemption.

RESULTS

Of the 1100 largest patient nodules that were >= 6mm to < 10mm (category 3 or 4A in LungRADS v1.0), 215 (19.5%) were reclassified as perifissural (category 2 in LungRADS v1.1) or 215/4079 (5.3%) of all solid nodule CTs. None of the reclassified perifissural nodules proved to be malignant. Of the initial 248 GGNs, 243 GGNs were categorized as category 2 and five categorized as category 3 using Lung RADS v1.0 criteria, of which 4/5 (80%) were reclassified from category 3 to category 2 using Lung-RADS v1.1, or 4/248 (1.6%) of all GGNs. One of the reclassified GGNS proved to be malignant.

CONCLUSION

In the updated LungRADS v1.1, a substantial proportion of patients with higher category nodules were reclassified downward to category 2 (solid nodules-19.5%, GGN-80%) based on prevalence CT scans from the NLST. Only one reclassified nodule proved to be malignant.

CLINICAL RELEVANCE/APPLICATION

The use of the updated Lung-RADS v1.1 reclassifies downward a substantial percentage of nodules from category 3 and 4a to category 2, which will lead to less frequent follow-up CT (at one year, equivalent to a negative low dose CT) and work-up.

SSER02

Science Session with Keynote: Emergency Radiology (Trauma - Head, Spine and Extremities)

Monday, Nov. 30 2:00PM - 3:00PM Room: Channel 5

CT ER MK MR NR HN LM PR SQ

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSER02-01 Emergency Radiology Keynote Speaker: Role of Radiologist in Detecting Intimate Partner Violence

Participants
Bharti Khurana, MD, Brookline, MA (*Presenter*) Research Consultant, General Electric CompanyEditor, Wolters Kluwer nvAuthor, Cambridge University Press

SSER02-02 Recognizing Intimate Partner Violence: Defensive Ulnar Fractures

Participants
David Sing, MD, Boston, MA (*Presenter*) Nothing to Disclose
Rahul B. Gujrathi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Steven E. Seltzer, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Steven E. Seltzer, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Giles W. Boland, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
George Dyer, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mitchell A. Harris, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Paul Tornetta, Boston, MA (*Abstract Co-Author*) Editorial Advisory Board, Wolters Kluwer nv; Royalties, Wolters Kluwer nv; Royalties, Smith & Nephew plc
Bharti Khurana, MD, Brookline, MA (*Abstract Co-Author*) Research Consultant, General Electric CompanyEditor, Wolters Kluwer nvAuthor, Cambridge University Press

For information about this presentation, contact:

BKHURANA@bwh.harvard.edu

PURPOSE

The purpose of this study is to characterize the imaging pattern of in isolated ulnar fractures or "nightstick" fractures in victims of intimate partner violence (IPV)

METHOD AND MATERIALS

Electronic medical records from 6 hospitals were queried to identify a cohort of female patients age 18-50 sustaining isolated ulnar fractures from 2005-2019. Radiographs were reviewed for fracture location, comminution, displacement, and associated injuries. Demographic data, known IPV risk factors, and whether IPV screening was performed were also collected. Patients were stratified into four groups based on self-reporting and/or injury documentation as reported by EMS: confirmed IPV, suspected IPV, suspected unrelated to IPV, and confirmed unrelated to IPV.

RESULTS

62 patients avg age 31±9 were identified (IPV: 11 confirmed, 9 suspected, 8 suspected unrelated, 34 confirmed unrelated). Patient language, race, ZIP code, wealth index, marital status, religion, alcohol/IV drug abuse, and psychiatric historywere not associated with IPV with or without suspected cases. Comparative analysis with and without suspected cases demonstrated IPV to be associated with minimally displaced fractures (95% vs 43%; p <0.001 and 91% vs 44%; p=0.012). Confirmed cases were also associated with homelessness (46% vs 0%; p<0.001), and number of documented ED visits attributable to musculoskeletal injury (avg 4.4 ±3.7 vs 0.9 ±0.4; p<0.001). Formal documentation of IPV evaluation or screening was completed in only 40.0% of confirmed/suspected IPV patients and in 14.3% of confirmed/suspected unrelated to IPV patients.

CONCLUSION

Up to one-third of adult women sustaining isolated ulnar fractures were potentially caused by IPV, yet screening for IPV was insituted in only 40% of suspected and confirmed cases. Radiologists should raise a suspicion of IPV especially with a non dispalced isolated ulnar fracture.

CLINICAL RELEVANCE/APPLICATION

Isolated ulnar fracture in a woman, especially non displaced, should prompt the radiologist to raise a concern for IPV.

SSER02-03 When Does a Facial Gunshot Wound Become Fatal?

Awards
Trainee Research Prize - Fellow

Participants
Mustafa B. Chaudhry, MBBS, Karachi, Pakistan (*Presenter*) Nothing to Disclose
Kumail Khandwala, MBBS, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose
Raza Sayani, FRCR, Karachi, Pakistan (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

mustafa.b.chaudhry@gmail.com

PURPOSE

Isolated facial gunshot wounds(FGW) are rare & has complex course of injuries and outcomes. Our purpose is to ascertain factors, including bullet type(BT), bullet orientation(BO), firing range(FR), facial zone(FZ), facial injuries(FI) and intracranial injuries(ICI), resulting in higher mortality

METHOD AND MATERIALS

Retrospective analysis of CT scans, medical & legal records of adult patients who suffered isolated FGW, from 01/2008-12/2018, was done. Patients with gunshot to head, neck, torso or multiple FGW were excluded. Patients were divided into two groups; alive(AD) & dead at discharge(DD). BT was divided into handgun, rifle & shotgun; BO in 4 planes y-axis, x-axis, z-axis & oblique planes; FR into near, intermediate & distant; FZ into mid-face(MFZ) & peripheral face(PFZ); FI into fractures[simple facial, mandibular & complex (SFF, MFF, CFF)], & paranasal sinus, tongue, palatal, pharangeal & eye injuries (PNSI, TI, PLI, PHI, EI); ICI into hematomas [EDH,SDH,IPH], midline shift(MLS), cerebral edema, vault(SVF) & base(SBF) fractures

RESULTS

Total 81 patients were included, mean age was 33.8±13 years with 76 being males. 17 patients were in DD and 64 in AD groups. Significant proportion of patients in DD group suffered; close-intermediate FR FGW [DD vs AD: 14(82%) vs 30(47%) p-value 0.02], with handgun [13(76%) vs 34(53%) p-value 0.05], BO in z-axis [7(41%) vs 9(14%) p-value 0.04], in front of face(FF) [13(77%) vs 27(42%) p-value 0.01], in MFZ [11(65%) vs 17(26%) p-value 0.005], & larger bullet size [(9.3±4.2) vs (6.9±3.6) p-value 0.02]. DD endured significantly higher ICI [17(100%) vs 10(16%) p-value <0.0005](including SBF, SVF, EDH, IPH, CE, MLS), and FI including EI [11(65%)p-value 0.005], PNSI [17(100%)p-value 0.002], SFF [17(100%)p-value 0.01]. AD group suffered more TI[24(40%)p-value 0.009] and MFF[42(65%)p-value 0.002]. Age of patient, gender; FI(PLI, PHI, CFF), number of bullet fragments, and sizes of EDH/IPH were not significantly associated between groups. Due to small sample size, on multivariate analysis, no significant association was noted

CONCLUSION

FGW to FF,in MFZ, in z-axis,by handgun, with close-intermediate FR,cause significantly higher ICI, FI & are more fatal. Studies with larger sample size are needed to establish independent causes resulting in higher mortality

CLINICAL RELEVANCE/APPLICATION

To assist surgeons and radiologist to act timely to save a life and predict chances of survival in patients with FGW

SSER02-04 Upper Extremity Injuries in the Victims of Intimate Partner Violence

Participants
Richard Thomas, MBBS, MD, Burlington, MA (*Presenter*) Nothing to Disclose
Babina Gosangi, MBBS,MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Rahul B. Gujrathi, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Hyesun Park, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Najmo Hassan, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Kathryn Rexrode, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
George Dyer, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Mitchel B. Harris, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Steven Seltzer, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Giles W. Boland, MD, Wellesley, MA (*Abstract Co-Author*) Nothing to Disclose
Paul Tornetta, Boston, MA (*Abstract Co-Author*) Editorial Advisory Board, Wolters Kluwer nv; Royalties, Wolters Kluwer nv; Royalties, Smith & Nephew plc
Bharti Khurana, MD, Brookline, MA (*Abstract Co-Author*) Research Consultant, General Electric CompanyEditor, Wolters Kluwer nvAuthor, Cambridge University Press

For information about this presentation, contact:

rthomas16@bwh.harvard.edu

PURPOSE

To demonstrate the characteristic imaging patterns of upper extremity (UE) injuries in intimate partner violence (IPV).

METHOD AND MATERIALS

Radiological review of 308 consecutive patients who reported physical IPV in our institution's violence prevention support program from January 2013 to June 2018 identified 55 patients with 88 unique upper extremity injuries. The electronic health record and radiology reports were analyzed to understand the patterns and associations of injuries. Demographic data were also collected.

RESULTS

The cohort included 49 females and 6 males (19-63; mean age 38) with 22 white (40%), 20 African American (36%) and 13 other race (24%) individuals. At the time of the injury, IPV was documented as a mechanism of injury for only 14/88 injuries (16%) and IPV screening was documented in only 22/88 injuries (25%).The hand was the most common site of injury and was involved in 34/55 (62%) patients and in 54/88 injuries (28 fractures, 5 dislocation/subluxation, 21 soft tissue injuries). Of 88 injuries, 50 were on the right side (57%). Phalangeal fractures constituted 46% of all UE fractures (21/46) with distal phalanx being the most common (9/46). Among hand fractures, the 5th digit was the most commonly involved digit (8/28) followed by the 1st digit (7/28). Medial hand fractures (5th, 4th digit) constituted 43% of hand fractures (12/28). 9 patients had concomitant injuries, with the most common being injuries of the head and neck region (8/9). Five patients had synchronous facial and hand injuries. 26 patients had a subsequent injury, of which the most common was another UE injury (12/26). Of the 12 patients with recurrent UE injuries, 7 had recurrent hand injuries. Of these, the majority had at least one recurrent injury of the same side (6/7). 4 of 5 chronic injuries (80%) were of the hand.

CONCLUSION

Hand injuries are the most common type of UE injuries in patients with IPV, with phalanx being the most common site of fracture and medial hand the most common region of fracture. Repeated injuries involving the same site in the hand could represent IPV.

CLINICAL RELEVANCE/APPLICATION

Awareness of the characteristic patterns of UE injuries in IPV is essential for early identification of domestic abuse and to facilitate appropriate timely intervention.

SSER02-05 Imaging the Tight Orbit: Radiologic Manifestations of a Vision-threatening Emergency

Participants
Christoph Maier, MD, Berlin, Germany (*Presenter*) Nothing to Disclose
Jan O. Voss, MD,DMD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Benedicta Beck-Broichsitter, MD,DMD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Kilian Kreutzer, MD,DMD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Nadine Thieme, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

christoph.maier@charite.de

PURPOSE

Orbital compartment syndrome occurs when a rapidly expanding pathology (most commonly hematoma) causes a sudden rise in intraorbital pressure. Patients are acutely at risk for optic nerve injury secondary to pressure damage or concomitant vascular compromise. Urgent surgical decompression is paramount to avoid vision loss. While patient management is usually guided by the syndrome of the "tight orbit" (firm globe, vision deficit and impaired ocular motility), clinical assessment may be limited in unconscious, polytraumatized or pediatric patients. Therefore, we sought to evaluate radiological signs of the orbital compartment syndrome.

METHOD AND MATERIALS

CT images of consecutive patients with clinically proven orbital compartment syndrome from two academic level 1 trauma centers (timeframe 2012-2017) were analyzed retrospectively. Proptosis, optic nerve length and posterior globe angle were manually measured, each patient's unaffected orbit served as an intra-individual control.To correct for globe displacement and motility disorders commonly seen in our patient collective, each measurement was obtained in a plane reformatted obliquely to the respective anatomy. Active bleeding was visually assessed.Data is reported as mean±SD and the paired t-test was used to test for statistical significance.

RESULTS

A total of 26 patients were diagnosed with orbital compartment syndrome (10 male, 16 female, age 64,2±24,9). Most cases were due to traumatic hematoma and active bleeding was observed in 5 out of 11 patients examined with CECT. 24 patients underwent urgent surgical decompression. CT imaging was available for quantification in 21 cases (no imaging: n=3; significant bilateral pathology: n=2). We observed marked proptosis and stretching of the optic nerve in the affected orbit (24.2±3.5 mm vs 17.4±3.3 mm and 31.6±3.1 vs 25.6±3.2, respectively; $p < 0.01$) as well as tenting of the posterior globe (posterior angle 123±17 vs 146±7 °; $p < 0.01$).

CONCLUSION

In the largest patient collective reported to date, we show that the orbital compartment syndrome is characterized by marked proptosis, stretching of the optic nerve and tenting of the posterior globe.

CLINICAL RELEVANCE/APPLICATION

The radiologic phentotype of the 'tight orbit' enables radiologists to alert clinicians to this vision-threatening emergency, particularly in patients where clinical assessment is limited.

SSER02-06 Supplementary MRI for Exclusion of Ligamentous Injuries in Trauma Patients with Detected Asymmetry of the Lateral Atlanto-dental Interval on Initial CT Examination: A Diagnostic Benefit?

Participants
Christoph H. Endler, MD, Bonn, Germany (*Presenter*) Nothing to Disclose
Daniel Ginzburg, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Anton Faron, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Alexander Isaak, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Patrick A. Kupczyk, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Claus C. Pieper, MD, Bonn, Germany (*Abstract Co-Author*) Grant, Guerbet SA; Speakers Bureau, Guerbet SA; Speakers Bureau, Bayer AG; Speakers Bureau, Koninklijke Philips NV; ; ;
Daniel Kuetting, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Ulrike I. Attenberger, MD, Mannheim, Germany (*Abstract Co-Author*) Research Consultant, Bayer AG
Julian A. Luetkens, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

christoph.endler@ukbonn.de

PURPOSE

To rule out cervical spine injuries (CSI), cervical spine CT (CSCT) is regularly applied for the initial evaluation of trauma patients. Patients with detected asymmetry of the lateral atlanto-dental interval (LADI) often undergo a supplementary MRI to rule out ligamentous injuries. We aimed to investigate the additional benefit of cervical spine MRI in trauma patients with LADI asymmetry and lack of other proven cervical injuries.

METHOD AND MATERIALS

In this retrospective study all trauma patients were included that have undergone a CSCT in the emergency room between 03/2017 and 08/2019. All patients with LADI asymmetry without other signs of cervical injury that underwent a supplementary cervical spine MRI were identified. These MRI examinations were re-evaluated by experienced (with >8 years of experience in trauma imaging), blinded readers regarding possible ligamentous injuries.

RESULTS

146 out of 1553 patients (9.4%) presented a LADI asymmetry on initial CT examination. Out of these, 46 patients without other signs of cervical injuries received an additional MRI with LADI asymmetry as the only indication. On initial examination, 9/46 patients (19.6%) had cervical tenderness on palpation; 37/46 (80.4%) were asymptomatic. The mean LADI asymmetry was 2.54±1.33 mm. Based on MRI, ligamentous injuries could be detected in only 2/46 (4.4%) patients; each with a LADI asymmetry >3mm and cervical tenderness on palpation. Patients received treatment for ligamentous injury. Signal alterations of the alar ligaments without ruptures could be observed in 13/46 (28.3%) patients, leading to consequence of treatment regimen in 4 patients, although they were asymptomatic.

CONCLUSION

In trauma patients with LADI asymmetry on CSCT, an additional MRI to exclude ligamentous injuries is only reasonable in symptomatic patients. The additional diagnostic value in clinically asymptomatic patients without any other proven cervical injuries is low and possibly can lead to overtreatment. The results of this study may help to reduce the tremendous amount of additional MRI examinations in ruling out CSI and to reduce unnecessary treatment and overall treatment costs.

CLINICAL RELEVANCE/APPLICATION

In trauma patients sole LADI asymmetry can be due to normal variants, incorrect positioning and ligamentous injuries, which can lead to diagnostic difficulties on initial CSCT. Additional MRI might only be indicated in symptomatic patients.

Printed on: 05/05/21

SSGI03

Gastrointestinal (Artificial Intelligence Liver)

Monday, Nov. 30 3:30PM - 4:30PM Room: Channel 4

CT GI MR US OI AI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSGI03-01 Establishing Volume Thresholds for Hepatomegaly at CT Using an Automated Artificial Intelligence (AI)-based Tool

Participants
Victoria Noe-Kim, MS, BS, Madison, WI (*Presenter*) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (*Abstract Co-Author*) Grant, Koninklijke Philips NVGrant, Johnson & JohnsonSpouse, Consultant, Farcast Biosciences
Peter Graffy, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Ryan Zea, MS, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Ronald M. Summers, MD,PhD, Bethesda, MD (*Abstract Co-Author*) Royalties, iCAD, IncRoyalties, Koninklijke Philips NVRoyalties, ScanMed, LLCResearch support, NVIDIA Corporation
Perry J. Pickhardt, MD, Madison, WI (*Abstract Co-Author*) Stockholder, SHINE Medical Technologies, Inc; Stockholder, Elucent Medical; Advisor, Bracco Group; Advisor, Zebra Medical Vision Ltd;

For information about this presentation, contact:

mlubner@uwhealth.org

PURPOSE

To utilize and evaluate a novel artificial intelligence (AI)-based method that derives hepatic volume at CT in a fully-automated manner to establish thresholds for hepatomegaly.

METHOD AND MATERIALS

Hepatic volumes were extracted in 3068 asymptomatic healthy adults (mean age, 45.3 years; 1641 women) who underwent MDCT (1106 with IV contrast, 1962 without) using an automated, AI-based tool. Manual liver volumes and linear craniocaudal measurement were also obtained from a subset of 189 patients. Additional demographic information (height/weight/BMI/BSA) was collected to identify factors that impact hepatic size.

RESULTS

Mean automated liver volume was 1500.2±337.5 ml in the pooled cohort, demonstrating a normal distribution. Therefore, the upper limit of normal (ULN) for hepatomegaly was set at two standard deviations above the mean (=2175.2 ml). For the 189 cases with manual comparison, the mean hepatic volume difference was 2.81%. Linear measures using a threshold of 20 cm tended to overestimate hepatomegaly (based on volume definition), whereas a threshold of 22 cm tended to underestimate. Hepatic volume was significantly impacted by age, height, BMI, and BSA. A weighted equation showed weight as the dominant factor ((Liver Vol = 78.3(BSA) - 122.5(Height) + 413.3(Weight) - 203.8(BMI) - 106.2(Age) - 5.6(Gender)). A simple nomogram using 3 weight categories was created. For wt <= 82.55kg, ULN for post-contrast hepatic volume was 1728.5 ml; for wt between 82.55 and 100.1 kg, ULN was 2078.8 ml; and for wt >100.1 kg, ULN was 2748.1 ml. The impact of IV contrast administration on hepatic volume was small (3.7%); no correction was felt needed.

CONCLUSION

A novel AI-based method reliably measured hepatic volumes in a high-throughput, fully-automated manner, closely matching manual methods. Patient weight most strongly impacted liver volume, allowing for creation of a simple nomogram for determining volume-based thresholds for hepatomegaly.

CLINICAL RELEVANCE/APPLICATION

Assessment for hepatomegaly is difficult. Imaging-based diagnosis is not well established and currently utilizes unidimensional measures. This AI tool allows for totally automated assessment of hepatic volume which taken in combination with the proposed nomogram makes this more robust measure feasible for clinical practice.

SSGI03-03 Automated Estimation of Sonographic Hepatorenal Index for Hepatic Steatosis Diagnosis

Awards
Trainee Research Prize - Fellow

Participants
Shuhang Wang, Boston, MA (*Presenter*) Nothing to Disclose
Szuyeu Hu, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Xiaohong Wang, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Lei Chen, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Jingchao Wang, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

Masoud Baikpour, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Arinc Ozturk, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Qian Li, MD, Malden, MA (*Abstract Co-Author*) Nothing to Disclose
Theodore T. Pierce, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Yelena Tsymbalenko, Wauwatosa, WI (*Abstract Co-Author*) Nothing to Disclose
Paul O'Dea, Wauwatosa, WI (*Abstract Co-Author*) Nothing to Disclose
Michael Washburn, MS, Wauwatosa, WI (*Abstract Co-Author*) Nothing to Disclose
Viksit Kumar, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anthony E. Samir, MD, Boston, MA (*Abstract Co-Author*) Consultant, Pfizer IncConsultant, General Electric CompanyConsultant, PAREXEL International CorporationResearch Grant, Koninklijke Philips NVResearch Grant, Siemens AGResearch Grant, Canon Medical Systems CorporationResearch Grant, General Electric CompanyResearch Grant, Samsung Electronics Co, LtdResearch Grant, Analogic CorporationResearch support, SuperSonic ImagineResearch support, Hitachi, LtdResearch contract, Koninklijke Philips NV

For information about this presentation, contact:

swang38@mgh.harvard.edu

PURPOSE

To develop an auto-estimation method of the hepatorenal index (HRI) from ultrasound (US) images to be used for the diagnosis and quantification of liver steatosis.

METHOD AND MATERIALS

A retrospective cohort of 1315 patients referred for US-guided liver biopsy was identified (2011-2018). For each patient, a B-mode US image of Morrison's pouch view (MPV) containing liver and right kidney with minimal shadowing artifacts (SA) was selected. 57 cases were excluded due to unqualified MPV (n=36) or SA (n=21). 1258 qualified images were divided into training (n=1166) and test (n=92) sets. The test set included 47 patients without steatosis (S0) and 45 patients with steatosis (S1-S3). A radiologist manually annotated the liver and renal cortex as ground truth. A three-step method was developed to automatically estimate HRI. 1) The liver and renal cortex boundaries were segmented by a deep learning model trained on our dataset. 2) Invalid pixels were excluded by a custom rule-based algorithm identifying hepatorenal ducts, vessels, masses, and cysts. 3) Circular regions of interest (ROI) were automatically placed in the densest area of valid renal cortical pixels and the nearby liver at the same depth. HRI is the ratio of liver to kidney mean ROI pixel value. For comparison, a radiologist manually estimated HRI. Receiver operating characteristic curves (ROCs) were plotted to compare manual and automated HRI prediction of histologic steatosis.

RESULTS

The manually/automatically calculated HRI (mean±std) was 0.99±0.28/1.01±0.33 for S0 and 1.24±0.36/1.49±0.87 for S1-S3. For steatosis diagnosis, the manual/auto-method obtained the best accuracy of 0.70/0.82 at the HRI threshold of 1.26/1.22. The areas under ROC for the physician and auto-method were 0.71 (95% CI: 0.60-0.80) and 0.81 (95% CI: 0.71-0.88), with significant difference (p=0.04).

CONCLUSION

A custom algorithm capable of automatically calculating HRI was developed, which better predicts hepatic steatosis than manual measurements. The algorithm can be easily translated into clinic care to optimize the diagnostic capability of US for hepatic steatosis.

CLINICAL RELEVANCE/APPLICATION

Automated HRI calculation enables accurate, reproducible, and reliable diagnosis of hepatic steatosis to allow early intervention and management optimization of patients with fatty liver disease.

SSGI03-04 End-to-end Liver Lesion Detection and Classification on Computed Tomography Scans Using Densely-connected Convolution Network-based Deep Learning Model

Participants
Wan Hang K. Chiu, MBBCh, FRCR, Hong Kong, Hong Kong (*Presenter*) Nothing to Disclose
Philip L. Yu, PhD,BSC, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Wenming Cao, PhD, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Ho Ming Cheng, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Alistair Yap, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Wai Keung Li, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Man-Fung Yuen, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose
Wai-Kay Seto, Hong Kong, Hong Kong (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

kwhchiu@hku.hk

PURPOSE

Hepatocellular Carcinoma (HCC) is the fourth most common cancer worldwide accounting for 850,000 deaths annually. Cross-sectional imaging plays a crucial role in the detection and diagnosis of HCC although more than 40% of HCC demonstrate atypical enhancement pattern resulting in additional investigations and delay in treatment. In recent years, convoluted neural networks (CNN) has been successfully applied in many computer vision tasks including in radiological imaging and in this study, we applied the state-of-the-art CNN architecture in detecting and classifying liver lesions on computed tomography (CT) scans.

METHOD AND MATERIALS

Multi-phase abdominal CT of 899 patients were curated from 2 hospitals (571 and 328 scans with 842 and 658 lesions >1 cm respectively). Each lesion was manually contoured and labelled with ground-truths based on histology or clinical/radiological follow-up. All lesions were also categorized based on LI-RADS classification, with diagnosis validated by a clinical composite reference standard based on patients' outcome over the subsequent 12 months. A densely-CNN consisting of five dense blocks, each containing 64 convolutional layers, followed by a fully-connected layer with softmax as the activation function for classification. (Figure 1a).

RESULTS

The mean age of the cohort was 63.5 years, 74.1% male. It was split into 7:3 as the training (629 cases) and testing (270 cases) sets with the latter consisting of 75 (27.8%) HCC. After optimizing for over 115 million parameters, our model achieved 97% accuracy, 92% PPV, 99% NPV, 97% sensitivity and 97% specificity on binary classification for HCC, compared to 86% accuracy, 87% PPV, 86% NPV, 85% sensitivity and 88% specificity for diagnosis via LI-RADS. Heat maps are also generated and superimposed on original images based on the model's predictions of likelihood of the location of the lesions (Figure 1b).

CONCLUSION

Our interim results have demonstrated high diagnostic accuracy of the densely-CNN in detecting and classifying liver lesions. Our Deep Learning model has the potential to improve the diagnostic capabilities for HCC and prevent delays in treatment.

CLINICAL RELEVANCE/APPLICATION

Deep learning can be applied to accurately detect and evaluate focal liver lesions on Computed Tomography and has the potential to improve the diagnostic capabilities for HCC, prevent delays in treatment and improve patient outcomes.

SSGI03-05 Identification of Liver Cirrhosis on Standard T2-weighted MRI Images Using Deep Transfer Learning

Participants
Narine Mesropyan, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Sebastian Nowak, Bonn, Germany (*Presenter*) Nothing to Disclose
Anton Faron, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Maike Theis, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Wolfgang Block, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Martin Reuter, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Ulrike I. Attenberger, MD, Mannheim, Germany (*Abstract Co-Author*) Research Consultant, Bayer AG
Julian A. Luetkens, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Alois Martin Sprinkart, MSc, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

narine.mesropyan@ukbonn.de

PURPOSE

Several morphologic imaging criteria have been described for the diagnosis of liver cirrhosis. However, most of these findings are subjective, prone to interobserver variability, and overall, limited in sensitivity and specificity. We aimed to investigate the capabilities of a Deep Learning (DL) pipeline utilizing transfer learning to identify liver cirrhosis on standard T2-weighted (T2-w) magnetic resonance imaging (MRI). The diagnostic performance was compared against radiologists with different levels of experience.

METHOD AND MATERIALS

This retrospective clinical study included 713 (343 female) patients who underwent liver MRI between 2017-2019. Based on clinical and histopathological parameters, 553 patients had cirrhosis of any stage. 160 patients did not have liver disease. For DL analysis, radially acquired motion corrected T2-w MRI slices at the level of the lobus caudatus were exported. Data were randomly split into training, validation and test sets (70%/15%/15%). The DL pipeline consisted of three steps: i) liver segmentation using a multi-stream convolutional neural network (CNN); ii) post-processing, image cropping, interpolation and normalization; iii) image classification with the ResNet18 CNN pre-trained on the ImageNet dataset, fine-tuned with the one cycle learning rate policy. Validation and test data were also classified by two radiology residents (1st and 4th year) and a board certified radiologist with 8 years of experience in abdominal imaging. Differences in accuracy of the DL based classification and the readers were assessed by χ^2-test.

RESULTS

Accuracy of segmentation was 0.99 for validation (vACC) and test data (tACC). The accuracy of the DL based classification of cirrhosis (vACC 0.96, tACC 0.95) was higher compared to the radiological residents' (1st year: vACC 0.68, $p<0.01$; tACC 0.72, $p<0.01$; 5th year: vACC 0.88, $p<0.01$; tACC 0.91, $p<0.07$) and equal or higher compared to the experienced radiologist's (vACC 0.96; tACC 0.90, $p<0.03$).

CONCLUSION

The DL pipeline for image-based diagnosis of liver cirrhosis exhibited an expert-level classification and therefore could assist radiologists in diagnosis of liver cirrhosis, leading to a higher accuracy of the reading performance.

CLINICAL RELEVANCE/APPLICATION

A Deep Learning pipeline using transfer learning can accurately identify liver cirrhosis on standard T2-w MR images.

SSGI04

Science Session with Keynote: Gastrointestinal (Artificial Intelligence General Applications)

Wednesday, Dec. 2 8:30AM - 9:30AM Room: Channel 4

CT GI MR OT OI BQ

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSGI04-01 Gastrointestinal Keynote Speaker: Practical Artificial Intelligence for the Abdominal Radiologist

Participants
Andrew D. Smith, MD, PhD, Birmingham, AL (*Presenter*) CEO, AI Metrics LLC Owner, AI Metrics LLC CEO, Radiostics LLCOwner, Radiostics LLCCEO, Liver Nodularity LLC Owner, Liver Nodularity LLC Research Grant, General Electric CompanySpeaker, Canon Medical Systems CorporationSpeaker, AlgoMedica, Inc

SSGI04-02 Diagnostic Performance of a Deep Learning Image Reconstruction for Low-Contrast Detectability: Potential for Radiation Dose Reduction in a Multireader Study

Participants
Peijie Lyu, MD, Zhengzhou, China (*Presenter*) Research Grant, General Electric Company
Justin B. Solomon, PhD, Durham, NC (*Abstract Co-Author*) License agreement, Sun Nuclear Corporation;
Carolyn R. Lowry, BS, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric CompanyResearch Grant, Siemens AGAdvisory Board, medInt Holdings, LLCLicense agreement, 12 Sigma TechnologiesLicense agreement, Gammex, Inc
Yuqin Ding, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Francesca Rigiroli, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Fides Schwartz, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Jered R. Wells, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Brian Thomsen, MSc, Waukesha, WI (*Abstract Co-Author*) Employee, General Electric Company
Daniele Marin, MD, Cary, NC (*Abstract Co-Author*) Research support, General Electric Company

For information about this presentation, contact:

lvpeijie2@163.com;PEIJIE.LYU@duke.edu

PURPOSE

To assess the effect of radiation dose reduction on low-contrast detectability by using a deep learning image reconstruction (DLIR) algorithm (TrueFidelity, GE Healthcare) in a contrast-detail phantom as compared with filtered back projection(FBP) and hybrid model-based adaptive statistical iterative reconstruction(ASiR-V).

METHOD AND MATERIALS

This institutional review board-approved study included 40 nonconsecutive patients (mean age, 55 years ± 18 [standard deviation]; mean weight, 78 kg ±15) who underwent routine liver CT examinations. A proprietary low-contrast phantom consisting of low-contrast cylindrical objects was scanned at five dose index levels (1, 2, 3, 6, and 10 mGy) which were chosen to obtain images with noise levels comparable to the typical clinical images, given the phantom size. Image data sets from the human and phantom were reconstructed at section thickness of 2.5mm using three different reconstruction algorithms (FBP, ASiR-V 60%, DLIR with a strength level of medium). Subjective noise magnitude, noise texture, spatial resolution and diagnostic confidence of liver CT images were assessed. Next, twelve readers (five radiologists, seven medical physicists) assessed all data sets by measuring the detection accuracy using a two-alternative forced-choice perception approach(five contrast levels [range, 5-20 HU]and two sizes [4,6 mm]). The dose reduction potential of DLIR was estimated using a generalized linear mixed-effects statistical model.

RESULTS

Compared with FBP and ASiR-V 60%, DLIR medium showed lower noise magnitude, higher noise texture, and spatial resolution, yielding better diagnostic confidence of liver CT images. Compared to FBP, both ASiR-V 60% and DLIR medium showed better lesion detection rate (improved by 4%, both P <.001) but identical between one another, which translated into an estimated radiation dose reduction potential (±95% confidence interval) of 31±25%.

CONCLUSION

DLIR medium increased detectability at a given radiation dose (approximately 4% increase in detection accuracy) allowing for reducing the radiation dose of 31% ± 25 as compared to FBP, while improving readers' perception of overall image quality than FBP and ASiR-V 60%.

CLINICAL RELEVANCE/APPLICATION

The use of the DLIR algorithm might maintain or improve the low-contrast detection performance at a low radiation dose level without compromising the subjective abdominal image quality.

SSGI04-03 Radiation Dose Reduction at Abdominal Ultra-high-resolution CT with Deep Learning Reconstruction

Participants
Keigo Narita, Hiroshima, Japan (*Presenter*) Nothing to Disclose

Yuko Nakamura, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Toru Higaki, PhD, Minami-ku, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Motonori Akagi, MD, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose
Yukiko Honda, MD, Kure, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuo Awai, MD, Hiroshima, Japan (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation; Research Grant, Hitachi, Ltd; Research Grant, Fujitsu Limited; Research Grant, Eisai Co, Ltd; Research Grant, Nemoto Kyorindo co., Ltd; Research Grant, Fuji Pharma Co, Ltd;
Makoto Iida, Hiroshima, Japan (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Ultra-high-resolution computed tomography (U-HRCT) scanners yield images of increased spatial resolution although on smaller detectors, higher radiation doses are required for sufficient incident photons. Deep learning reconstruction (DLR) introduces deep convolutional neural networks trained on teaching datasets of higher-dose CT images reconstructed with model-based iterative reconstruction (MBIR) into the reconstruction flow. In efforts to reduce the radiation dose we evaluated the effect of DLR on abdominal U-HRCT images.

METHOD AND MATERIALS

We evaluated 74 patients subjected to hepatic dynamic CT acquired by U-HRCT: 37 were scanned with standard- (group A) and 37 with 70% of the standard dose (group B). Hepatic arterial- (HAP) and equilibrium phase (EP) images were reconstructed with hybrid-IR, MBIR, and DLR. A radiologist recorded the standard deviation of attenuation in the paraspinal muscle as the image noise. The overall image quality was assessed by two other radiologists using a 5-point confidence scale ranging from 1 (unacceptable) to 5 (excellent). Non-inferiority was defined using a prespecified non-inferiority margin in which the upper limit of the 95% confidence interval (CI) did not exceed 2.0 for the image noise and in which the lower limit of the 95% CI was lower than -1 for the overall image quality.

RESULTS

On DLR- (95% CI: -0.97 - 1.71) but not on hybrid-IR- (95% CI: 2.32 - 5.60) and MBIR images (95% CI: -0.62 - 3.21), the criterion for the non-inferiority of the image noise in the HAP was met. In the EP, the image noise on DLR- and MBIR images of group B was not inferior to group A (95% CI: DLR, 0.59 - 1.86; MBIR, -1.13 - 1.85). However, on hybrid-IR images it was inferior in group B (95% CI: 2.75 - 5.64). The quality score of DLR images acquired in the HAP of group B (95% CI: -0.74 - 0.18) and in the EP (95% CI: -0.85 - 0.16) was not inferior to group A. However, on hybrid-IR- and MBIR images of the HAP it was inferior in group B (95% CI: hybrid-IR, -1.47 - -0.44; MBIR, -1.82 - -0.60). The same was true for EP images (95% CI: hybrid-IR, -1.67 - -0.59; MBIR, -3.32 - -1.03).

CONCLUSION

DLR preserved the quality of abdominal U-HRCT images even when scanned with a reduced radiation dose.

CLINICAL RELEVANCE/APPLICATION

DLR yielded similar image quality of abdominal U-HRCT irrespective of the radiation dose, suggesting that DLR is essential for radiation dose reduction in abdominal U-HRCT.

SSGI04-04 Automated Segmentation and Worklist Prioritization of Pneumoperitoneum in Abdominal CT Images Using a Convolutional Neural Network

Participants
Robert J. Harris, PhD, Eden Prairie, MN (*Presenter*) Employee, Virtual Radiologic Corporation

For information about this presentation, contact:

robert.harris@vrad.com

PURPOSE

Pneumoperitoneum, the presence of free gas in the peritoneal cavity, can be a sign of critical pathology such as bowel perforation or trauma. Pneumoperitoneum is often diagnosed with abdominal CT and early detection is important to a patient's outcome. Our institution processes approximately 3,300 abdominal CT studies per day, of which 1.3% are positive for pneumoperitoneum. We hypothesized that a convolutional neural network could be trained to detect pneumoperitoneum in prospective patients in order to expedite patient care.

METHOD AND MATERIALS

Natural language processing (NLP) of radiology CT reports was used retrospectively to identify 297 body CT studies containing pneumoperitoneum. Axial CT images of these studies were annotated by a Board Certified radiologist to train a convolutional neural network. The training dataset consisted of 2,986 positive images and their segmentations, along with an equal number of negative images. A uNet model was trained using ResNet32 as the backbone. The model was first applied to a test cohort of 100 patients. This model was then integrated with our teleradiology pipeline to screen prospective patients for pneumoperitoneum in real-time, with NLP of the subsequent radiology report used as ground truth.

RESULTS

The model achieved an AUC of 0.906 on the test dataset. A detection threshold of 3 cc pneumoperitoneum was selected. Over a two-week period, for prospective patients, the model had a sensitivity of 50.1% and a specificity of 94.7%. The mean volume of pneumoperitoneum was 37.4 cc for true positives with a maximum of 413.5 cc.

CONCLUSION

An artificial intelligence model was trained to quantify pneumoperitoneum on CT images and implemented in a real-time clinical system. To our knowledge, this is the first use of machine learning to identify pneumoperitoneum on CT images and perform worklist prioritization for patients based on its presence. This model is currently being expanded to identify additional types of free air such as pneumothorax, pneumomediastinum, and soft tissue gas.

CLINICAL RELEVANCE/APPLICATION

Pneumoperitoneum is often an indicator of critical pathology and an artificial intelligence model can provide real-time detection of this condition on CT to save patients valuable time between scanning and treatment.

SSGI04-05 Mri-Based Radiomics Nomogram to Predict Synchronous Liver Metastasis in Primary Rectal Cancer Patients

Participants
Fu Shen, Shanghai, China (*Presenter*) Nothing to Disclose
Minglu Liu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jianping Lu, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Yuwei Xia, MEd,MEd, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

ssff_53@163.com

PURPOSE

To investigate the value of MRI-based radiomics nomogram in prediction of synchronous liver metastasis (SLM) in patients with primary rectal cancer.

METHOD AND MATERIALS

A total of 127 patients with rectal cancer were enrolled and underwent rectal MRI in our hospital on a 3T scanner. Radiomics features were extracted from oblique axial high resolution T2WI images of the entire primary tumor. Computer-generated random numbers were used to assign 80% of the VOIs to the training set and 20% of VOIs to the validation set. The optimal features were selected by least absolute shrinkage and selection operator (LASSO) method and to construct the radiomics signature. Univariate logistic regression was used to select for independent clinical risk factors and multivariate logistic regression with radiomics signature were used to construct predictive model and nomogram. The prediction performance of the nomogram was evaluated by receiver operating characteristic (ROC) and the decision curve analysis (DCA) was used to judge the net benefit for a range of threshold probabilities to estimate whether the nomogram was sufficiently robust for clinical use.

RESULTS

Of the 127 patients, 32 patients (25.20%) were accompanied by SLM. 1409 quantitative imaging features were extracted from MR images, and 5 optimal features were selected by LASSO algorithm (Fig. 1). CEA and CA19-9 were included in the multifactor logistic regression to construct predictive model and nomogram (Fig. 2). The radiomics nomogram combined with clinical risk factors showed a good predictive performance in the validation set (Fig. 3), the AUC, specificity and sensitivity were 0.944 (95% CI: 0.895 - 0.993), 88.90% and 95.83%, which was higher than that the radiomics model with an AUC of 0.866 (P=0.044). The DCA for the radiomics nomogram was displayed in Fig. 4. It showed relatively good performance for radiomics nomogram model in predicting SLM.

CONCLUSION

The radiomics nomogram combining the radiomics signature and clinical factors can serve as a quantitative tool to predict synchronous liver metastasis of rectal cancer.

CLINICAL RELEVANCE/APPLICATION

Our study indicated that radiomics nomogram based on primary rectal cancer could provide a non-invasive way to predict the risk of SLM in clinical practice.

SSGI04-06 Prediction of Major Cardiovascular Events in a Large Outpatient Adult Cohort Using Fully Automated and Normalized Deep Learning Body Composition Analysis of Routine Abdominal CT

Awards
Trainee Research Prize - Fellow

Participants
Kirti Magudia, MD,PhD, San Francisco, CA (*Presenter*) Nothing to Disclose
Christopher Bridge, Boston, MA (*Abstract Co-Author*) Institutional support, NVIDIA CorporationInstitutional support, General Electric CompanyInstitutional support, Nuance Communications, Inc
Camden P. Bay, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Florian J. Fintelmann, MD, Boston, MA (*Abstract Co-Author*) Consultant, Jounce Therapeutics, Inc; Research support, BTG International Ltd
Ana Babic, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Katherine P. Andriole, PhD, Chestnut Hill, MA (*Abstract Co-Author*) Research funded, NVIDIA CorporationResearch funded, General Electric CompanyResearch funded, Nuance Communications, Inc
Brian M. Wolpin, MD, Boston, MA (*Abstract Co-Author*) Consultant, GI Therapeutics Consultant, BioLineRx Ltd Consultant, Grail Research Grant, Celgene Corporation
Michael H. Rosenthal, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

kirti.magudia@ucsf.edu

PURPOSE

Manually segmented muscle and fat body composition (BC) metrics from abdominal computed tomography (CT) exams are associated with cardiovascular (CV) risk but are too costly to perform clinically. We hypothesize that fully automated BC analysis can augment traditional CV risk models in a large outpatient cohort.

METHOD AND MATERIALS

33,182 outpatient abdominal CT exams performed in our hospital system in 2012 for 23,126 patients were identified. 12,128 patients were free of major CV or cancer diagnoses at time of imaging and their earliest abdominal CT exam in 2012 was selected and analyzed by a deep learning pipeline to determine BC metrics: skeletal muscle area, visceral fat area (VFA) and subcutaneous fat

area (Fig A, B). Reference curves were generated through a modified LMS method and used to calculate normalized z-scores. Cause-specific Cox proportional hazards models corrected for height, weight, BMI, institution, smoking status, diabetes and systolic blood pressure (SBP) were used to predict the risk of future myocardial infarction (MI) and stroke based on BC z-scores.

RESULTS

The cohort (mean age, 52 years; 57% women; 83% White, 9% Black, 3% Asian) was followed for 5 years following each person's index abdominal CT exam. 1560 MI and 938 stroke events occurred. Visceral fat area (VFA) was independently associated with future MI (hazard ratio [HR] with 95%CI: 1.15 [0.95-1.41], 1.05 [0.84-1.31], and 1.31 [1.03-1.67] for quartiles 2, 3, and 4 versus the first quartile, p=0.04), while no evidence of an association was present for weight and height (Fig C). VFA was also independently associated with future stroke (HR: 1.37 [1.05-1.77], 1.49 [1.13-1.97], and 1.46 [1.07-2.00] for quartiles 2, 3, and 4 versus the first quartile, p=0.04), while no evidence of an association was present for weight and height (Fig D). BMI was not independently associated with MI or stroke in a model adjusted for all BC metrics.

CONCLUSION

Fully automated BC analysis of outpatient abdominal CT exams enables prediction of major cardiovascular events better than weight, height and BMI.

CLINICAL RELEVANCE/APPLICATION

Fully automated and normalized CT-based BC analysis potentially provides valuable latent value from routine CT imaging to augment cardiovascular risk prediction in a large outpatient population.

Printed on: 05/05/21

SSGI06

Gastrointestinal (Colorectal Carcinoma)

Thursday, Dec. 3 5:00PM - 6:00PM Room: Channel 4

CT GI MR OI BQ

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSGI06-01 Extramural Venous Invasion and Depth of Extramural Invasion on Preoperative CT as Prognostic Imaging Biomarkers in Patients with Locally Advanced Ascending Colon Cancer

Participants
Jungheum Cho, MD, Seongnam, Korea, Republic Of (*Presenter*) Nothing to Disclose
Young Hoon Kim, MD, PhD, Seongnam, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hae Young Kim, MD,MS, Seongnam, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Won Chang, MD, Seongnam-si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jungheum.cho.md@gmail.com

PURPOSE

To evaluate prognostic significance of extramural venous invasion (EMVI) and depth of extramural invasion (DEMI) on preoperative CT in patients with ascending colon cancer

METHOD AND MATERIALS

This retrospective study conducted in a tertiary center included patients with T3 ascending colon cancer pathologically diagnosed from January 2013 to December 2016. Two abdominal radiologists independently evaluated EMVI and DEMI on preoperative CT, blinded to pathology. We assessed the association of age, sex, EMVI, and DEMI to synchronous metastasis on preoperative CT, using the Fisher's exact test for univariable analysis and logistic regression for multivariable analysis. Continuous variables were dichotomized (older vs. younger than mean age; DEMI > 5 mm vs. 5 mm or less). We used the log-rank tests to compare disease-free survival (DFS) with and without the variables (age, sex, EMVI, DEMI, synchronous metastasis, and lymph node metastasis on pathology). We used the Cox's proportional hazards models to identify variables significantly associated with recurrence. We assessed interobserver agreement using kappa.

RESULTS

We included 189 patients (81 men; mean [standard deviation] age, 65.4 [13.0] years), 21 of whom had synchronous metastases on preoperative CT. 29 patients showed EMVI, and 78 showed more than 5-mm DEMI. On multivariable analysis, DEMI > 5 mm was associated with synchronous metastasis (odds ratio, 27.5; 95% confidence interval [CI], 9.8-82.1; $P < .001$). In DFS analysis, we included 166 patients (66 men; 65.2 [12.9] years), excluding those who underwent non-curative surgeries (R1 or R2) or were lost follow-up. Median follow-up duration was 47 months (interquartile range, 29-60 months). Recurrence was observed in 34 patients (20%) during at least 12-month follow-up. Variables associated with worse DFS were EMVI (hazard ratio[HR], 3.6; 95% CI, 1.4-9.2; $P = .001$), DEMI > 5 mm (HR, 3.8; 95% CI, 1.7-8.5; $P = .008$), and lymph node metastasis on pathology (HR, 2.7; 95% CI, 1.1-6.7; $P = .03$). Interobserver agreements were good (EMVI, 0.67, 95% CI, 0.50-0.83; DEMI, 0.64, 95% CI, 0.48-0.80).

CONCLUSION

EMVI and DEMI > 5 mm on preoperative CT are associated with worse prognosis of T3 ascending colon cancer.

CLINICAL RELEVANCE/APPLICATION

This study showed the prognostic impact of EMVI and DEMI in patients with T3 ascending colon cancer. Thus, these CT findings could be used as imaging biomarkers for the stratification of patients with T3 ascending colon cancer.

SSGI06-02 Quantitative Evaluation from Spectral Detector CT in Regional Lymph Node Metastasis of Colorectal Cancer

Participants
Yan Chen, Guangzhou, China (*Presenter*) Nothing to Disclose
Yuru Ma, MD,MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yiyan Liu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Ziqiang Wen, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xinyue Yang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xiaojuan Xiao, BMedSc, MMedSc, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Bao Lan Lu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Shen Ping Yu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

cheny866@mail.sysu.edu.cn

PURPOSE

To investigate the value of quantitative parameters derived from spectral detector computed tomography (SDCT) in the diagnosis of regional metastatic lymph nodes (LNs) of colorectal cancer.

METHOD AND MATERIALS

The venous phase contrast enhanced SDCT images of 84 patients with colorectal cancer were analyzed. The short-axis diameter (S) of the largest regional LN was measured, and the border and the enhancement homogeneity of the LN were evaluated. The iodine density (ID), effective atomic number (Zeff), normalized iodine density (NID) and normalized effective atomic number (NZeff) of the whole volume of the LN were measured. These parameters were compared between pathologically metastatic and nonmetastatic LNs. Receiver operating characteristic (ROC) curves were performed to evaluate diagnostic performance for these parameters.

RESULTS

A total of 84 LNs were included, with 31 metastatic LNs. The S, border, enhancement homogeneity, ID, Zeff, NID and NZeff of LNs in venous phase contrast enhanced images all showed significant differences between the metastatic and nonmetastatic LNs (each $P < 0.001$). ID was the best parameter for differentiating metastatic and nonmetastatic LNs, the area under the curve (AUC) was 0.946. With a threshold of 1.56 mg/mL of ID, the sensitivity and specificity were 87.10% and 88.68%, respectively. The diagnostic value was higher than that of S (AUC = 0.830, $P < 0.05$), border (AUC = 0.659, $P < 0.001$) and enhancement homogeneity (AUC = 0.734, $P < 0.001$) of LNs. Interobserver reproducibility was excellent for ID, Zeff, NID and NZeff of LNs measurements (intraclass correlation coefficient = 0.977-0.986).

CONCLUSION

SDCT quantitative parameters facilitate the accurate diagnosis of regional metastatic LNs in patients with colorectal cancer, among which, ID has the highest diagnostic efficiency in differentiating metastatic and nonmetastatic LNs.

CLINICAL RELEVANCE/APPLICATION

SDCT quantitative parameters provide an effective noninvasive method for accurate evaluation of regional metastatic LNs in patients with colorectal cancer.

SSGI06-03 MRI-based Tumor Regression Analysis after Short-course and Long-course Neoadjuvant (Chemo) Radiotherapy in Locally Advanced Rectal Cancer

Participants
Arya Haj-Mirzaian, MD,MPH, Baltimore, MD (*Presenter*) Nothing to Disclose
Bashar Safar, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jeffrey Meyer, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Amol Narang, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Nilofer Azad, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Adrian Murphy, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Chady Atallah, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Lysandra Voltaggio, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Rebecca Sahyoun, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Atif Zaheer, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

ahajmir1@jhmi.edu

PURPOSE

To assess the diagnostic value of restaging MRI after short- and long-course neoadjuvant (chemo)radiotherapy in patients with locally advanced rectal cancer. We also aimed to compare the radiologic response between these two neoadjuvant (chemo)radiotherapy regimens.

METHOD AND MATERIALS

This HIPAA-compliant study was approved by IRB. Medical records of patients diagnosed with stage II/III (T3/4, any N, M0) rectal cancer who received short- or long-course neoadjuvant (chemo)radiotherapy were reviewed. Short-course radiotherapy was defined as 25Gy given over a week before surgery. Long-course (chemo)radiotherapy was defined as 50.4-54Gy given over 5-6 weeks before surgery. MRI-based tumor regression grade (mrTRG), mrTNM stage, and other imaging features were assessed by a radiologist using pre- and post-treatment T2-weighted and DWI MRIs. Pathological findings were reviewed for the post-treatment pTNM stage. Level of agreement between restaging MRI findings and pathological results were evaluated using weighted k analysis. Association between regimens (short- vs. long-course) and radiologic/pathologic findings was assessed using regression analysis.

RESULTS

A total of 44 patients were included (short-course=22, long-course=22; matched for age, gender, pre-treatment mrTNM stage). The overall inter-test agreement (κ value) of 0.3-0.8 was observed between restaging mrTNM/mrTRG and pTNM. Analyses showed a significantly higher level of agreement between radiologic and pathologic findings in short-course group (κ=0.81) when compared with long-course group (κ=0.32) (P=0.002). Short-course radiotherapy was associated with a better mrTRG (OR(95%CI): 3.75(1.1-13.1)) and mrTNM (OR(95%CI): 4.39(0.9-19.4)) complete response when compared with long-course (chemo)radiotherapy. However, no significant association between neoadjuvant regimens and pTNM complete response and ΔADC was detected (P>0.05).

CONCLUSION

In patients with locally advanced rectal cancer, restaging MRI is more valid after short-course radiotherapy in comparison with long-course regimen. Furthermore, short-course neoadjuvant radiotherapy may lead to a better or equal radiologic tumor response when compared with long-course (chemo)radiotherapy.

CLINICAL RELEVANCE/APPLICATION

MRI-based tumor regression analysis of rectal cancer is more accurate after short-course neoadjuvant radiotherapy (vs. long-

course). Short-course radiotherapy is also associated with a better radiologic response.

SSGI06-04 Magnetic Resonance Imaging Tumor Response Score (mrTRS) Predicts Therapeutic Effect and Prognosis of Locally Advanced Rectal Cancer After Neoadjuvant Chemoradiotherapy: A Prospective, Multi-Center Study

Awards
Trainee Research Prize - Medical Student

Participants
Zhen Guan, Beijing, China (*Presenter*) Nothing to Disclose
Ying-shi Sun, MD,PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

18801231091@163.com

PURPOSE

The mrTRG is limited by its subjectivity and poor consistency with pathological tumor regression grade (pTRG). We proposed to establish a new MRI criterion to predict pTRG of LARC which can accurately predict prognosis.

METHOD AND MATERIALS

The established new MRI criterion (mrTRS) was based on the retrospective sample of 214 LARC patients. Subsequently, a prospective, multicenter of 878 LARC patients were enrolled. Baseline and post-operative MRI were obtained, imaging features including mrTRS, mrTRG, T staging, N staging, extramural venous invasion (EMVI), mesorectal fascia(MRF) were measured with pathological, clinical and follow-up data collection. The primary outcome was to prove mrTRS an independent predictor for prognosis in LARC patients with NACRT by Kaplan-meier method with log-rank estimate and multivariate cox regression model. The second outcome was to compare the predictive capability for 3-year prognosis between mrTRS and mrTRG by time-dependent ROC curves.

RESULTS

Multivariate analysis indicated that mrTRS was an independent predictor of survival outcomes. mrTRS stratified good and moderate responders presented significantly lower risk for death compare with poor responders(HR=0.04, 95%CI 0.01-0.31; HR=0.35, 95%CI 0.23-0.52), distant metastasis(HR=0.25, 95%CI 0.13-0.52; HR=0.42, 95%CI 0.30-0.58), and local recurrence(HR=0.01 95%CI 0.23-0.52;HR=0.38, 95%CI 0.16-0.90). Contrastly, there was no significant difference in survival outcomes among mrTRG stratified groups. Excellent and substantial interobserver agreement for mrTRS and mrTRG evaluation (κ=0.92 and 0.62), respectively.

CONCLUSION

The established mrTRS can serve as an effective predictor for assessing tumor regression grade in LARC with neoadjuvant chemoradiotherapy.

CLINICAL RELEVANCE/APPLICATION

We recommend the evaluation of mrTRS in clinical practice.

SSGI06-05 Tumor Heterogeneity in Locally Advanced Rectal Cancer Treated with Neoadjuvant Chemoradiation: Can It Predict Pathological Complete Response?

Participants
Toru Tochigi, MD, Boston, MA (*Presenter*) Nothing to Disclose
Sophia C. Kamran, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anushri Parakh, MBBS, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Yoshifumi Noda, MD,PhD, Gifu, Japan (*Abstract Co-Author*) Nothing to Disclose
Theodore S. Hong, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Koninklijke Philips NV

For information about this presentation, contact:

tochigi819@gmail.com

PURPOSE

Following neo-adjuvant chemoradiation therapy (nCRT) in patients with locally advanced rectal cancer (LARC), there are individual variations in treatment response and a proportion of patients experience pathological complete response (pCR). No reliable modality that can predict the efficacy of nCRT and relapse.The purpose of this study is to measure tumor heterogeneity in patients with LARC using CT based fractal and filtration-histogram analysis, and to assess their influence on the efficacy of nCRT.

METHOD AND MATERIALS

In this retrospective study, 215 patients [57 years (18-87 years)] who received nCRT for LARC between June 2005 to December 2016 and underwent a staging diagnostic portal venous phase CT were identified. The patients were randomly divided into two datasets: a training set (n = 170), and a validation set (n = 45). Tumor heterogeneity was assessed on the CT images using fractal dimension (FD) and filtration-histogram analysis. In training set, the patients with pCR and non-pCR were compared in univariable analysis. Logistic regression analysis was applied to identify the predictive value of efficacy of nCRT and receiver operating characteristic analysis determined cut-off value. Subsequently, we assessed that parameter in validation set.

RESULTS

Out of the 215 patients were evaluated. pCR was reached in 20.9% (n = 45/215) patients. In the training set, 7 out of 37 textural parameters showed significant difference comparing between the pCR and non-pCR groups and logistic multivariable regression analysis incorporating clinical and 7 textural parameters showed that only FD was associated with pCR (P = 0.001). The area under the curve of FD was 0.76. In the validation set, we applied FD for predicting pCR and sensitivity, specificity and accuracy was

60%, 89% and 82%, respectively.

CONCLUSION

Fractal Dimension on pretreatment CT is a promising parameter for predicting pathological complete response to neo-adjuvant chemoradiation in patients with LARC and could be used to help make treatment decisions.

CLINICAL RELEVANCE/APPLICATION

CT based depiction of tumor heterogeneity is a highly promising imaging biomarker and may potentially select patients for individualized therapy.

SSGI06-06 A Large-Scale Temporal Validation of the MRI Radiomics Model for Prediction of Pathological Complete Response After Preoperative Chemoradiotherapy in Locally Advanced Rectal Cancer

Participants
Sungwon Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jaeseung Shin, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Heejin Bae, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Nak-Hoon Son, PhD, Yongin, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joonseok Lim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

dinbe@yuhs.ac

PURPOSE

To evaluate radiomics model using T2-weighted magnetic resonance imaging (MRI) as a potential biomarker for predicting pathological complete response (pCR) after neoadjuvant chemotherapy-radiation therapy (CRT) in patients with rectal cancer, compared with qualitative assessment by radiologists.

METHOD AND MATERIALS

This retrospective study included consecutive 898 patients with locally advanced rectal adenocarcinoma (>=cT3 or N+) who underwent MRI and subsequent total mesorectal excision after CRT between January 2009 and December 2018. The patients were divided into training cohort (n = 592) and temporally independent validation cohort (n = 306). Surgical histopathologic analysis was the reference standard for pCR. Radiomics features were extracted from the volume of interest on T2-weighted images and a radiomics signature was generated using least absolute shrinkage and a selection operator with ten-fold cross-validation. Three experienced abdominal radiologists independently rated tumor regression grade and compared the diagnostic outcome of the radiomics model.

RESULTS

Among 898 patients, 189 patients (21%) achieved pCR. The radiomics model demonstrated an area under the curve of 0.82 (95% confidence interval [CI]: 0.76, 0.87) in the temporal validation cohort, which is significantly higher than the AUCs of the three readers (0.73, 0.74, 0.73) and the pooled AUC (0.74, P=0.009). In the binary classification using the best cutoff derived from the training cohort, radiomics model showed sensitivity of 80% (95% CI: 0.71, 0.89) and specificity of 68% (95% CI: 0.62, 0.74). The sensitivity of the radiomics model showed significantly higher than the values of the three readers (22.7%, P<0.001; 14.7%, P<0.001; 9.3%, P<0.001).

CONCLUSION

In the large-scale temporal validation MRI based radiomics model showed better classification performance compared with qualitative assessment for diagnosing pCR in patients with locally advanced rectal cancer after CRT.

CLINICAL RELEVANCE/APPLICATION

MRI radiomics features of locally advanced rectal adenocarcinoma may serve as noninvasive predictors of pathological complete response after neoadjuvant CRT, providing potentially valuable information for selecting patients for watch-and-wait approach.

SSGI07

Gastrointestinal (Dual Energy CT Technique)

Friday, Dec. 4 10:00AM - 11:00AM Room: Channel 4

CT GI PH OI BQ

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSGI07-01 A Technique to Differentiate and Quantify High-Z Contrast Elements with Dual-layer Spectral CT: a Phantom Study

Participants
Todd C. Soesbe, PhD, Dallas, TX (*Presenter*) Nothing to Disclose
Yin Xi, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Khaled A. Nasr, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
John R. Leyendecker, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Robert E. Lenkinski, PhD, Dallas, TX (*Abstract Co-Author*) Research Grant, Koninklijke Philips NVResearch Consultant, Aspect Imaging
Matthew A. Lewis, PhD, Dallas, TX (*Abstract Co-Author*) Research collaboration, CMR Naviscan Corporation Research collaboration, QT Ultrasound, LLC

PURPOSE

To develop a dual-layer spectral CT method for differentiating and quantifying high-Z contrast elements and to evaluate the limitations based on element concentration and atomic number by using an anthropomorphic phantom study.

METHOD AND MATERIALS

Mass spectrometry standards for I, Ba, Gd, Yb, Ta, Au, and Bi were serially diluted from 10 to 0.3 mg/mL and placed inside 7-mL vials. The vials were scanned with dual-layer spectral CT (Philips IQon) at 120 kVp and 140 kVp using an anthropomorphic abdominal phantom and cylindrical water-filled insert. Three different phantom habitus were evaluated, with the cylindrical insert rotated to 0, 120, and 240 degrees for each habitus (126 scans total). Circular ROI of 1.1 cm^2 were placed inside each vial on three consecutive slices and the Hounsfield, Compton, and photoelectric mean values were used for analysis (2,646 ROI total). This procedure was repeated at 120 kVp with all seven high-Z elements at six isoattenuating values from 250 to 8 HU (54 scans and 1,296 ROI total). Compton versus photoelectric mean value plots were used for analysis. Quantification accuracy was measured by using a linear regression model and residual error analysis with 90% limits of agreement. Pairwise differentiation of isoattenuating vials was evaluated using the mean AUC values and the difference in fit angle between the two elements.

RESULTS

Each high-Z element had a unique concentration vector in a 2D histogram of Compton versus photoelectric attenuation. Concentration mean values were within +/- 0.1 mg/mL of the true values for each element vial and kVp with no proportional error in the 90% limits of agreement (less than +/- 0.4 mg/mL for each vial). Pairwise differentiation of isoattenuating vials was proportional to the Hounsfield unit and the angle of separation between the linear fits with mean AUC values of 0.61, 0.78, 0.85, 0.91, 0.95, and 0.98 at 6, 16, 31, 63, 125, and 250 HU, respectively.

CONCLUSION

Dual-layer spectral CT can differentiate and quantify isoattenuating high-Z elements, with the differentiation accuracy being directly proportional to the elemental concentration and the angle of separation in a two-dimensional histogram of Compton and photoelectric attenuation.

CLINICAL RELEVANCE/APPLICATION

The high-attenuation and unique concentration vectors of Yb, Ta, Au, and Bi are well suited for new clinical dual-energy CT contrast agents, especially when simultaneously imaged with I, Ba, or Gd.

SSGI07-02 Reproducibility of Dual-energy CT Derived Radiomic Features Across Different Dual-energy CT Scanner Types

Participants
Simon Lennartz, MD , Cologne, MA (*Presenter*) Institutional research support, Koninklijke Philips NV
Aileen O'Shea, FFR(RCSI),MBBCh, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anushri Parakh, MBBS, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Koninklijke Philips NV

For information about this presentation, contact:

simon.lennartz@uk-koeln.de

PURPOSE

Radiomic feature analysis has been investigated for various applications of abdominal dual-energy CT, yet evidence on inter-scanner reproducibility is scarce and mostly limited to phantom studies. Our aim was to investigate the reproducibility of radiomic features in patients who underwent repeated abdominal CTs on three different dual-energy CT (DECT) scanner types.

METHOD AND MATERIALS

30 patients were included in this retrospective, IRB-approved study. Each patient had between two and three contrast-enhanced abdominal DECTs, with the same protocol, on at least two of three dual energy scanner types: dual-source, rapid kV switching and dual-layer detector. Radiomic features were obtained, following single slice placement of four individual, fixed-diameter (10mm) regions-of-interest (ROIs) in hepatic segments II and VI, and the upper and lower poles of the spleen. ROIs were placed on virtual monoenergetic images at 65 keV (VMI65keV) and virtual unenhanced images (VUE) in a side-by-side setup, permitting consistent ROI placement. Liver and splenic parenchyma with non-physiological appearance (e.g. metastatic involvement) was excluded to avoid confounding (e.g. due to therapy response or disease progression). 92 radiomic features were extracted from each ROI. Intra-class correlation coefficient (ICC) was calculated in order to determine inter-scanner reproducibility for individual radiomics features.

RESULTS

7 features derived from VUE and 10 features derived from VMI65keV yielded a good reproducibility (ICC > 0.6). The three most robust VUE-derived features were gray level matrix features: low gray level emphasis, joint average and sum average (ICC of all=0.65), whereas the three most robust VMI65keV features were the first order features median, mean and 10th percentile (ICC=0.70, 0.71, 0.72). A large proportion of features in both reconstructions (VMI65keV: 83.2%, VUE: 86.4%) showed a poor reproducibility across vendors (ICC <0.4).

CONCLUSION

Our initial data suggest a limited reproducibility of radiomics features across the three most frequently used dual-energy CT scanner types. Iodine enhancement seems to impact reproducibility of higher-level feature classes, while first order features were rather robust in contrast-enhanced images.

CLINICAL RELEVANCE/APPLICATION

Data on reproducibility of radiomic features across different scanners is crucial to facilitate clinical application of diagnostic approaches based on radiomics.

SSGI07-05 Quantification of the Liver-Fat Content Using Dual-energy CT Multimaterial Decomposition (MMD) Algorithm: Comparison with Tissue Reference Standards and Magnetic Resonance Imaging Derived Proton Density Fat Fraction (MRI-PDFF) in an Animal Study

Participants
Tingting Xie JR, MD, Shenzhen, China (*Presenter*) Nothing to Disclose
Ying Guo, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jingyu Zhou, MS, BS, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Guanxun Cheng, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

ttxietinarsna@163.com

PURPOSE

To compare the difference of DECT MMD algorithm and MRI-PDFF for hepatic fat fraction quantification.

METHOD AND MATERIALS

A total of 12 rats were divided into the normal group, moderate and severe hepatic steaotosis group (3,6,3 rats relatively) according to TG mass-fraction of 4.43%, 14.03%and 27.83%(the quantifications of TG were acquired by using a colorimetric assay). The rats were scanned by GE Revolution CT scanner using GSI mode first, then were scanned by MRI using Philips Ingenia 3.0T magnetic resonance system with mDixcon-quant sequence and eight channel animal coil. After the CT scan, reconstructed imaging data were processed by using MMD soft-ware currently not commercially available. MMD-derrived fat volume fraction (MMD-FVF) and PDFF-based fat fraction (PDFF) were measured. Reference values of FVF were determined by the quantification of Triglyceride (TG) mass-fraction using a colorimetric assay. A linear regression was performed to analyze the relationship between the measured fat fractions and the actual TG fraction.

RESULTS

The TG mass-fraction of this study can be used to simulate the fat content of normal to severe hepatic steatosis in human liver. Both algorithms showed good linear relationship between the measured fat fraction and actual TG fraction. MMD algorithm revealed a linear correlation equation of $y=0.925x+3.986$($r^2 = 0.965$, $P=0.000$). For PDFF, the linear correlation equation was $y=0.924x-2.025$($r^2 = 0.973$, $P=0.000$).

CONCLUSION

Both of DECT FVF acquired by using MMD algorithm and MRI-PDFF acquired by using mDixcon-quant sequence were demonstrated to provide accurate and reliable measurement of fat fraction for animal model, which will has the potential to be used in clinical trials for hepatic fat quantification.

CLINICAL RELEVANCE/APPLICATION

This study demonstrated that dual-energy CT MMD algorithm may has the potential to provide an opportunity to screen for hepatic steatosis in NAFLD patients undergoing scan for unrelated reasons. The advantages include high accuracy with no additional scanning required, fast acquisition, ease of performance, which makes it attractive to be applied in future clinical trials.

SSGI07-06 Longitudinal Reproducibility of Dual-Energy CT Derived Iodine Quantification: An In-Patient, Inter-Scanner Comparison

Participants
Simon Lennartz, MD , Cologne, MA (*Presenter*) Institutional research support, Koninklijke Philips NV
Anushri Parakh, MBBS, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jinjin Cao, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

Nils Grosse Hokamp, MD, Koln, Germany (*Abstract Co-Author*) Research Grant, Koninklijke Philips NVSpeakers Bureau, Koninklijke Philips NV
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Koninklijke Philips NV

For information about this presentation, contact:

Simon.Lennartz@uk-koeln.de

PURPOSE

Dual-energy CT (DECT)-derived iodine quantification has been investigated for lesion characterization and response assessment, yet data on reproducibility of such measurements is scarce. Our aim was to investigate reproducibility of iodine measurements in patients who underwent two repetitive DECT examinations either on a dual-source (dsDECT), a rapid kV switching (rsDECT) or a dual-layer detector scanner (dlDECT).

METHOD AND MATERIALS

We retrospectively included 133 patients who underwent two repetitive, portal-venous phase abdominal DECT examinations. 48 patients were repetitively scanned on dsDECT, 45 on rsDECT and 41 on dlDECT. The groups were matched for body weight, age, sex and average inter-scan differences in contrast media and saline chaser amount as well as flow rate. Three readers measured iodine concentration in iodine maps and HU in virtual monoenergetic images (VMI) at 65 keV as grey-scale reference; regions of interest (ROIs) were placed in the left/right liver lobe, upper/lower spleen, left/right renal cortex, abdominal aorta and portal vein.

RESULTS

Averaged over all ROIs, absolute difference in iodine between two repetitive scans was 0.60±0.63, 0.78±0.83 and 0.85±0.83 mg/ml for rsDECT, dlDECT and dsDECT, respectively; the corresponding HU differences in VMI65keV were 18.0±19.0, 24.1±26.6, 20.1±32.8 HU. Median relative variation between repetitive scans regarding the kidneys was comparable between rsDECT (9.1 (3.6-15.4)%), dlDECT (10.3 (4.4-20.4)%) and dsDECT 10.9 (5.6-37.4) %). For liver and spleen, differences were more pronounced (rsDECT:10.6 (5.1-18.7) %, dlDECT: 14.8 (6.9-31.0)%, dsDECT:0.23 (9.9-59.0)%. Normalizing the iodine uptake of the liver/spleen to the portal vein/aorta did not reduce longitudinal variability in any of the included scanners (p-range: 0.49-0.55).

CONCLUSION

Iodine quantification in DECT is subject to intra-individual, longitudinal variability which should be acknowledged when aiming to use it for oncologic imaging. Longitudinal variability may vary between scanner types when quantifying iodine in the liver and the spleen.

CLINICAL RELEVANCE/APPLICATION

Our study provides evidence on longitudinal consistency of iodine measurements, comparing frequently used DECT scanner types. This facilitates clinical application, e.g. at oncologic response assessment.

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SSGI08

Gastrointestinal (Dual Energy CT Diagnosis)

Saturday, Dec. 5 5:00PM - 6:00PM Room: Channel 4

CT GI OT OI BQ

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSGI08-01 Use of Dual-energy CT for Prediction of Response to Immune Checkpoint Inhibitor Therapies

Participants
Carolyn L. Wang, MD, Mercer Island, WA (*Presenter*) Research Grant, General Electric Company
Erik Soloff, MD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company
Janet M. Busey, MS, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Danielle H. Cox, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Evan T. Hall, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Achille Mileto, MD, Seattle, WA (*Abstract Co-Author*) Research grant, General Electric Company;
Kent M. Koprowicz, Seattle, WA (*Abstract Co-Author*) Research Consultant, Axio Research, LLC
Ryan O'Malley, MD, Seattle, WA (*Abstract Co-Author*) Research Grant, General Electric Company

For information about this presentation, contact:

wangcl@uw.edu

PURPOSE

To investigate the use of tumor iodine concentrations from dual-energy CT (DECT) for prediction of response in patients treated with immune checkpoint inhibitors.

METHOD AND MATERIALS

This single-center, retrospective HIPAA-compliant study included 17 patients (11 men, 6 women; mean age, 57 years) with pathology-proven Merkel cell carcinoma, renal cell carcinoma, or melanoma. All patients underwent contrast-enhanced DECT exams at baseline (BL) and after initiation of immune checkpoint inhibitor therapy. At least one exam after treatment initiation (FU1) was available. Target lesions were selected and assessed based on RECIST 1.1 criteria for BL, FU1 and final follow-up (FFU), defined as the most recent exam while on therapy. DECT-based iodine concentration values were obtained for all target lesions and subsequently normalized to iodine in the abdominal aorta (NIC). Tumor percent changes in NIC between BL and FU1 were calculated. Lesions were categorized at FFU as progressive disease (PD), stable disease (SD) or partial response (PR). Analysis of variance was used to assess differences in NIC between lesions based on response category. Ordinal logistic regression of percent change in NIC at FU1 on status at FFU was performed. Cut-off values for NIC were determined from the model parameter estimates and used to assess NIC performance on FU1 using RECIST 1.1 status at FFU as the standard.

RESULTS

Thirty-one lesions were assessed at BL and FU1 with an average of 141 days between scans. At FU1, mean NIC increased 34% in PD lesions compared to -38% for PR and -18% for SD (p=0.032). Twenty-four lesions were assessed at FFU with an average of 236 days after BL. NIC at FU1 was predictive of response at FFU (p=0.014). Cut-off values were defined as +65.9% change in NIC for non-responders and -10.2% change for responders. NIC at FU1 predicted 23/24 responding lesions at FFU and misclassified 1 lesion as PD, while use of RECIST 1.1 criteria at FUI predicted 22/24 responders but misclassified 2 lesions as PD.

CONCLUSION

In patients treated with immune checkpoint inhibitors, early changes in DECT iodine concentration may allow for prediction of lesion response with increasing NIC predicting future progression and decreasing NIC predicting future response.

CLINICAL RELEVANCE/APPLICATION

Early changes in DECT lesion iodine concentration may be useful in predicting treatment response in patients on immune checkpoint inhibitor therapies.

SSGI08-02 Dual Energy CT of the Liver: True Non-contrast versus Virtual Non-contrast Image Derived from Multiple Phases to Predict Hepatic Steatosis

Participants
Moon Hyung Choi, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Young Joon Lee, MD,PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

choimh1205@gmail.com

PURPOSE

To compare the difference in liver density on the true non-contrast image (TNC) and three virtual non-contrast images (VNCs) derived from the arterial, portal and delayed phases of dual-energy CT (DECT) of the liver and to evaluate a correlation between liver density on four non-contrast images (NCs) and the degree of hepatic steatosis measured on liver MRI

METHOD AND MATERIALS

Among patients who underwent DECT of the liver using the third-generation DECT in 2019, 75 patients who underwent liver MRI within 100 days of liver CT were included in this study. The gold standard of hepatic steatosis was determined by the multi-echo Dixon technique of liver MRI. A board-certificated radiologist drew multiple regions-of-interest (ROIs) in the liver (left lateral, right posterior, and right anterior sections) avoiding large vessels and masses on TNC and VNCs from arterial (VNCa), portal (VNCp), and delayed (VNCd) phases. Three ROIs in the liver were compared to each other on each image using paired t-tests with Bonferroni correction. Mean liver densities among four NCs were compared using paired t-tests. Correlation between mean liver density on each NC and the degree of hepatic steatosis was analyzed using a Pearson correlation test.

RESULTS

The average degree of hepatic steatosis in the patients was 3.8 %. Liver densities in three ROIs were not different on four NCs ($P > 0.05$). In the left lateral and right anterior hepatic sections, liver density was significantly lower on all VNCs than TNC ($P<0.001$). In the right posterior hepatic section, liver density on VNCd was significantly lower than TNC ($P<0.001$) and liver density did not differ from each other in other pairwise comparisons. Liver densities in three ROIs on TNC showed a significant correlation to the degree of hepatic steatosis but liver densities in all ROIs on three VNCs did not.

CONCLUSION

Most of the liver densities measured in different areas on three VNCs derived from the multiple phases were significantly different from those on TNC. Hepatic steatosis significantly correlated to only liver density measured on TNC, but not on VNCs.

CLINICAL RELEVANCE/APPLICATION

Virtual non-contrast images derived from the multiple phases of liver DECT may not show similar liver density to true non-contrast images. So, radiologists should know about the limitations in VNC images to measure the liver density in clinical practice.

SSGI08-04 Acute Cholecystitis: Performance of Conventional CT versus Dual-Energy CT

Participants
Fahimul Huda, MD, Boston, MA (*Presenter*) Nothing to Disclose
Christina A. LeBedis, MD, Newton, MA (*Abstract Co-Author*) Nothing to Disclose
Muhammad M. Qureshi, MBBS,MPH, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avneesh Gupta, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

fahimul.huda@bmc.org

PURPOSE

To compare the performance of CT with dual-energy CT (DECT) in acute cholecystitis.

METHOD AND MATERIALS

The IRB approved this HIPAA-compliant retrospective study. Informed consent was waived. 65 patients who underwent IV contrast-enhanced abdominal DECT on a GE Revolution or Philips iQon scanner from 9/1/18-1/30/20 were studied, including 32 with acute abdominal pain, subsequent cholecystectomy and pathology-confirmed acute cholecystitis, and 33 sequential patients without pain. An abdominal radiologist reviewed the images in two sessions separated by 4 weeks, blinded to clinical data. Initially, only conventional CT images were reviewed. Subsequently, conventional and DECT reconstructions including low keV and Iodine maps were reviewed. Individual findings including gallbladder fossa hyperemia, gangrene and heterogeneous wall enhancement were assessed. Frequency distribution and area under the receiver operating characteristic curve (AUC) were calculated.

RESULTS

Gallbladder fossa hyperemia was detected at CT in 31% (10/32) of cholecystitis patients and 0/33 normal patients (AUC 0.656 [95% CI: 0.528 to 0.770]), and at DECT in 66% (21/32) of cholecystitis patients and 3% (1/33) of normal patients (AUC 0.813 [95% CI: 0.697 to 0.899]). AUC difference reached statistical significance ($p=0.0005$). Heterogeneous wall enhancement was detected at CT in 13% (4/32) of cholecystitis patients and 0/33 normal patients (AUC 0.563 [95% CI: 0.434 to 0.685]), and at DECT in 38% (12/32) of cholecystitis patients and 0/33 of normal patients (AUC 0.688 [95% CI: 0.560 to 0.797]). AUC difference reached statistical significance ($p= 0.005$). Of 32 patients with histologically confirmed cholecystitis, 8 demonstrated gangrene at pathology. Gangrene was detected at CT in 13% (1/8) of patients with confirmed gangrene and 4% (1/24) of cholecystitis patients without gangrene (AUC 0.542 [95% CI: 0.357 to 0.718]), and at DECT in 63% (5/8) of patients with confirmed gangrene, and 13% (3/24) of cholecystitis patients without gangrene (AUC 0.75 [95% CI: 0.566 to 0.885]). AUC difference reached statistical significance ($p= 0.04$).

CONCLUSION

DECT shows improved performance over conventional CT in acute and gangrenous cholecystitis.

CLINICAL RELEVANCE/APPLICATION

Review of dual-energy CT reconstructions can offer improved diagnostic performance for diagnosis of acute cholecystitis compared with conventional CT.

SSGI08-05 Association of Psoas Muscle Lean Volume Measured on Dual-Energy CT With Relative Dose Intensity in Patients With Hepatocellular Carcinoma Treated With Lenvatinib

Participants
Takeru Yamaguchi, Kobe, Japan (*Presenter*) Nothing to Disclose
Keitaro Sofue, MD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Eisuke Ueshima, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Yushi Tsujita, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Yoshiko Ueno, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Takamichi Murakami, MD, PhD, Osaka, Japan (*Abstract Co-Author*) Nothing to Disclose

Takuya Okada, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Masato Yamaguchi, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Munenobu Nogami, MD, PhD, Kobe, Japan (*Abstract Co-Author*) Nothing to Disclose
Masatoshi Hori, MD, Kobe, Japan (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation

For information about this presentation, contact:

takeru.yamaguchi1216@gmail.com

PURPOSE

In treating patients with hepatocellular carcinoma (HCC) with lenvatinib, maintaining relative dose intensity (RDI) improves the prognosis. The purpose of this study was to investigate whether the psoas muscle lean volume measured on dual-energy CT (DECT) can predict RDI in HCC patients treated with lenvatinib.

METHOD AND MATERIALS

This IRB-approved retrospective study included 43 HCC patients (32 men, 11 women; median age, 71 years) treated with lenvatinib who underwent DECT before treatment. The psoas muscle area (cm2) at the third lumbar vertebra level and volume (cm3) were measured on non-contrast DECT images. The psoas muscle lean volume (cm3) was calculated as psoas muscle volume × (100 - fat fraction [%])/100, where the fat fraction was measured using the three-material decomposition algorithm. To standardize the value, the psoas muscle index for the area (PMI-A), the volume (PMI-V), and the lean volume (PMI-LV) were provided by dividing by height squared (m2). The 4- and 8-week RDI were calculated as the ratio of the actual dose delivered to the standard recommended dose during the initial 4 and 8 weeks. The Spearman's rank correlation was used to analyze the association of the PMI-A, PMI-V, and PMI-LV with the RDIs. The univariate Cox hazard analysis was used to evaluate the impact of the RDIs on progression-free survival (PFS).

RESULTS

The measured mean fat fraction within the psoas muscle volume was 15.7 ± 4.2% (range, 6.9-24.5). The mean values of PMI-A, PMI-V, and PMI-LV were 5.8 ± 1.5 cm2/m2, 93.0 ± 22.2 cm3/m2, and 79.0 ± 21.4 cm3/m2, respectively. The median 4- and 8-week RDI were 0.82 and 0.63. The median PFS was 199 days. PMI-A was not significantly correlated with the 4- or 8-week RDI. PMI-V was significantly correlated with the 4-week (ρ=0.347, P=0.023) and the 8-week (ρ=0.303, P=0.048) RDI. PMI-LV showed better correlation with the 4-week (ρ=0.36, P=0.018) and the 8-week (ρ=0.334, P=0.029) RDI. The 4- and 8-week RDI were significant factors for PFS (HR, 0.39; P=0.035 and HR, 0.023; P<0.001, respectively).

CONCLUSION

Psoas muscle had various fat fraction. In HCC patients treated with lenvatinib, PMI-LV measured on DECT correlated with the 4- and 8-week RDI that were significant factors for PFS.

CLINICAL RELEVANCE/APPLICATION

The psoas muscle lean volume measured on dual-energy CT correlates with relative dose intensity in patients with HCC treated with lenvatinib, potentially helping to predict the antitumor effect.

SSGI08-06 Liver and Body Fat Quantification: Dual Source Dual Energy Computed Tomography Compared to Magnetic Resonance Multi-Echo Dixon Imaging

Participants
Sebastian Gassenmaier, MD, Tubingen, Germany (*Presenter*) Nothing to Disclose
Karin Kaehm, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christoph P. Artzner, Tuebingen, Germany (*Abstract Co-Author*) Speaker, Siemens AG
Saif Afat, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Andreas Brendlin, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Sven S. Walter, MD, Tuebingen, Germany (*Abstract Co-Author*) Nothing to Disclose
Konstantin Nikolaou, MD, Tuebingen, Germany (*Abstract Co-Author*) Advisory Panel, Siemens AGAdvisory Panel, Bayer AGSpeakers Bureau, Siemens AGSpeakers Bureau, Bayer AG
Malte N. Bongers, MD, Tubingen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To investigate the feasibility of liver and body fat quantification in contrast enhanced dual source dual energy computed tomography (DECT) using multi-echo Dixon magnetic resonance imaging (MRI) as reference standard.

METHOD AND MATERIALS

Patients who underwent MRI of the liver including a dedicated multi-echo Dixon sequence in 2017 as well as DECT imaging of the abdomen within 90 days to MRI were included in this retrospective, monocentric IRB approved study. The final study group consisted of 45 patients with 48 pairs of examinations. Analysis of parameter maps was performed manually using congruent regions of interest (ROI) which were placed into liver parenchyma avoiding focal liver lesions and vessels. To compensate for possible liver parenchyma changes during the time frame of MRI and DECT, additional ROI were drawn into the left and right paravertebral muscles. These ROI encompassed the whole muscle parenchyma of one slice. Bony landmarks were used to identify the same slice on MRI and DECT.

RESULTS

Mean patient age was 60 ± 14 years. Median time between MRI and DECT was 23 days (interquartile range (IQR): 48 days). MRI liver fat quantification resulted in a median of 3.5% (IQR: 4.7%) compared to 1.0% (IQR: 5.4%) in DECT (p<0.001). Bland-Altman analysis resulted in a systematic underestimation in DECT with a mean difference of -2.3%. There was excellent Pearson correlation between MRI and DECT of 0.90 (p<0.001). The reference muscle measurements resulted in a Pearson correlation of 0.96 (p<0.001). There was no significant difference in the paravertebral muscles between MRI fat quantification (median: 12.1%; IQR: 10.0%) and DECT fat quantification (median: 13.3%; IQR: 10.7%; p=0.303).

CONCLUSION

Liver and body fat quantification with DECT is feasible with excellent correlation compared to a multi-echo Dixon MRI sequence

analysis. While there was a slight underestimation of the liver fat content in DECT, no significant difference between DECT and MRI fat quantification of the paravertebral muscles was found.

CLINICAL RELEVANCE/APPLICATION

Hepatic fat quantification using DECT in routine examinations can help to early identify patients with hepatic steatosis and might prevent deterioration of liver function.

Printed on: 05/05/21

SSGU01

Genitourinary (Renal Masses)

Friday, Dec. 4 8:30AM - 9:30AM Room: Channel 4

CT GI MR VA OI

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSGU01-01 Prospectively Assigned Clear Cell Likelihood Score on Multiparametric Magnetic Resonance Imaging for Diagnosis of Clear Cell Renal Cell Carcinoma: Diagnostic Performance Across All Clinical Stages in a Diverse Patient Population

Participants
Robert G. Rasmussen, MD,PhD, Dallas, TX (*Presenter*) Nothing to Disclose
Ryan Steinberg, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Brett Johnson, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Yin Xi, PhD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Alberto Diaz De Leon, MD, Coppell, TX (*Abstract Co-Author*) Nothing to Disclose
Jeffrey Cadeddu, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose
Ivan Pedrosa, MD, Dallas, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

robert.rasmussen@utsouthwestern.edu

PURPOSE

Despite increased treatment of incidental renal masses, cancer-specific mortality has not decreased. Thus, distinction of benign/indolent tumors that can be monitored from clear cell renal cell carcinoma (ccRCC), the most common and aggressive form of cancer, would be valuable. Our goal was to assess the performance of a clear cell likelihood score (ccLS) derived from multiparametric magnetic resonance imaging (mpMRI) across all clinical stages.

METHOD AND MATERIALS

This was an IRB-approved, HIPAA-compliant retrospective analysis of prospectively generated clinical data. Prospectively assigned ccLS of renal masses between 06/2016 and 11/2019 were reviewed. ccLS were correlated with histologic diagnosis when available. Diagnostic performance for diagnosing ccRCC and post-test probabilities of ccLS were quantified by contingency table analysis.

RESULTS

993 mpMRIs were prospectively assigned ccLS by 1 of 16 fellowship-trained radiologists. Of these, 463 renal masses (444 patients) had subsequent pathologic diagnosis via renal biopsy (66) or surgical excision (397) and represent the study cohort. Distribution of masses with and without pathology by ccLS and clinical stage is shown in Fig. 1a and b. In the study cohort, 22% masses were ccLS 1-2, 14% ccLS 3, and 64% ccLS 4-5; 47% were clinical stage T1a, 22% T1b, and 31% T2-4. Fig. 1c shows pathology distribution across ccLS. The sensitivity and specificity of ccLS >=4 in diagnosing ccRCC are 89.3% and 78.6%, respectively. The sensitivity and specificity of ccLS >=3 in diagnosing ccRCC are 97.6% and 56.1%, respectively. Diagnostic accuracy improved in higher stage tumors ($p = 0.0025$).

CONCLUSION

A non-invasive diagnosis of ccRCC in patients with renal masses using mpMRI can be achieved with reasonable clinical performance in a busy clinical practice with a large number of interpreting radiologists. ccLS performance improved in larger tumors.

CLINICAL RELEVANCE/APPLICATION

Implementation of ccLS in clinical practice can help reduce the number of renal biopsies prior to surgical resection (95.6% of ccLS 4-5 were malignant). Histologic prediction with mpMRI is improved in larger tumors.

SSGU01-02 Noninvasive Prediction of SSIGN Score in Clear Cell Renal Cell Carcinoma Using MR-based Radiomics

Participants
Ji Whae Choi, BA, Providence, RI (*Presenter*) Nothing to Disclose
Rong Hu, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Subhanik Purkayastha, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Thi My Linh Tran, BS, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Paul Zhang, MD, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Shaolei Lu, MD,PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
William S. Stavropoulos, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Yijun Zhao, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Zishu Zhang, MD, PhD, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Jing Wu, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Alvin C. Silva, MD, Scottsdale, AZ (*Abstract Co-Author*) Nothing to Disclose
Aidan McGirr, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Sun Ho Ahn, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Harrison X. Bai, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

ji_whae_choi@brown.edu

PURPOSE

To develop and assess a radiomics model for predicting the tumor stage, size, grade, and necrosis (SSIGN) score of clear cell renal cell carcinoma (ccRCC) using routine magnetic resonance imaging (MRI).

METHOD AND MATERIALS

A multicenter cohort of 364 ccRCC cases with preoperative T2-weighted and T1-contrast MRI and SSIGN calculation was included from 4 hospitals in the United States and China and The Cancer Imaging Archive. Images were divided into training and testing sets in an 8:2 ratio. Images were manually segmented using 3D Slicer software. For each image space, a total of 3,087 radiomics features were computed, including texture and non-texture features. All features were normalized and combined in one dataset with the clinical variables (age, gender, race, laterality, and location). 10 classifiers and 13 feature selection methods were screened to identify the most optimized pipeline for differentiation of ccRCCs with low (<4) SSIGN from those with high SSIGN (>4). In addition, TPOT, a Tree-Based Pipeline Optimization Tool was run on the dataset. TPOT was trained 10 times using 5-folds cross validation on training set of 291 patients. Then, the best performing model from our optimization process and the model generated by TPOT were tested on a set of 73 patients.

RESULTS

There were 272 cases with low SSIGN score (<4) and 92 cases with high SSIGN score (>=4). The Bayesian classifier along with Joint Mutual Information feature selection achieved a top test accuracy of 0.86 (CI:0.76-0.93), sensitivity of 0.74 (CI:0.51-0.89), and specificity of 0.91 (CI:0.80-0.96) with an area under the Receiver Operating Characteristic curve (ROC AUC) of 0.91. The TPOT exported pipeline achieved a test accuracy of 0.88 (CI: 0.78-0.94), sensitivity of 0.74 (CI:0.51-0.89), and specificity of 0.93 (CI:0.82-0.98) with a ROC AUC of 0.94. There was no significant difference in performance metrics between the hand optimized model from our optimization process and the pipeline selected by TPOT.

CONCLUSION

Radiomics model based on routine MRI can predict SSIGN score of ccRCC with good accuracy. This study suggests that radiomics has potential in predicting the prognosis of patients with ccRCC prior to any invasive management.

CLINICAL RELEVANCE/APPLICATION

Despite the prevalence of ccRCC, there is no method to predict its prognosis prior to an invasive therapy. Prognostic model based on MR radiomics will help in triaging care for patients with ccRCC.

SSGU01-03 AI Augmentation of Renal Tumor Diagnosis on Routine MR Imaging

Awards
Trainee Research Prize - Medical Student

Participants
Thi My Linh Tran, BS, Providence, RI (*Presenter*) Nothing to Disclose
Ji Whae Choi, BA, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Ben Hsieh, MS, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Robin Wang, BA, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Rong Hu, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Yijun Zhao, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Jing Wu, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Zishu Zhang, MD, PhD, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Alvin C. Silva, MD, Scottsdale, AZ (*Abstract Co-Author*) Nothing to Disclose
Michael C. Soulen, MD, Lafayette Hill, PA (*Abstract Co-Author*) Consultant, F. Hoffmann-La Roche Ltd Consultant, Guerbet SA Research support, Guerbet SA Research support, BTG International Ltd Proctor, Sirtex Medical Ltd
S. William Stavropoulos, MD, Bryn Mawr, PA (*Abstract Co-Author*) Research, Cook Group Incorporated Research, SillaJen, Inc Consultant, C. R. Bard, Inc
Harrison X. Bai, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

thi_my_linh_tran@brown.edu

PURPOSE

To develop and evaluate artificial intelligence (AI) based on deep learning routine magnetic resonance imaging (MRI) that classifies renal tumors

PURPOSE

To develop and evaluate a deep neural network model based on routine magnetic resonance imaging (MRI) that distinguishes between benign renal lesions and renal cell carcinoma.

METHOD AND MATERIALS

A total of 843 histolopathologically confirmed renal lesions with preoperative T1-postcontrast and T2-weighted MR imaging was retrospectively collected from two hospitals in the United States, two hospitals in China, and the Cancer Imaging Archive between 1984 and 2019. The cohort was divided into training, validation, and test sets in a 7:2:1 ratio. T1C and T2WI images were manually segmented on 3D Slicer software (v4.6). T1C and T2WI models were trained using ResNet50 architecture. Clinical variables (age, gender, and tumor volume) were fed into a logistic regression model for prediction of malignancy. Afterwards, an ensemble model combining the clinical variable logistic regression model, T1C model, and T2WI model were made using a bagging classifier. The test set was blindly evaluated by radiologists without and then with AI assistance.

RESULTS

There were 576 malignant tumors, including 389 (67.5%) clear cell renal cell carcinomas (RCCs), 124 (21.5%) papillary RCCs, 25

There were 576 malignant tumors, including 389 (67.5%) clear-cell renal cell carcinomas (RCCs), 124 (21.5%) papillary RCCs, 25 (4.3%) chromophobe RCCs, 27 (4.7%) clear cell papillary RCCs, and 11 (1.9%) other RCC subtypes. There were 267 benign tumors, including 89 (33.3%) oncocytomas, 171 (64%) angiomyolipomas, and 7 (2.7%) other subtypes. The final model achieved a test accuracy of 0.82 (95% CI: 0.72 - 0.89), sensitivity of 0.82 (95% CI: 0.73 - 0.89), specificity of 0.81 (95% CI: 0.71 - 0.88), ROC AUC of 0.88 (95% CI: 0.79 - 0.93), and PR AUC of 0.87 (95% CI: 0.77 - 0.92). Compared to all experts averaged, the final ensemble model combining MR imaging and clinical features had a higher test accuracy (0.82 vs 0.69, p = 0.014), sensitivity (0.82 vs 0.74, p = 0.158), and specificity (0.81 vs 0.59, p = 0.017) in test set. Assisted by the model's probabilities, the experts achieved a higher average test accuracy (0.83 vs 0.69, Δ = 0.14, p < 0.001), sensitivity (0.92 vs 0.74, Δ = 0.18, p < 0.001), and specificity (0.64 vs 0.59, Δ = 0.05, p = 0.458).

CONCLUSION

AI assistance improved radiologist performance in distinguishing benign from malignant renal mass.

CLINICAL RELEVANCE/APPLICATION

Machine learning using routine MRI provides a non-invasive method to differentiate renal cell carcinoma from benign mass. With further studies, the model can be integrated into clinical workflow as a tool to aid radiologists.

SSGU01-05 Prediction of Treatment Outcomes After Aspiration Sclerotherapy of Renal Cysts on Computed Tomography

Participants
Taekmin Kim, MD, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Sang Youn Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jeong Yeon Cho, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

kjambong@gmail.com

PURPOSE

To investigate predictive factors of treatment response following aspiration sclerotherapy of large renal cysts by computed tomography (CT).

METHOD AND MATERIALS

We retrospectively reviewed 62 patients (62.0 ± 14.1 years; M:F = 31:31) who underwent pretreatment CT and were treated with aspiration sclerotherapy of a large (>5cm) renal cyst using 99% ethanol from January 2015 to February 2019. Patients with polycystic kidney disease were excluded due to rapid growth rate of the cysts. All patients were followed-up at least two times, short-term (defined as <6 months, median 1 month) and long-term (defined as >1 year, median 13 months), by ultrasound or CT. Suboptimal treatment response was defined as the volume of residual cyst >20ml in each follow-up. Predictive variables of clinical, CT findings, and technical factors were analyzed by logistic regression analysis.

RESULTS

Technically, all the patients tolerated the procedures. Suboptimal treatment response rates were 40.3%, 19.4% at short-term and long-term follow-up, respectively. Median cyst diameter and volume reduction were 62.8% (IQR 53.2-70.8%), 94.8% (IQR 90.5-97.2%) in short-term follow-up, and 72.9% (IQR 63.2-82.9%), 98.0% (95.9-99.4%) in long-term follow-up. In multivariate analysis, patients with suboptimal treatment response in short-term follow-up showed more frequent estimated cyst volume >300ml (OR 14.1, 95% CI 3.31-60, P<0.001) and sinus protrusion (OR 9.8, 95% CI 1.03-93.01, P = 0.047). However, there was no significant independent factors for predicting treatment response in long-term follow-up.

CONCLUSION

Suboptimal treatment response in short-term follow-up were associated with greater estimated volume (>300ml) and protrusion to sinus of the cyst in pretreatment CT. However, these variables did not predict long-term treatment response.

CLINICAL RELEVANCE/APPLICATION

Large cysts (>300ml) or cysts with sinus protrusion had higher risk of incomplete collapse after aspiration sclerotherapy in short-term follow up, despite these factors did not affect long-term treatment response.

SSGU01-06 Complex Cystic Renal Lesions: CT Imaging-based Radiomics Model for Preoperative Malignancy Risk Stratification in Comparison with Bosniak Classification

Participants
Jeremy T. Dana, MD, Paris, France (*Presenter*) Nothing to Disclose
Thierry Lefebvre, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Peter Savadjiev, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Sylvain Bodard, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Olivier Helenon, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Caroline Reinhold, MD, MSc, Westmount, QC (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jeremy.dana@icloud.com

PURPOSE

To design a CT-based radiomics model to differentiate benign from malignant complex cystic renal lesions (CCRL)

METHOD AND MATERIALS

We conducted an international multicenter retrospective study that included adult patients with cystic renal lesions on a dedicated renal CT scan. Patients with genetic conditions associated with multiple renal cysts were excluded. The standard of reference

included histology and/or follow-up of at least 4 years by CT or MRI without any changes in the Bosniak classification. Bosniak classification was assigned in consensus by two experienced abdominal radiologists. In order to obtain a balanced distribution of CT features, the training and independent testing sets (from two different institutions) contained a similar number of patients in each Bosniak category. 3D radiomic features (212) were extracted from segmented whole volume renal cysts on contrast-enhanced (nephrographic phase) CT images using the PyRadiomics Python package. A random forest classifier was trained to differentiate malignant from benign CCRL. The 20 most important features for the diagnosis of malignancy were identified and a second model was trained, validated, and tested on this subset of features.

RESULTS

We included 149 CCRL in the training/validation set and 50 CCRL in the independent external testing set (10 Bosniak I, 9 Bosniak II, 12 Bosniak IIF, 9 Bosniak III and 10 Bosniak IV) between 2005 and 2018. Our model based on the 20 most important features resulted in a similar performance between the training set (AUC = 0.92 [0.83-1.00]) and the testing set (AUC = 0.92). Sensitivity, specificity, and balanced accuracy were 89%, 100%, and 91%. All benign CCRL were correctly predicted irrespective of Bosniak categories. The only proven malignant Bosniak IIF lesion in the testing dataset was predicted as benign using the random forest classifier but with a higher risk of malignancy than the benign Bosniak IIF lesions. Twelve of the sixteen malignant CCRL were correctly predicted.

CONCLUSION

Our radiomics model shows strong performance in distinguishing benign from malignant CCRL, especially for prediction of benign lesions. *This work was jointly funded by the Fonds de recherche du Québec - Santé (FRQS) and the Fondation de l'association des radiologistes du Québec (FARQ).*

CLINICAL RELEVANCE/APPLICATION

Bosniak classification allows stratification of the risk of malignancy of complex cystic renal lesions on CT scans. Its limitations lie in non-optimal grading of lesion complexity between categories IIF and III.

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SSGU05

Genitourinary (Gynecologic Oncology)

Wednesday, Dec. 2 10:00AM - 11:00AM Room: Channel 4

CT GI MR PH OI

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSGU05-01 Comparison of O-RAD Classification and Simple Features to Evaluate Adnexal Masses Using Ultrasound

Participants
Mostafa Atri, MD, Toronto, ON (*Presenter*) Nothing to Disclose
Fatemeh Nasri, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Jonathon Solnik, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose
Genevieve Bouchard-Fortier, Toronto, ON (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

mostafa.atri@uhn.ca

PURPOSE

To compare accuracy of ultrasound using simple features and O-RAD classification to predict benign/malignant nature of an adnexal mass

METHOD AND MATERIALS

This is an Institutional Ethics Board approved retrospective study with waiver of consent. Video clips of US examinations of adnexal masses of consecutive patients who underwent surgery at two institutions (one consisted of gynecologists and one gyne oncologists) were reviewed by an abdominal radiologist blinded to the final pathology. Lesions were scored as benign or malignant, using predetermined criteria for benignancy or malignancy. A mass was called benign if it was unilocular, multilocular without focal septal thickening or nodularity, contained low level echoes/mural echogenic foci/attenuating nodule (endometriotic cyst), echogenic attenuating component (dermoid) or hypoechoic attenuating component (fibrous tissue). Solid lesions without attenuation and cyst with nodularity were considered malignant. Additionally, lesions were scored using O-RAD classification of 2 to 5

RESULTS

Cohort consisted of 226 masses in 214 patients measuring 1cm - 23cm (median 7cm). There were 176 benign masses and 50 malignant (40 invasive and 10 low malignant potential) masses. Simple features review resulted in SEN of 0.88 (44/50), SPE of 94% (165/176), PPV of 80% (44/51) and NPV of 97% (165/171) for malignancy. Combining O-RAD 2&3 as an indication of a benign lesion and O-RAD 4&5 as an indication of a malignant lesion, corresponding numbers for O-RAD classification were 80% (40/50), 85% (149/176), 60% (40/67), and 94% (149/159). The percentage of malignancy in O-RAD 2 was 7% (6/87), O-RAD 3 9% (7/75), O-RAD 4 44% (19/43), and O-RAD 5 91% (20/22). The difference between the two approaches was not statistically significant ($p>0.05$).

CONCLUSION

Ultrasound evaluation of an adnexal mass using simple features performed as well as a more complicated O-RAD classification

CLINICAL RELEVANCE/APPLICATION

Simple ultrasound features can predict benign or malignant of an adnexal mass as well as more complicated O-RAD classification

SSGU05-02 Evaluation of the Efficacy of ACR O-Rads as a Stand-Alone Test Versus Its Efficacy When Combined With Contrast Enhanced Ultrasound (Ceus) for Definitive Characterisation of Adnexal Tumors

Participants
Shabnam B. Grover, MD,DMRD, Greater Noida, India (*Presenter*) Nothing to Disclose
Sayantan N. Patra, MBBS, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Hemal Grover, MBBS, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Pratima Mittal, MS, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose
Geetika Khanna, MD, New Delhi, India (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

shabnamgrover@yahoo.com

PURPOSE

The aim of this study was to evaluate stand-alone efficacy of O-RADS versus its efficacy when combined with contrast enhanced ultrasound (CEUS) using both qualitative (Qltv) & quantitative (Qntv) parameters (pa) for the definitive characterization of adnexal tumors.

METHOD AND MATERIALS

In this Institutional Review Board approved prospective study, 98 patients at primary presentation of adnexal tumors were

In this Institutional Review Board approved prospective study, 98 patients at primary presentation of adnexal tumors were recruited. Patients underwent ultrasound (US) examination by two evaluators: the first & second author, & O-RADS risk category was assigned to each tumor by consensus. The patients then underwent CEUS examination on a Siemens S-3000 contrast enabled scanner, following intravenous injection of 2.4 ml SonovueTM. Real time scan video clips were captured for 180 seconds. The clips were analyzed for Qltv pa: enhancement order, extent & contrast distribution. Software generated Time intensity curves (TIC) of each patient were evaluated for peak enhancement (PE), time to peak (TTP), area under TIC (AUC) & mean transit time (MTT). ROC curve analysis was performed for obtaining cut offs of quantitative CEUS parameters. Any two of three characteristic pa for Qltv & any three of four characteristic pa for Qntv CEUS, were considered favoring benignity/malignancy. Diagnostic tests were employed to evaluate efficacy of O-RADS as stand-alone & when combined with results of CEUS, using histology from biopsy/resection specimen as gold standard.

RESULTS

Of the evaluated tumors, 36 were benign & 62 were malignant. Using O-RADS risk stratification system alone, a sensitivity/NPV of 100% & diagnostic accuracy of 81.6% was obtained. However, specificity was 50%. Using ROC curve analysis, cut-off for malignancy using Qntv CEUS pa was: >35 dB for PE (AUROC: 0.959), <54 s for TTP (AUROC: 0.616), >860 dB s for AUC (AUROC: 0.980) & >31 for MTT (AUROC: 0.892) (Fig 1 with illustrative case). Using both Qltv & Qntv CEUS in combination with O-RADS, sensitivity, specificity, PPV, NPV & diagnostic accuracy was 92.2%, 91.2%, 95.2%, 86.1% & 91.8% respectively.

CONCLUSION

O-RADS as a stand-alone test shows high sensitivity & NPV, but poor specificity. However, specificity & diagnostic accuracy of O-RADS improves with addition of CEUS.

CLINICAL RELEVANCE/APPLICATION

O-RADS as stand-alone test shows good diagnostic performance for malignancy & management stratification of adnexal tumors; its only limitation of poor specificity can be overcome by addition of CEUS.

SSGU05-03 Interobserver Agreement in the Interpretation of Adnexal Masses Using International Ovarian Tumor Analysis Simple Rules and Ovarian-Adnexal Reporting and Data System Lexicon Descriptors

Participants
Neha Antil, MBBS,MD, Stanford, CA (*Presenter*) Nothing to Disclose
Edwina Chang, MD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Preethi R. Raghu, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Aya Kamaya, MD, Stanford, CA (*Abstract Co-Author*) Royalties, Reed Elsevier

PURPOSE

To quantify interobserver agreement and analyze causes of disagreement in assigning imaging features of adnexal masses using the International Ovarian Tumor Analysis (IOTA) simple rules and the Ovarian-Adnexal Reporting and Data System (O-RADS) lexicon descriptors.

METHOD AND MATERIALS

In this retrospective HIPAA-compliant IRB-approved study, pelvic ultrasound examinations in 74 women (mean age 45.0 ± 9.46years; range 20 to 84 years) with 77 adnexal masses were evaluated separately by two radiologists blinded to the diagnosis. Adnexal masses were evaluated according to 5 malignant and 5 benign feature categories of the IOTA simple rules and according to 9 feature categories that constitute O-RADS lexicon descriptors. Interobserver agreement in feature assignments was assessed with the Fleiss kappa (k) statistic. Interreader agreement was defined as poor (k<0.2), fair (k=0.2-0.39), moderate (k=0.4-0.59), substantial (k=0.6-0.79) or almost perfect (k=0.8-1).

RESULTS

IOTA: Interobserver agreement was almost perfect for all five malignant feature categories of the IOTA simple rules with k value of 0.90-0.95. Interobserver agreement was almost perfect for two of five benign feature categories (presence of solid component <7 mm and acoustic shadowing) with k value of 0.90-0.97. The remaining three benign feature categories (presence of unilocular cyst, smooth multilocular component and no color flow) and the final conclusion had moderate to substantial agreement with k value of 0.58, 0.66, 0.51, and 0.69 respectively.O-RADS: Agreement in interpretation was almost perfect for two feature categories (presence of ascites and peritoneal nodules) with k of 0.95- 1. Agreement in interpretation for remaining seven feature categories (lesion type, inner wall type, septation type, number of septa, number of solid component, contour of solid component and color score) and final conclusion was moderate to substantial with k ranging from 0.40-0.67.

CONCLUSION

The interreader agreement of the new ACR O-RADS has moderate to substantial agreement, similar to IOTA simple rules although individual features in IOTA had greater interobserver agreement.

CLINICAL RELEVANCE/APPLICATION

The ACR O-RADS introduced in 2019 provides a structured risk stratification and management system intended to improve US reporting of adnexal cystic lesions and provide management recommendations.

SSGU05-04 Good Interobserver Agreement for MRI-based 2018 FIGO Staging Parameters in Uterine Cervical Cancer

Participants
Kari Wagner-Larsen, Bergen, Norway (*Presenter*) Nothing to Disclose
Njal G. Lura, MD, Bergen, Norway (*Abstract Co-Author*) Nothing to Disclose
Julie Andrea Dybvik, MD, Bergen, Norway (*Abstract Co-Author*) Nothing to Disclose
Mari Halle, Bergen, Norway (*Abstract Co-Author*) Nothing to Disclose
Jone Trovik, MD, Bergen, Norway (*Abstract Co-Author*) Nothing to Disclose
Camilla Krakstad, PhD, Bergen, Norway (*Abstract Co-Author*) Nothing to Disclose
Ingfrid H. Haldorsen, MD, Bergen, Norway (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

kari.strono.wagner-larsen@helse-bergen.no

PURPOSE

Findings from pelvic MRI at primary diagnostic work-up are incorporated in the newly revised 2018 FIGO staging system for uterine cervical cancer, and routinely guide choice of treatment. This study aimed to evaluate interobserver agreement for critical MRI-based staging parameters in a large cervical cancer patient cohort.

METHOD AND MATERIALS

Totally 417 patients with histologically confirmed cervical cancer who had pelvic MRI at primary diagnostic work-up were included. The patients' MRI scans were read independently by three radiologists (with 4,10 and 20 years of MRI experience) blinded for clinical information/FIGO stage. MRI derived parameters relevant for the 2018 FIGO staging system were recorded; primary tumor size >= 2 cm/>= 4 cm, parametrial/locoregional tumor invasion and enlarged (short axis > 1 cm) pelvic/paraaortic lymph nodes indicating metastases. Overall and pairwise interobserver agreement for these staging parameters were assessed using Cohen's and Fleiss' kappa (k) and receiver operating characteristic (ROC) analysis.

RESULTS

Overall (pairwise) agreement among all observers in the evaluation of tumor size >= 2 cm, tumor size >= 4 cm, parametrial infiltration, lymph node metastases and tumor extension to the vagina was good with k values 0.79 (0.75-0.85), 0.77 (0.72-0.83), 0.63 (0.54-73), 0.63 (0.51-0.74) and 0.61 (0.55-0.68), respectively. For tumor extension to the pelvic wall, bladder and/or rectum or hydrourether agreement was only fair or moderate with k values of 0.30 (0.18-0.39), 0.48 (0.46-0.51) and 0.41 (0.28-0.54), respectively. ROC curves for the different observers for prediction of disease specific death yielded area under the curves (AUCs) of 0.69-0.72 for tumor size >= 2 cm, 0.70-0.77 for tumor size >= 4 cm, 0.66-0.73 for parametrial infiltration, 0.58-0.62 for lymph node metastases and 0.64-0.74 for tumor extension to the vagina.

CONCLUSION

Interobserver reproducibility for the MRI-based staging parameters tumor size >= 2 cm and >= 4 cm, parametrial infiltration, lymph node metastases and tumor extension to the vagina is good, supporting the robustness of these imaging parameters for safe incorporation into the 2018 FIGO staging system for uterine cervical cancer.

CLINICAL RELEVANCE/APPLICATION

Good interobserver reproducibility for critical MRI-based staging parameters supports the favorable role of MRI for pretherapeutic staging and treatment tailoring in uterine cervical cancer.

SSGU05-06 Agreement of 360°- Three-dimensional Transvaginal Ultrasound with Magnetic Resonance Imaging in Assessment of Vaginal Invasion in Cervical Cancer

Participants
Yi Zhu, Chengdu, China (*Presenter*) Nothing to Disclose
Man Lu, PhD, Chengdu, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

doczhuy@163.com

PURPOSE

The International Federation of Gynecology and Obstetrics (FIGO) staging system for cervical cancer was revised in 2018. Imaging evidence was included officially in the new staging system. 360°-three-dimensional transvaginal ultrasound (360°-3D TVUS) is an emerging, innovative diagnostic imaging tool. In this work, we aim to compare two-dimensional (2D) and 360°-3D TVUS with magnetic resonance imaging (MRI) as the gold standard in assessment of vaginal invasion of cervical cancer and to determine if all parts of the vaginal are equally assessable with ultrasound.

METHOD AND MATERIALS

Patients with macroscopically evident and histologically confirmed cervical cancer were staged using FIGO criteria and underwent MRI, and 2D and 360°-3D TVUS examination before treatment. When assessing vaginal invasion with 360°-3D TVUS and MRI, the vaginal was (virtually) divided into 12 points and 2 segments (the upper two-thirds, and the lower third of the vagina). The presence and the extent of vaginal invasion were recorded for each sector. Results of 2D, 360°-3D TVUS, and MRI were compared and reported in terms of percentage agreement and kappa value.

RESULTS

A total of 36 consecutive patients were included in the work. All patients underwent 360°-3D TVUS without adverse reactions. The percentage agreement between 2D TVUS and MRI in assessing vaginal invasion (yes or no) was 75% (kappa, 0.491) and that between 360°-3D TVUS and MRI was 96.9% (kappa, 0.842). The results of 2D TVUS showed the following agreement with those of MRI: 66.7% for the upper two-thirds of the vagina (kappa, 0.400), 75% for the lower third of the vagina (kappa, 0.667). The results of 360°-3D TVUS showed the following agreement with those of MRI: 92.3% for the upper two-thirds of the vagina (kappa, 0.713), 88.9% for the lower third of the vagina (kappa, 0.800). Compared with MRI, 360°-3D TVUS can more clearly show the extent and specific range of lesions invading the vagina, as well as the distance from the lowermost end of the lesion to the urethral opening and the cervical opening.

CONCLUSION

The results of 360°-3D TVUS showed good agreement with MRI, which is less costly and more readily available than MRI and should be considered in the pre-treatment work-up for cervical cancer.

CLINICAL RELEVANCE/APPLICATION

360°-3D TVUS is equal to MRI in detecting vaginal invasion and is recommended in the pre-treamt evaluation of cervical cancer

SSGU07

Science Session with Keynote: Genitourinary (PI-RADS)

Monday, Nov. 30 5:00PM - 6:00PM Room: Channel 4

RO

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSGU07-01 Genitourinary Keynote Speaker: PI-RADS: the Evolution Continues

Participants
Silvia D. Chang, MD, Vancouver, BC (*Presenter*) Nothing to Disclose

SSGU07-02 Predictive Value of Multi-parameter MRI PI-RADS v2.1 Combined Clinical Indicators for Clinically Significant Prostate Cancer

Participants
Shuyuan Zhong, Shenzhen, China (*Presenter*) Nothing to Disclose
Xiaoting Wei, MD,MD, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Zhiguang Ding, MD, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Jinsen Zou, MD, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Genwen Hu, MD, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Jianmin Xu, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

921969913@qq.com

PURPOSE

To investigate the diagnostic efficacy and application value of the Prostate Imaging Reporting and Data System version 2.1 (PI-RADS v2.1) combined with clinical indicators for clinically significant prostate cancer (CsPCa).

METHOD AND MATERIALS

Retrospectively analyzed 243 patients who underwent multi-parameter magnetic resonance imaging (mp-MRI) and prostate biopsy from Jan 2018 to Jun 2019, including 57 cases of CsPCa and 186 cases of non-CsPCa (21 clinically insignificant prostate cancer and 165 benign prostate hyperplasia). All mp-MRI images were scored using PI-RADS v2.1 and clinical data as following were collected: age, PSA, fPSA/tPSA, PV, and then calculated PSA density (PSAD). Univariate analysis were performed, and logistic regression was carried out on the statistically significant indicators to build a combined risk model. Diagnostic performance was evaluated by receiver operating characteristic (ROC) curve, calibration curve and decision curve.

RESULTS

PI-RADS v2.1 score, age, PSA, fPSA/tPSA, PV and PSAD were all statistically significant between the CsPCa group and the non-CsPCa group, with the AUC was 0.934, 0.588, 0.738, 0.733, 0.719, and 0.845, respectively. Logistic regression analysis showed that PI-RADS v2.1 score and PSAD were independent predictors of CsPCa; with the cutoff value were 4 and 0.17ng/ml/ml. The AUC of the combined risk model was 0.959 (P<0.0001, sensitivity 91.23%, specificity 88.71%, positive predict value 71.2%, negative predict value 97.1%), which was statistically larger than PI-RADS v2.1score (Z=3.062, P<0.05) and PSAD (Z=4.222, P<0.05) alone. The model illustrated good calibration with mean absolute error was 0.008. Decision curve analyses showed good performance in predicting CsPCa when the risk threshold was 0.05 or above compared to PI-RADS v2.1 score and PSAD. Combined PI-RADS v2.1 score and PSAD for risk stratification. It is a low risk area with a extremely low CsPCa positive rate when PI-RADS v2.1 score <=2 and PSAD <=0.27 ng/ml/ml, or PI-RADS v2.1 score = 3 and PSAD <0.17 ng/ml/ml. In contrast, PI-RADS v2.1 score = 3 and PSAD >0.27 ng/ml/ml, or PI-RADS v2.1 score> =4 and PSAD> =0.17 ng/ml/ml, was associated with CsPCa positive rate over 30%.

CONCLUSION

Combined risk model including PI-RADS v2.1 score and PSAD clinically relevanted CsPCa better than PI-RADS v2.1 score and PSAD alone. Its application in clinical decision may result in a net benefit.

CLINICAL RELEVANCE/APPLICATION

The combined risk model based on PI-RADS v2.1 score and PSAD showed great potential in improving the efficacy of predicting CsPCa compared to the results of Chinese Prostate Cancer Consortium Risk Calculator, European Randomized Study for Screening of Prostate Cancer Risk Calculator and Prostate Cancer Prevention Trial Risk Calculator (Chen R., Urol Oncol, 2016). It may be helpful for puncture decision-making and follow-up strategy.

SSGU07-03 Understanding Prostate MR PI-RADS 3: A Longitudinal Study

Participants
Andres Camacho, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Fatima Salah, MD, Boston, MA (*Presenter*) Nothing to Disclose
Camden P. Bay, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jonathan Waring, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nicola M. Hughes, MBBCh, Dublin, Ireland (*Abstract Co-Author*) Nothing to Disclose

Renato Umeton, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Andriy Fedorov, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Michelle Hirsch, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Clare M. Tempany-Afdhal, MD, Charlestown, MA (*Abstract Co-Author*) Nothing to Disclose
Massimo Loda, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Fiona M. Fennessy, MD,PhD, Brookline, MA (*Abstract Co-Author*) Consultant, VirtualScopics, Inc

For information about this presentation, contact:

FFENNESSY@BWH.HARVARD.EDU

PURPOSE

To determine the incidence of subsequent clinically significant prostate cancer (csPCa) in men with a PI-RADS V2.0 assessment category 3 (PR-3) on prostate multiparametric MRI (mpMRI).

METHOD AND MATERIALS

In this HIPAA-compliant, IRB approved retrospective study, we identified 3,238 men who underwent mpMRI between 07/01/14-08/22/19. From the mpMRI report, we identified all men with a PR-3 (n=423). We excluded those with a prior diagnosis of csPCa (Gleason Score [GS] >= 3+4) (n=42), prior prostate treatment (n=17) or those with no follow-up pathology (n=42). Procedure-related data was recorded for all PR-3: type (biopsy/surgery); number per patient; and timing of procedure. Serum PSA, prostate volume and PSA density at the time of mpMRI was recorded. Reference pathology from prostatectomy over biopsy, or the highest GS from all biopsies, were used to classify patients as having no PCa, non-csPCa (GS=3+3), or csPCa. The Tukey-Kramer pairwise comparison test was used to compare mean prostate volume, PSA and PSA density. Poisson regression was used to compared procedure number per patient among groups.

RESULTS

292 men (age: 63.3±7.4 years) with a PR-3 underwent 713 procedures: biopsy (n=639; 90%), prostatectomy (n=59; 8%), transurethral resection 2% (n=15; 8%). The follow-up period was <1 to 4.9 years. Pathology outcomes were: csPCa 26% (n=77), non-csPCa 51% (n=149), no PCa 23% (n=66). Those who were diagnosed with csPCa did so over 8.3±10.2 months [0.13-48.7]. The csPCa group had lower prostate volumes (56.1±50.8mL) compared to no PCa (82.9±54.2mL; p<0.0001), and higher PSA densities (0.162±0.100ng/mL2) vs. non-csPCa (0.114±0.089 ng/mL2) and vs. no PCa (0.119±0.114ng/mL2), p<0.02 for both. Those who were diagnosed with PCa had greater number of procedures (2.8±1.2 and 2.6±1.3 for csPCa and non-csPCa) compared to those with no PCa (1.7±1); p< 0.0001.

CONCLUSION

In this population 26% were diagnosed with csPCa within 8.3±10.2 months [0.13-48.7] of PR-3 assessment. Those who were diagnosed with csPCa had a higher PSA density at the time of mpMRI. A subsequent diagnosis of PCa in those with a PR-3 on MRI is associated with a higher number of procedures.

CLINICAL RELEVANCE/APPLICATION

Clinically significant prostate cancer is common in those with PI-RADS 3 assessment on MRI. It is associated with increase in PSA density and increased number of procedures for pathological diagnosis.

SSGU07-04 Two Readers Validation of Prostate Imaging Reporting and Data System (PI-RADS) version 2.1 for Detection of Prostate Cancer with Whole Mount Histopathology Correlation on 3 Tesla Multiparametric MRI

Participants
Voraparee Suvannarerg, MD, Bangkok , Thailand (*Presenter*) Nothing to Disclose
Teeravut Tubtawee, MD, Hatyai, Thailand (*Abstract Co-Author*) Nothing to Disclose
Melina Hosseiny, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Sohrab Afshari Mirak, MD, Beverly Hills, CA (*Abstract Co-Author*) Nothing to Disclose
Holden H. Wu, PhD, Los Angeles, CA (*Abstract Co-Author*) Institutional research support, Siemens AG
Kyunghyun Sung, PhD, Los Angeles, CA (*Abstract Co-Author*) Research support, Siemens AG
Ely R. Felker, MD, Pacific Plsds, CA (*Abstract Co-Author*) Nothing to Disclose
Anthony Sisk, DO, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Robert E. Reiter, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
David Y. Lu, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (*Abstract Co-Author*) Consultant, Johnson & JohnsonConsultant, Bayer AGConsultant, Merck & Co, IncConsultant, Amgen IncConsultant, Profound Medical Inc

For information about this presentation, contact:

voraparee.suv@gmail.com

PURPOSE

To determine the diagnostic performance of PI-RADS v2.1 to diagnose prostate cancer (PCa) on 3 Tesla multiparametric MRI (3TmpMRI) with Whole Mount Histopathology Correlation (WMHP).

METHOD AND MATERIALS

With IRB approval and HIPAA compliance the study cohort 367 comprised consecutive patients with 514 3TmpMRI derived lesions between December 2013 and June 2019 prior to robotic-prostatectomy (RALP) and WMHP. All peripheral zone (PZ) lesions were retrospectively reviewed according to PI-RADS v2.1 and transitional zone (TZ) lesions were evaluated with both PI-RADS v2.1 and v2.0 by two genitourinary radiologists (GU-R). All discrepancies PI-RADS scores were consensus with senior GU-R. The diagnostic performance was calculated including sensitivity, specificity, PPV, NPV, and area under curve (AUC) for PI-RADS assessment threshold categories >= 3 and >= 4 to diagnose PCa and clinically significant PCa (csPCa > Gleason group 2). The weighted kappa method was used to calculated inter-reader reliability.

RESULTS

In the 514 lesions study cohort, 87.5% (450/514), and 74.7% (384/514) were PCa and csPCa while 12.5% (64/514) were benign. The detection rate of csPCa for PI-RADS v2.1 category 2, 3, 4, and 5 were 4.8% (1/21), 35% (35/100), 85.5% (201/235), and 93% (147/158), respectively. The AUC of TZ lesions was higher than PZ lesions (Table1). The inter-reader agreement of whole gland (K=0.76) and PZ lesions (K=0.80) was significantly higher than for TZ lesions (K=0.60). PI-RADS v2.1 in TZ lesions had higher sensitivity and NPV and lower specificity for diagnosing PCa and csPCa when compared with v2.0 by using threshold score >= 3 and score >= 4. The detection rate of csPCa in the TZ for PI-RADS v2.1 vs 2.0 for score 2 was 0% vs 12.5%. The csPCa detection rate in the TZ was similar for PI-RADS v2.1 vs 2.0 for scores 3 (34.7%, 39.5%), 4 (80%, 78.6%), and 5 (92.9%, 95%), respectively.

CONCLUSION

In this study there was excellent inter-reader agreement for whole gland and PZ and good agreement for TZ. Over performance for diagnosing PCa and csPCa using PI-RADS v2.1 was high.

CLINICAL RELEVANCE/APPLICATION

PI-RADS v2.1 has a high diagnostic performance to diagnose PC and csPC with high inter-reader reliability.

SSGU07-05 Comparison of PI-RADS v2.0 and v2.1 for Evaluation of Transition Zone Lesions: A 5-Reader 202-Patient Analysis

Participants
Nancy Kim, MD, Washington, DC (*Presenter*) Nothing to Disclose
Sooah Kim, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Vinay Prabhu, MD, Brooklyn, NY (*Abstract Co-Author*) Nothing to Disclose
Krishna Prasad Shanbhogue, MD, Jersey City, NJ (*Abstract Co-Author*) Nothing to Disclose
Paul Smereka, MD, Brooklyn, NY (*Abstract Co-Author*) Nothing to Disclose
Angela Tong, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Rebecca Anthopolos, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Samir S. Taneja, MD, New York, NY (*Abstract Co-Author*) Royalties, Reed Elsevier; Consultant, TROD Medical; Consultant, InSightec Ltd; Consultant, Boston Scientific Corporation; Consultant, Johnson & Johnson; Investigator, MDxHealth SA
Andrew B. Rosenkrantz, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To compare PI-RADS v2.0 and v2.1 for evaluation of transition zone (TZ) lesions.

METHOD AND MATERIALS

The study included 202 patients who underwent 3T prostate MRI showing a TZ lesion that was later biopsied with MRI/US fusion. 5 abdominal imaging faculty reviewed T2WI and high-b/ADC image sets in 2 sessions. Cases were randomized using a crossover design whereby half in the 1st session were reviewed using v2.0 and the other half using v2.1, and vice versa for the 2nd session. Readers, informed of the location of the biopsied lesion, provided T2WI and DWI scores using v2.0 or v2.1 criteria. PI-RADS scores were derived.

RESULTS

Inter-reader agreement had kappa of 0.36 for v2.0 and 0.25 for v2.1. For 4 readers, the percentage of lesions retrospectively-scored PI-RADS 1 increased >5% from v2.0 to v2.1 (R2: 0% to 11%; R3: 7% to 25%; R4: 0% to 19%; R5: 0% to 31%). For 4 readers, the percentage scored PI-RADS 2 decreased >5% (R1: 23% to 17%; R3: 41% to 25%; R4: 50% to 17%; R5: 41% to 26%). For 2 readers, the percentage scored PI-RADS 3 decreased >5% (R2: 33% to 27%; R5: 39% to 22%), and for 2 readers increased >5% (R1: 32% to 37%; R4: 15% to 27%). The percentage of PI-RADS 4 and 5 lesions changed <5% for all readers. For the 4 readers with increased frequency of retrospectively-scored PI-RADS 1 lesions using v2.1, these PI-RADS 1 lesions were GS >=3+4 in 4%, 8%, 8%, and 16%. Frequency of GS >=3+4 in PI-RADS 3 lesions increased for R3 (36% to 43%) and R5 (33% to 38%) and decreased for R4 (37% to 26%). Sensitivity of PI-RADS >=3 for GS >=3+4 ranged 76-90% for v2.0 and 69-96% for v2.1. Specificity ranged 32-64% for v2.0 and 25-72% for v2.1. PPV ranged 43-55% for v2.0 and 41-58% for v2.1. NPV ranged 82-87% for v2.0 and 81-91% for v2.1. PPV and NPV varied <10% between v2.0 and v2.1 for all readers.

CONCLUSION

TZ inter-reader agreement was poor for both versions, but worse for v2.1. Though v2.1 resulted in a large shift from a score of 2 to 1, 4-16% of retrospectively-scored PI-RADS 1 were GS >=3+4. v2.1 yielded an inconsistent small increase or decrease in PI-RADS 3 lesions. v2.0 and v2.1 both demonstrated variable performance, with inconsistent small shifts in accuracy between versions and no clear improvement for v2.1.

CLINICAL RELEVANCE/APPLICATION

The observed reduced inter-reader agreement and lack of improvement in diagnostic accuracy raise concern regarding the clinical performance of PI-RADS v2.1.

SSHS03

Health Service, Policy and Research (Patient and Family Centered Care)

Sunday, Nov. 29 5:00PM - 6:00PM Room: Channel 4

BR HP OI PR SQ

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSHS03-01 Point-of-Care Synchronous Virtual Radiology Consultations: Preliminary Results from A Cluster-Randomized Study in Primary Care Patients

Awards
Trainee Research Prize - Fellow

Participants
Dania Daye, MD, PhD, Medford, MA (*Presenter*) Nothing to Disclose
Evita Joseph, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nikhita Nambiar, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Garrett Chinn, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Efren J. Flores, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Susan E. Bennett, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Avinash R. Kambadakone, MD, Boston, MA (*Abstract Co-Author*) Research Grant, General Electric Company; Research Grant, Koninklijke Philips NV

For information about this presentation, contact:

dania.daye@gmail.com

PURPOSE

Synchronous virtual visits are an emerging model of care and their feasibility has been demonstrated in radiology. The purpose of this study is to assess the value of point-of-care virtual radiology consultations in a randomized study.

METHOD AND MATERIALS

In this IRB-approved feasibility study, 91 patients were enrolled between September 2019 and February 2020. Patients were cluster-randomized to control (n=47) and intervention arms (n=44) with the following inclusion criteria of: 1) age >45 years; 2) consult with PCP; 3) a recent CT of the chest or abdomen. The patients in the control and intervention arms were age- and gender-matched. In the intervention arm, a virtual real-time radiology consultation with referring PCPs and the patient was conducted with review of CT images focused on extent of vascular atherosclerosis. In the control arm, PCPs followed the standard of care without virtual radiology consultation. Primary study endpoints consisted of patient-reported understanding of their disease and changes in PCP prescriptions of statins and anti-hypertensives. Data was collected via internally-validated surveys. Statistical significance was assessed using Fisher's exact test.

RESULTS

30 patients in the intervention arm and 25 patients in the control arm completed the study (Control: 66% female, mean age: 71 years; intervention: 67% female, mean age: 66 years). Discussion of the imaging findings by the PCP with the patient occurred in all patients in the intervention arm, while discussion of imaging findings by PCP with the patients occurred only in 2 in every 5 cases in the control arm (P<0.001). All patients in the intervention arm indicated that seeing or discussing their images improved their understanding of their disease while only 2 in every 4 patients in the control arm did (P=0.04). In the intervention arm, 33% of patients left the PCP visit with a change in a prescription for statins or antihypertensives, while only 12% of patients in the control arm did (P=0.03).

CONCLUSION

Preliminary results from a cluster-randomized trial shows that radiology-led virtual visits has a positive effect on patient shared decision-making metrics and might change PCP management decisions.

CLINICAL RELEVANCE/APPLICATION

Virtual radiology consults have the potential to advance radiology's value in care delivery by providing more personalized radiology care and by promoting patient-centered practice models.

SSHS03-02 Prospective Survey of Hepatobiliary Conference Cases at an Oncology Center: Role of Imaging and Impact of Imaging Errors on Management

Participants
Veronica L. Cox, MD, Houston, TX (*Presenter*) Nothing to Disclose
Hyunseon C. Kang, MD, PhD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Sireesha Yedururi, MBBS, Sugar Land, TX (*Abstract Co-Author*) Nothing to Disclose
Leonardo P. Marcal, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Roland Bassett Jr, Houston, TX (*Abstract Co-Author*) Research Grant, Lantheus Medical Imaging, Inc
Elena Panettieri, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose
Yoshikuni Kawaguchi, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

Jean-Nicolas Vauthey, MD, Houston, TX (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

vcox1@mdanderson.org

PURPOSE

Subspecialty imaging plays a key role in patient management. In complex oncologic cases, radiologist errors can complicate management plans or potentially set them on the wrong course altogether. The purpose of our project is to prospectively characterize the role of imaging in hepatobiliary cases presented at multidisciplinary conference (MDC) at an oncology center, and attempt to quantify the impact of second review on management.

METHOD AND MATERIALS

113 cases referred to hepatobiliary MDC for review and discussion as per hospital routine were prospectively collected and classified into groups according to referral information, presence of imaging errors, original management plan (prior to MDC) and final management plan (after MDC).

RESULTS

The majority of cases (80%) were referred to hepatobiliary MDC for clinical rather than specific imaging questions (usually "treatment selection"); management depended upon imaging findings 96% of the time. Original imaging interpretation was revised by liver MDC radiologists 36% of the time, with most revisions made to reports by abdominal imagers who are not part of the liver MDC ($p=0.03$). Revisions to original interpretation resulted in a change of management 42% of the time. Colorectal liver metastases (CLM) and cholangiocarcinoma cases were the most frequently revised, with most management changes occurring from revisions to CLM cases (41%). Clinical and imaging questions were answered by available imaging 95% of the time, rarely needing further imaging or biopsy. Liver-group radiologists reviewed an average of 5 imaging studies per case, with a range of 1-14.

CONCLUSION

Management for the vast majority of cases brought to conference was dependent upon imaging findings; the decisions were made using available imaging, often multiple priors, without need for further studies. Input of liver MDC radiologists resulted in revised management 42% of the time. Most revisions were made to reports originally done by abdominal imagers without liver-focused specialization.

CLINICAL RELEVANCE/APPLICATION

Second review of challenging hepatobiliary cases by organ-focused imagers impacts management in up to 42% of cases.

SSHS03-03 Improved Readability of the Screening Mammography Recall Lay Letter Improves Patient Follow-up

Participants
Derek Nguyen, MD, Baltimore, MD (*Presenter*) Nothing to Disclose
Susan C. Harvey, MD, Danbury, CT (*Abstract Co-Author*) Vice President of Global Medical Affairs, Breast and Musculoskeletal Division of Hologic, Inc.
Eniola T. Oluyemi, MD, Lutherville, MD (*Abstract Co-Author*) Nothing to Disclose
Kelly Myers, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Lisa A. Mullen, MD, Cockeysville, MD (*Abstract Co-Author*) Nothing to Disclose
Emily Ambinder, MD, MSc, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

dnguye80@jhmi.edu

PURPOSE

The importance of written patient communication comprehension has increased as many patients are choosing to take a more active role in their health care. In the setting of an abnormal screening mammogram, the Mammography Quality Standards Act (MQSA) mandates that patients receive a mailed "recall" lay letter informing them to return for additional follow-up imaging. MQSA states that the language used in this letter should be "easily understood by a lay person." The Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) recommend that all written patient communication should have between a 6th and 8th grade reading level. On February 15, 2019, our institution revised the language of our recall lay letter to the appropriate 6th grade reading level from a 12th grade reading level. This was implemented across all four of our institution's outpatient breast imaging sites. We hypothesize that the lack of readability of our previous recall lay letter may have led to patient misinterpretation, thus resulting in delayed or no patient follow-up. Therefore, the purpose of our study is to analyze the effect of implementing an updated letter on patient follow-up rates.

RESULTS

This study included 1987 patients in the pre-intervention group and 2210 patients in the post-intervention group. The overall patient follow-up rate within 60 days increased from 90.0% (1790/1987) in the pre-intervention group to 93.9% (2076/2210) in the post-intervention group ($p < 0.001$). The imaging site serving the population with the lowest percentage (81.5%) of high school graduates or higher had the most improvement in follow-up within 60 days from 86.0% (208/242) to 93.3% (237/254) ($p = 0.01$). The imaging site serving the population with the highest percentage (96.5%) of high school graduates or higher initially began with a high follow-up rate and did not significantly change after the intervention from 94.0% (625/665) to 94.9% (732/771) ($p = 0.5$). Overall, even when controlling for imaging site, patients in the post-intervention group had 1.68 increased odds of returning for a diagnostic follow-up examination within 60 days compared to the pre-intervention group (95% CI 1.34-2.11). When controlling for intervention group, however, patients from the imaging site serving the population with the lowest education level had 0.52 decreased odds of returning for follow-up examination within 60 days (95% CI 0.36-0.75). Therefore, while the intervention overall improved patient follow-up, disparities based on education persisted.

CONCLUSION

Revising our institution's recall lay letter to an appropriate reading grade level significantly improves timely patient follow-up in the setting of an abnormal screening mammogram. Our data demonstrates the direct impact of improved readability on patient follow-up

adherence to the federally mandated written patient communication, particularly in setting of lower education. Thus, revising the language utilized in screening mammography recall lay letters to less than an 8th grade reading level can positively impact patient adherence and facilitate more inclusivity for patients of diverse educational backgrounds. This will enable better patient understanding of these letters and increase the effectiveness of breast cancer screening for women of all educational levels.

METHODS

This retrospective study reviewed data from all screening mammograms at our institution with a Breast Imaging Reporting and Data System (BI-RADS) 0 assessment excluding technical recalls between 2/15/18-2/14/19 (pre-intervention group) and 2/15/19-2/14/20 (post-intervention group). Studies were performed at our institution's four breast imaging sites, each serving a geographically different patient population. The most common zip code among patients attending screening mammography at each site was used as a general representation for the educational diversity of each population. The percentage of high school graduates or higher derived from these zip codes was obtained from the 2013-2017 US Census Bureau. Our primary outcome was the percentage of patients in each intervention group who returned for their diagnostic follow-up examination within 60 days (standard recommended by the CDC). We evaluated this outcome overall and stratified by imaging site using the Chi square test. Multivariate logistic regression was done to estimate odds ratios and 95% confidence intervals for follow-up within 60 days with intervention group and imaging site included as covariates.

SSHS03-04 Cascade of Care Framework Can Examine Racial Disparities in Adherence among Patients with Incidental Pulmonary Nodules

Participants
Rebecca A. Schut, BA, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Eduardo J. Mortani Barbosa JR, MD, Philadelphia, PA (*Presenter*) Research Consultant, FluiddaResearch Grant, Siemens AG

PURPOSE

To assess the value of a cascade of care framework for evaluating racial disparities in adherence to follow-up of incidental pulmonary nodules.

METHOD AND MATERIALS

We reviewed electronic medical record and U.S. Census data for 1,562 patients diagnosed with incidental pulmonary nodules identified on chest CT in a tertiary healthcare system in 2016, and examined their follow-up adherence cascades until 2019.

RESULTS

Disparities between non-White/White patients exist on each step of the adherence pathway, particularly between diagnosis and provider-patient communication of incidental findings (55% for Black patients, 80% for Whites); between communication and ordering/scheduling of follow-up imaging/procedures, and between ordering/scheduling and timely adherence (29% for Black patients, 54% for Whites). Modeling adherence, we find non-White patients present increased odds of never adhering and delaying adherence compared with White patients (OR 1.3 and 2.5 for Black patients, respectively, $p < 0.05$), controlling for sociodemographic, communication, and health characteristics.

CONCLUSION

We demonstrate substantial gaps in adherence to follow up of incidental pulmonary nodules between non-White/White patients, which is lessened by provider-patient communication. Moreover, our methods can pinpoint exactly where in the pathway towards adherence patients may fall off (Figure 1), enabling specific target for health policy interventions.

CLINICAL RELEVANCE/APPLICATION

Our research has major implications for clinical practice and public health policy, as adherence disparities are a key mechanism through which health disparities across racial groups continue to be produced and maintained, leading to worse outcomes for disadvantaged racial/ethnic groups.

SSHS03-05 Longitudinal Changes in Multiple Sclerosis Patient-Reported Financial Toxicity and Its Impact on Clinical Care and Imaging Non-Adherence

Participants
Gelareh Sadigh, MD, Atlanta, GA (*Presenter*) Research funded, TailorMed Medical Inc
Jeffrey Switchenko, PhD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Neil Lava, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Richard Duszak JR, MD, Atlanta, GA (*Abstract Co-Author*) Advisor, Ethos Medical, Inc; Shareholder, Ethos Medical, Inc
Richard Duszak JR, MD, Atlanta, GA (*Abstract Co-Author*) Advisor, Ethos Medical, Inc; Shareholder, Ethos Medical, Inc
Elizabeth A. Krupinski, PhD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Carolyn C. Meltzer, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Danny Hughes, PhD, Reston, VA (*Abstract Co-Author*) Nothing to Disclose
Ruth C. Carlos, MD, MS, Ann Arbor, MI (*Abstract Co-Author*) In-kind support, Reed ElsevierEditor, Reed Elsevier

For information about this presentation, contact:

gsadigh@emory.edu

PURPOSE

To assess longitudinal changes in health-related financial toxicity (FT) in multiple sclerosis (MS) patients and their impact on care non-adherence.

METHOD AND MATERIALS

Adult patients with new or established diagnoses of MS visiting an outpatient neurology clinic were prospectively recruited. FT was measured at baseline, 3, 6, 9 and 12 months using the Comprehensive Score for Financial Toxicity (COST) score (range 0-44, the lower the score, the worse the FT). Independent correlates of FT and changes in FT over time were identified using linear regression. Cost-related care non-adherence was defined as patients reporting delaying, forgoing, or changing MS medications, office visits, laboratory, and imaging testing due to cost concerns. Associations of overall care non-adherence (at any time point)

with baseline COST scores and changes in adherence compared with changes in COST scores at baseline and 12 months were assessed using ANOVA.

RESULTS

In all, 242 patients were recruited (43±13 years; 77% female; 47% White). Mean COST scores at baseline and 12 months were 17.4±10.1 and 19.4±11.1, respectively (P=0.09). Baseline financial self-efficacy (i.e., confidence in managing money) was the only independent predictor of COST that remained significant at all time points (B coefficient, 1.15 [95% CI, 0.89-1.41] at baseline; and 0.99 [95%CI, 0.54-1.43]) at 12 months; P<0.001). No independent predictors for changes in COST score were identified. Overall, 85% reported care non-adherence. Patients with care non-adherence had significantly greater FT at baseline (mean COST, 13.3) compared to those without care non-adherence (23.9) (P<0.001). Patients with improved adherence at 12 months reported a mean improvement of 7.8 in FT vs. those with persistent (mean -0.39 change in FT) and worsened non-adherence at 12 months (mean 0.6 change in FT) (p=0.007).

CONCLUSION

Although patients with MS are at high risk for FT, their degree of FT does not change over time. However, changes in FT as an adverse event of care is associated with changes in care (including imaging) non-adherence.

CLINICAL RELEVANCE/APPLICATION

Financial self-efficacy is a predictor of FT. Targeting interventions to improve financial self-efficacy may reduce FT and improve both clinical care and imaging non-adherence.

SSHS03-06 Impact of a Multidisciplinary Cancer Diagnostic Service on Wait Times for Image GuidedBiopsy in Patients with Suspected New or Metastatic Cancer

Participants
Isha Gujrathi, MD,DMRD, Brookline, MA (*Presenter*) Nothing to Disclose
Louise I. Schneider, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Kerry Kilbridge, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Oreofe Odejide, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Ann Pinto, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Luke Arney, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Ramin Khorasani, MD, Roxbury Crossing, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

igujrathi@bwh.harvard.edu

PURPOSE

Determine impact of a multidisciplinary Cancer Diagnostic Service (CDS) on Image-guided biopsy wait-times for patients with suspected new or metastatic cancer.

METHOD AND MATERIALS

This retrospective Institutional Review Board-approved study was conducted at a tertiary urban inpatient and ambulatory medical center between 10/1/2017-5/31/2019. Care plans for referred patients were devised by the CDS team, composed of 2 oncologists, 2 PCPs, a radiologist and a physician assistant who evaluated all relevant patient information in conference before PCP evaluated the patient in clinic. We compared the primary outcome, time from initial clinic appointment to tissue biopsy, in 125 of 439 total CDS patients who had image-guided biopsy to 125 randomly selected matched biopsy patients who were not cared for by CDS. Secondary outcome was need for second intervention due to inconclusive initial biopsy. Difference in mean number of days was assessed with unpaired two tailed t-test for unequal variances. We used t-test to assess secondary outcome defined as need for second intervention due to inconclusive initial biopsy.

RESULTS

The mean time to biopsy for the CDS patients was 40% lower than the non-CDS patients (6.2 days for CDS vs. 10.4 days for non-CDS; (10.4-6.2)/10.4 x 100=40%; p<0.0001). CDS patients had a 1.37 times higher relative risk of a repeat biopsy (p=0.63).

CONCLUSION

CDS patients had 40% shorter wait times for image-guided biopsy. Radiologist-embedded multi-disciplinary clinic evaluation and management of suspected new or metastatic cancer patients may improve patient experience by reducing wasted fear associated with longer wait times to establish a diagnosis. Although a higher proportion of CDS patients had repeat biopsy, the difference was not statistically significant. Future studies may be helpful to assess potential contributors to repeat biopsies in CDS patients.

CLINICAL RELEVANCE/APPLICATION

Radiologist embedded multidisciplinary Cancer Diagnostic Service clinics for management of suspected new or metastatic cancer patients may help to expedite time to image-guided biopsy and thus reduce wasted fear associated with longer wait times to establish a diagnosis, enhancing overall patient experience.

SSIN01

Informatics (Artificial Intelligence: The Cutting Edge)

Tuesday, Dec. 1 2:00PM - 3:00PM Room: Channel 5

RO

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSIN01-01 One Click Guided Automatic RECIST Lesion Measurement and Segmentation on CT Scans

Awards
Trainee Research Prize - Fellow

Participants
Youbao Tang, PhD, Bethesda, MD (*Presenter*) Nothing to Disclose
Ke Yan, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Jing Xiao, Shenzhen, China (*Abstract Co-Author*) Nothing to Disclose
Ronald M. Summers, MD,PhD, Bethesda, MD (*Abstract Co-Author*) Royalties, iCAD, IncRoyalties, Koninklijke Philips NVRoyalties, ScanMed, LLCResearch support, NVIDIA Corporation

For information about this presentation, contact:

tybxiaobao@gmail.com

PURPOSE

Lesion RECIST (Response Evaluation Criteria in Solid Tumors) measurement and segmentation from computed tomography (CT) scans are important tasks in oncology image analysis for assessing disease progression and therapy response. Manual lesion measurement and segmentation are tedious, time-consuming and subject to inter-observer variability. To reduce this manual burden and inconsistency, we propose a unified framework ("SEANet") for automatic and joint lesion SEgmentation and RECIST Annotation on a variety of lesion types throughout the body with only one click guidance.

METHOD AND MATERIALS

SEANet has two main parts performed by two convolutional neural networks. The first part extracts the lesion of interest with one-click guidance and predicts the lesion segmentation and RECIST measurement by multi-task learning. The second part refines the lesion segmentation and RECIST measurement by learning highly discriminative features and considering multi-scale contextual information. SEANet was trained and tested on the large-scale DeepLesion dataset composed of 32,735 CT lesion images annotated with RECIST measurements from 10,594 studies of 4,459 patients. 1,000 images were randomly selected from 500 patients and manually segmented as a segmentation test set. 500 lesions from 200 patients had three manual RECIST annotations and were used for the RECIST test set. The remaining patients' images served as training (90%) and validation (10%) sets.

RESULTS

For RECIST annotation, the long and short axis diameter differences of SEANet compared to the manual reference standard were 2.8±4.0 mm and 2.1±3.5 mm, while those for the human readers were 3.4±5.2 mm and 2.9±4.5 mm, respectively. These results demonstrate that our system performs more stably. For lesion segmentation, SEANet achieved a Dice score of 0.912±0.039.

CONCLUSION

SEANet allowed clinicians to easily control which lesion to segment and measure by only one click, and then made lesion RECIST measurements and segmentations automatically that were comparable in accuracy to that of human readers with reduced labor and time.

CLINICAL RELEVANCE/APPLICATION

SEANet is a practical tool for clinicians to generate accurate lesion RECIST measurements and segmentations with minimal human effort and may have a positive impact on oncologic image analysis workflows.

SSIN01-02 Improving Vertebral Fracture Detection in Standard Chest X-Rays Using an Ensemble of Image Views

Participants
Larissa C. Schudlo, PhD, Cambridge, MA (*Presenter*) Employee, IBM corporation
Yiting Xie, Cambridge, MA (*Abstract Co-Author*) Employee, IBM Corporation
Kirstin M. Small, MD, Newton Highlands, MA (*Abstract Co-Author*) Fellow, IBM Corporation
Benedikt Graf, PhD, Cambridge, MA (*Abstract Co-Author*) Employee, IBM Corporation

For information about this presentation, contact:

Larissa.Schudlo@ibm.com

CONCLUSION

Timely identification of vertebral fractures can improve patient care. A robust AI algorithm for standard chest x-rays that uses available images may reduce the rate of missing these injuries.

Background

Spine fractures are powerful predictors of future spine and hip fractures. Yet, up to 30% go undiagnosed in the acute phase, often being missed on standard x-rays. Artificial intelligence (AI) algorithms for x-rays can potentially reduce the rate of missed vertebral fractures and facilitate early intervention. Most AI work in spinal evaluation on x-ray has focused on lateral images, with limited work on frontal images. Although such injuries are better seen on lateral views, many routine chest x-rays only include the frontal view. An AI pipeline that accommodates both frontal and lateral images, rather than just a single view, would be more robust to different imaging studies and could improve vertebral fracture detection.

Evaluation

We explored the value of using both frontal and lateral images to automatically identify chest x-rays with vertebral fractures, wedging and compression. EfficientNet-B4 networks were trained on frontal or lateral x-rays to differentiate images with and without these vertebral injuries. 7022 frontal (1126 positive) and 4175 lateral (1080 positive) images were used for training. Performance was evaluated on 2961 exams (495 positive; with 2834 frontals and 1664 laterals). We compared the performance of each model and their combination under various ensemble paradigms, including training an auxiliary network to combine outputs. AUCs of 0.838 and 0.833 were achieved by the frontal and lateral models, respectively. An optimal AUC = 0.882 was achieved with as ensemble using a weighted average of frontal and lateral outputs (0.33 and 0.66 weights) for exams with both images, and the available model output otherwise.

Discussion

The results demonstrate the value of using both frontal and lateral x-rays to substantially improve vertebral fractures detection, despite favourability toward using lateral images in practice and literature. To the best of our knowledge, we are the first to demonstrate the value of considering multiple x-rays views concurrently for this application.

SSIN01-03 Data-Distributed Deep Learning using Federated Learning: A Case Study

Awards
Trainee Research Prize - Medical Student

Participants
Karthik V. Sarma, MS, Los Angeles, CA (*Presenter*) Nothing to Disclose
Stephanie A. Harmon, PhD , Bethesda, MD (*Abstract Co-Author*) Research collaboration, NVIDIA Corporation
Thomas H. Sanford, Bethesda, MD (*Abstract Co-Author*) Research collaboration, NVIDIA Corporation
Holger R. Roth, PhD, Bethesda, MD (*Abstract Co-Author*) Employee, NVIDIA Corporation Researcher, NVIDIA Corporation
Mona Flores, MD,MBA, Santa Clara, CA (*Abstract Co-Author*) Employee, NVIDIA Corporation
Rushikesh Kulkarni, MS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Bradford J. Wood, MD, Bethesda, MD (*Abstract Co-Author*) Researcher, Koninklijke Philips NVRoyalties, Koninklijke Philips NVIntellectual property, Koninklijke Philips NVResearcher, Celsion CorporationResearcher, BTG International LtdIntellectual property, BTG International LtdResearcher, Siemens AGResearcher, XAct Robotics LtdResearcher, NVIDIA CorporationEquipment support, AngioDynamics, IncResearcher, Profound Medical IncResearcher, Canon Medical Systems CorporationResearcher, AstraZeneca PLCResearcher, Exact Imaging Inc
Peter L. Choyke, MD, Bethesda, MD (*Abstract Co-Author*) License agreement, Koninklijke Philips NVResearcher, Koninklijke Philips NVLicense agreement, ScanMedLicense agreement, Rakuten MedicalResearcher, Rakuten MedicalResearcher, General Electric CompanyResearcher, Progenics Pharmaceuticals, IncResearcher, Novartis AG
Steven S. Raman, MD, Santa Monica, CA (*Abstract Co-Author*) Consultant, Johnson & JohnsonConsultant, Bayer AGConsultant, Merck & Co, IncConsultant, Amgen IncConsultant, Profound Medical Inc
Dieter R. Enzmann, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Baris Turkbey, MD, Rockville, MD (*Abstract Co-Author*) Research support, Koninklijke Philips NVRoyalties, Koninklijke Philips NVInvestigator, NVIDIA Corporation
William Speier IV, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Corey W. Arnold, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

ksarma@mednet.ucla.edu

ksarma@mednet.ucla.edu

CONCLUSION

Our results validated the data-distributed FL approach. This outcome enables future work using non-pooled datasets to enhance model transportability and clinical utility.

Background

One challenge in translating deep learning models to the clinic is a lack of generalizability across institutions, due to poor availability of multi-institutional datasets. The creation of such datasets is often limited by data governance limitations as well as patient privacy and other ethical concerns. As such, it is desirable to enable the training of such models across institutions without sharing the underlying data (i.e., 'data-distributed learning'). Here, we present a case study on the use of federated learning (FL), a data-distributed learning methodology.

Evaluation

343 T2-weighted images were retrieved from the ProstateX Challenge dataset and annotated with prostate contours. 43 images were reserved as a held-out test set.Two models were trained using a pooled data (PD) or data-distributed FL approach. For all experiments, the 3D AH-NET was used as the deep learning model, the soft Dice loss was used with the Adam optimizer, and the evaluation metric was the Dice criterion.For the benchmark PD model, 300 cases were split into 240 training cases and 60 validation and trained for 300 epochs. A mean Dice score of 0.911 on the held-out test set was obtained from evaluation.For the experimental FL model, 300 cases were split into three subsets of 100 cases and distributed to each of our three institutions and similarly split into training and validation sets. Each institution then trained the model for 300 epochs, and after each epoch the model weights were collected, averaged, and then redistributed to each institution for use in the next epoch.After 300 training epochs, each institution's model was then used to predict segmentations for the held-out test set, resulting in mean Dice scores of 0.909, 0.905, and 0.910.

Discussion

Our results showed equivalent performance from both the experimental FL (0.908) and benchmark PD models (0.911). This indicates the FL approach sufficiently enabled learning from the whole dataset without the need to transfer data between institutions.

SSIN01-04 Evaluating Automated Approaches for Classifying Stroke Onset Time

Awards
Trainee Research Prize - Resident

Participants
Jennifer Polson, MS, Los Angeles, CA (*Presenter*) Nothing to Disclose
Haoyue Zhang, MENG, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Kambiz Nael, MD, Los Angeles, CA (*Abstract Co-Author*) Medical Advisory Board, Canon Medical Systems Corporation
Noriko Salamon, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Bryan Y. Yoo, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Suzie M. El-Saden, MD, Tarzana, CA (*Abstract Co-Author*) Nothing to Disclose
William Speier IV, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Corey W. Arnold, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose

CONCLUSION

Using imaging-based approaches to determine TSS may identify a new population of patients eligible for stroke treatments. Our analysis represents a robust approach for evaluating multiple automated and radiologist-dependent methods on a single dataset. Moreover, the significantly higher sensitivity of the DL model means that this approach could increase the number of patients eligible for thrombolysis.

Background

Stroke is the fifth-leading cause of death in the United States. Interventions that focus on reperfusion of ischemic areas, i.e. thrombolysis, are only available to patients with a known time since stroke (TSS) up to 4.5 hours, but up to 27% of patients are ineligible due to unknown TSS. Research has sought to estimate TSS using imaging. Radiologists use diffusion-weighted imaging (DWI) and fluid-attenuated inversion recovery (FLAIR) to assess signal mismatching regions representing ischemic, not yet infarcted, brain regions. In parallel, automated image analysis may be able to classify TSS, which could allow more patients to receive thrombolytic therapies.

Evaluation

Using diffusion MRI from 411 patients, we evaluate our deep learning (DL) model, a slicewise convolutional network, to classify TSS within 4.5 hours. We compare the performance of two other methods: radiologist assessment of DWI-FLAIR mismatch, and a machine learning (ML) approach that extracts radiomic features from a region of interest. For the ML and DL, we report bootstrapped confidence intervals for sensitivity and specificity.

Discussion

Three board-certified neuroradiologists' assessments, based on majority vote, yielded a sensitivity of 0.47, a specificity of 0.89, and a Fleiss' kappa of 0.46. Both the ML and DL methods had significantly higher sensitivities than the radiologists (0.69 ± 0.04 and 0.78 ± 0.05, respectively); the DL model was able to correctly identify 18% more eligible patients than the radiologist readings. The ML pipeline was limited in that its preprocessing excluded over half of the patients from analysis; the DL model was able to evaluate all subjects in the dataset. Visualization of DL model gradient activations provided insight into image regions most informative to the model's classification.

SSIN01-05 Fully Automatic Detection and Scoring of Kidney Stones on Noncontrast CT Images Using S.T.O.N.E Nephrolithometry: Deep Learning-Based Algorithms

Participants
Yingpu Cui, Beijing, China (*Presenter*) Nothing to Disclose
Zhaonan Sun, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaodong Zhang, MD, PhD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoying Wang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

cui_yingpu@163.com

PURPOSE

To develop and validate cascaded deep learning algorithms for automatic kidney stone detection and scoring on noncontrast computed tomography (NCCT) images according to S.T.O.N.E nephrolithometry.

METHOD AND MATERIALS

Abdominal NCCT images were retrospectively archived from February 2018 to April 2019 for three parts: a dataset for kidney and renal sinus segmentation (n=167), a dataset for hydronephrosis classification (n=282) and a test dataset for S.T.O.N.E scoring (n=117). The algorithms consisted of four steps. First, a 3D U-Net model for kidney and renal sinus segmentation was developed. Second, Deep 3D Dual-Path Nets for hydronephrosis grading was developed. Third, the thresholding method was used to detect and segment stones in the renal sinus region. Stone size, CT attenuation and tract length were calculated from the segmented stone region. Fourth, the stone's location was determined in the renal sinus region. The performance of stone detection was estimated with sensitivity and positive predictive value (PPV). The performance of hydronephrosis grading and stone size, tract length, number of involved calyces, essence grading were estimated with areas under the curve (AUC) and linear-weighted κ statistics, respectively.

RESULTS

The stone detection model reached a sensitivity of 96.3% (236/245) and a PPV of 98.7% (236/239). The hydronephrosis classification model reached AUC of 0.97. The algorithm showed good agreement with radiologists for stone size, tract length,

number of involved calyces, and essence grading (κ=0.94; 95% confidence interval [CI]: 0.91, 0.98, κ=0.97; 95% CI: 0.95, 1.00, κ=0.95; 95% CI: 0.92, 0.98 and κ=0.97; 95% CI: 0.94, 1.00).Conclusions Cascaded algorithms were constructed that can detect and score stones in abdominal NCCT images automatically.

CONCLUSION

Cascaded algorithms were constructed that can detect and score stones in abdominal NCCT images automatically.

CLINICAL RELEVANCE/APPLICATION

Automated kidney stone detection and scoring, enabling automated structured reporting of kidney stones, could decrease interobserver variability, cost, and surgeons' or radiologists' burden.

SSIN01-06 Improving Presentation Consistency of Radiographic Images Using Deep Learning

Participants
Najib Akram, Waukesha, WI (*Presenter*) Employee, General Electric Company
German Vera, MENG, Waukesha, WI (*Abstract Co-Author*) Employee, General Electric Company
Ping Xue, PhD, Milwaukee, WI (*Abstract Co-Author*) Employee, General Electric Company
Justin Wanek, Waukesha, WI (*Abstract Co-Author*) Employee, General Electric Company
Fengchao Zhang, Hartland, WI (*Abstract Co-Author*) Employee, General Electric Company
Gireesha Rao, BEng, Waukesha, WI (*Abstract Co-Author*) Employee, General Electric Company
Khaled Younis, PhD, Parma Heights, OH (*Abstract Co-Author*) Employee, General Electric Company

For information about this presentation, contact:

najib.akram@ge.com

najib.akram@ge.com

CONCLUSION

The proposed approach demonstrates the feasibility of using deep learning technique to reduce inconsistency in initial display presentation and improve user workflow.

Background

In general radiography, inconsistency of brightness and contrast in initial presentation is a common complaint from radiologists. Inconsistencies, which may be a result of variations in patient positioning, dose and image processing, may lead to additional workflow by technologists and radiologists to adjust the images.

Evaluation

An algorithm (AI BC) was developed to improve the consistency in presentation by using a customized ResNet50 neural network trained to classify Xray images based on NxN classes of brightness and contrast combinations. More than 30,000 unique images from sites in US, Ireland and Sweden covering 31 anatomy/view combinations were used to train the model. During training, an image and a class were randomly selected, and each image was adjusted according to the class selected. The model achieved an average accuracy of 99.2% when tested on an independent test set of 2700 images. The AI BC algorithm uses the model to adjust images to achieve a reference class and then to adjust brightness and contrast to achieve the desired look. Evaluation on 3770 images demonstrated 99.1% success rate in reaching the reference look.

Discussion

The improvement in brightness and contrast consistency was evaluated in two ways: First, quantitative analysis on a set of 12 wrist images with ROIs placed on raw radiation, tissue and bone showed a 53% reduction in mean pixel intensity variation and a 39% reduction in bone-tissue contrast variation. Second, a study in which 3 application specialists were asked to adjust brightness and contrast to achieve consistent presentation was performed. Two sets of images (with and without AI BC), each with 30 images covering 3 anatomies (foot, abdomen and knee) were used. On average, the application specialists took ~20 mins to adjust the images for the non-AI BC set, whereas they took ~10 mins for the AI BC set.

SSIN05

Informatics (Artificial Intelligence: Novel approaches Beyond Images)

Saturday, Dec. 5 10:00AM - 11:00AM Room: Channel 4

CH CT MR BQ AI

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSIN05-01 Comparison of State-of-the-Art Transformer-Based Deep Learning Algorithms for Multilabel Radiology Report Text Classification

Participants
Brian A. Xavier, MD, Cleveland, OH (*Presenter*) Nothing to Disclose
Kenneth C. Wang, MD, PhD, Ellicott City, MD (*Abstract Co-Author*) Co-founder, DexNote, LLC
Jigar B. Patel, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Paul H. Yi, MD, Baltimore, MD (*Abstract Co-Author*) Consultant, BunkerHill Health; Shareholder, BunkerHill Health

For information about this presentation, contact:

xavierb@ccf.org

PURPOSE

Rapid developments in natural language processing (NLP) research have led to multiple models with encoder-decoder transformer architectures achieving state-of-the-art results in NLP tasks such as text classification. However, their utility in radiology text classification has not been well-established. The purpose of this study was to compare several state-of-the-art transformer-based deep learning algorithms for multilabel chest radiograph (CXR) report classification.

METHOD AND MATERIALS

We obtained 3,937 radiology reports from the publicly available Indiana University CXR dataset. These reports were parsed in XML format using Python and the BeautifulSoup4 library to extract 16 manually coded MeSH/RadLex labels associated with each report's findings. In total, 16 labels were extracted for NLP classification (Table 1) and 1,366 (34.7%) reports were labeled as normal. The dataset was split into training/testing split of 90%/10% and used to train and evaluate 6 state-of-the-art transformer-based NLP models to perform 16-label classification: BERT, RoBERTa, distilBERT, distilRoBERTa, XLNet, and ALBERT. Performance was measured using area under receiver operating characteristic curve (AUC) and label ranking average precision (LRAP) based on threshold of 0.5.

RESULTS

The RoBERTa model had the highest AUC of 0.990 whereas the DistilRoBERTa model had the highest LRAP of 0.987. The remainder of the models performed similarly with AUC and LRAP scores ranging from 0.975-0.990 and 0.973-0.987, respectively (Figure 1).

CONCLUSION

State-of-the-art transformer-based deep learning NLP models demonstrate high accuracy on a multilabel CXR report classification task, despite using a small dataset. These results suggest that accurate NLP systems can be developed even in the absence of large text corpora.

CLINICAL RELEVANCE/APPLICATION

State-of-the-art transformer-based deep learning NLP models can accurately classify multiple labels from chest radiograph reports even with modest dataset sizes.

SSIN05-02 Retrospective Evaluation of Artificial Intelligence Leveraging Free Text Order Entry to Facilitate Federally-Required Clinical Decision Support (CDS)

Participants
Amy L. Ellenbogen, MD, Richmond, VA (*Abstract Co-Author*) Nothing to Disclose
David Gish, MD , Charlottesville, VA (*Presenter*) Nothing to Disclose
Cree M. Gaskin, MD, Keswick, VA (*Abstract Co-Author*) Author with royalties, Oxford University PressAuthor with royalties, Thieme Medical Publishers, IncResearch Grant, Carestream Health, IncResearch Grant, Koninklijke Philips NVConsultant, IBM Corporation

For information about this presentation, contact:

cree@virginia.edu

PURPOSE

The Protecting Access to Medicare Act requires a qualified Clinical Decision Support Mechanism (qCDSM) at order entry. qCDSMs require structured indications for the mapping of CDS scores. Provider acceptance is a challenge as some prefer free text order entry over searching lists of structured indications. Our purpose was to evaluate the performance of commercially available artificial intelligence (AI) leveraging free text order entry to facilitate provider selection of structured indications.

METHOD AND MATERIALS

Our health system has used a qCDSM (ACR Select/CareSelect Imaging) since 2014, integrated with our EHR (Epic). In Feb 2020, we implemented the qCDSM vendor's new AI facilitating selection of structured indications based upon the ordering provider's entry of free text reason for exam in the context of other EHR data. Providers could order via direct search for structured indications or take the new free text/AI approach. AI presented several featured indications predicted as likely matches, and additional less likely indications. Providers could select predicted indication(s), perform additional search, indicate there's no match, or exit. We hypothesized the free text approach would be elected more often and the AI would be successful in facilitating selection. We reviewed advanced imaging orders n=22,516 since AI implementation (Feb-Apr). This QI effort absent PHI did not require IRB approval.

RESULTS

Providers more often chose the free text/AI approach 15,671 (69.6%) over direct search for structured indications 6,845 (30.4%) at order entry. Free text/AI approach yielded alerts with predicted indications in 14,387 (91.8%). Of these, providers chose: AI featured indication 7,029 (48.9%), AI additional indication 349 (2.4%), to add direct search 892 (6.2%), to indicate no satisfactory match 2750 (19.1%), to exit workflow 3,061 (21.3%). There were 306 (2.1%) logging errors. Of 892 free text/AI approaches where providers added direct searches, providers returned to select initial AI predicted indications in another 476 (53.4%).

CONCLUSION

Providers more often elected the free text/AI approach, suggesting provider preference over direct searching. The AI commonly predicted indications acceptable to ordering providers.

CLINICAL RELEVANCE/APPLICATION

Commercially available AI can facilitate capture of structured indications needed to meet federal requirements for clinical decision support at imaging order entry.

SSIN05-03 Personalized Computed Tomography - Automated Estimation of Height and Weight by Simulation of a Digital Twin Using a 3d Camera and Artificial Intelligence

Participants
Matthias S. May, MD, Erlangen, Germany (*Presenter*) Speakers Bureau, Siemens AG
Frederik Geissler, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Rafael Heiss, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG
Marco Wiesmueller, MD, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG
Wolfgang Wust, MD, Erlangen, Germany (*Abstract Co-Author*) Speakers Bureau, Siemens AG
Michael Uder, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

matthias.may@uk-erlangen.de

PURPOSE

Aim of this study was to develop an algorithm for automated estimation of patient height and weight during computed tomography (CT) and to evaluate its accuracy in everyday clinical practice.

METHOD AND MATERIALS

Depth images of 200 patients were recorded with a 3D camera mounted above the patient table of a CT scanner. Reference values were obtained using a calibrated scale and a measuring tape to train a machine learning algorithm that fits a patient avatar into the recorded patient surface data. The resulting algorithm was prospectively used on 101 patients in clinical practice and the results were compared to the reference values and to estimations from the patient himself, from the radiographer and from the radiologist. The body mass index was calculated from the collected values for each patient using the WHO formula. A tolerance level of 5 kg was defined in order to evaluate the impact on weight dependent contrast agent dosage in abdominal CT.

RESULTS

Differences between values for height, weight and BMI were non-significant over all assessments ($p > 0.99$). The most accurate values for weight were obtained from the patient information ($R^2 = 0.99$) followed by the automated estimation via 3D camera ($R^2 = 0.89$). Estimates by medical staff were considerably less precise (radiologist: $R^2 = 0.78$, radiographer: $R^2 = 0.77$). A body-weight dependent dosage of contrast agent using the automated estimations matched the dosage using the reference measurements in 65% of the cases. The dosage based on the medical staff estimation would have matched in 49% of the cases.

CONCLUSION

Automated estimation of height and weight using digital twin model from 3D camera acquisitions provide a high precision for protocol design in computer tomography.

CLINICAL RELEVANCE/APPLICATION

Height and weight calculated from digital twins are comparable to real measurements of the patients and can be used for calculation of contrast agent dosage.

SSIN05-04 Use of a Novel Dual Artificial Intelligence (AI) Platform to Detect Unreported Lung Nodules While Avoiding Unnecessary Alerts

Participants
Andrew Yen, MD, La Jolla, CA (*Abstract Co-Author*) Consultant, IMedis AI
Yitzi Pfeffer, BS, Raanana, Israel (*Abstract Co-Author*) Stockholder, Imedis AI
Aviel Blumenfeld, Raanana, Israel (*Abstract Co-Author*) Stockholder, Imedis AI
Jonathan N. Balcombe, MBBS, Miami, FL (*Abstract Co-Author*) Employee, IMedis AI
Lawrence N. Tanenbaum, MD, Riverside, CT (*Abstract Co-Author*) Speaker, General Electric CompanySpeaker, Siemens AGSpeaker, Guerbet SASpeaker, Koninklijke Philips NVConsultant, Enlitic, IncConsultant, icoMetrix NVConsultant, Subtle MedicalConsultant,

ColumboConsultant, Canon Medical Systems CorporationConsultant, FUJIFILM Holdings Corporation
Lincoln L. Berland, MD, Birmingham, AL (*Abstract Co-Author*) Consultant, IMedis AI ; Consultant, DeepSight AI Labs
Seth J. Kligerman, MD, La Jolla, CA (*Presenter*) Speakers Bureau, Boehringer Ingelheim GmbHAuthor, Reed ElsevierConsultant, IBM Corporation

For information about this presentation, contact:

Jbalcombemd@gmail.com

CONCLUSION

The Dual-AI Platform detects unreported pulmonary nodules while markedly reducing the number of alerts provided by a comparable CV-only system. Reviewing alerts generated by the Dual-AI Platform would occupy only 1-2 minutes per day. The benefit of catching an unreported nodule with malignant potential should justify this minimal workflow disruption.

Background

Pulmonary nodules may be precursors to malignancy and are routinely missed on computed tomography (CT). Computer-aided detection (CAD) assists with nodule detection, but repeated notifications lead to alert fatigue. A novel Dual-AI Platform detects nodules >=6mm by a Computer-Vision (CV) algorithm and filters the positive results by a Natural Language Processing (NLP) analysis of the dictated report, only alerting the radiologist to unreported nodules, thereby decreasing alert frequency.

Evaluation

The Dual-AI Platform was applied retrospectively to 5,047 chest CTs and their corresponding reports. The CV algorithm detected nodules >=6mm in 1,830 (36.3%) cases. Of these, 355 were unreported per the NLP algorithm. Two chest radiologists determined that 139 of the 355 were truly unreported. 130 were deemed unnecessary alerts because of vague language in the report confounding the NLP algorithm. The remaining 86 comprised an absence of nodules, non-nodules (e.g. scar), and nodules < 6mm.

Discussion

The Dual-AI Platform detected unreported nodules in 2.8% of cases, an 8.7% (139/1,605) increase in nodule detection. It prevented 81% (1,475/1,830) of alerts that would have been unnecessary. For a radiologist reading 50 chest CTs per day, a 7.0% (355/5,047) alert rate and a 2.8% (139/5,047) true-positive rate correspond to 3-4 potential alerts, with 1-2 representing genuine missed actionable findings.

SSIN05-05 Empowering Patients to Participate in Care: Practical Implementation of Natural Language Generation (NLG) for Real-Time Creation of Patient-Accessible Documents While Producing Conventional Radiology Reports

Participants
Michael A. Morris, MD, MS, Glen Burnie, MD (*Presenter*) Founder, Advanced Molecular Imaging and TherapyDirector, Advanced Molecular Imaging and TherapyAdvisory Board, Gentem Health, IncAdvisory Board, Softhread, Inc
Babak Saboury, MD, MPH, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Pradeep Rajashekaran, Morristown, NJ (*Abstract Co-Author*) Employee, Arria NLG
Cathy Herbert, Morristown, NJ (*Abstract Co-Author*) Employee, Arria NLG
Elizabeth C. Jones, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Eliot L. Siegel, MD, Severna Park, MD (*Abstract Co-Author*) Board of Directors, Carestream Health, IncBoard of Directors, Mach7 Technologies LtdFounder, PartoFounder, ChiosFounder, TopodermFounder, TraumaVisualFounder, ACREWFounder, DACREWFounder, i-NucsCommittee member, RadSite LLC

For information about this presentation, contact:

morrism@umbc.edu

CONCLUSION

Increasingly patients have direct access to radiologist reports. These reports are not designed for the patient audience and can cause patients undue emotional distress and misunderstanding. NLG can provide multiple report outputs while automatically incorporating accepted clinical guidelines without adding burden to the radiologist.

Background

Lack of comprehension of medical image reporting jargon (both semantics and syntax) is a critical barrier to patient understanding and engagement in their own care. This lack of clarity may inadvertently give patients an incorrect impression of their findings or diagnosis, and creates risk due to the communication gap between patients and radiologists. This may also contribute to loss of satisfying patient-physician relationships which is reported to be a source of job alienation and burnout for radiologists. We present the utilization of NLG technology as a first step to reconcile this problem while being cognizant of real-world constraints and objectives. NLG is a type of artificial intelligence (AI) that translates data into linguistic data stories.

Evaluation

First-trimester US reporting is evaluated as a use case, such as normal early pregnancy, early pregnancy unknown viability, early pregnancy suspicious for fetal demise, early pregnancy diagnostic for fetal demise, and early pregnancy suspicious for ectopic. US findings and measurements are deconstructed into a collection of independent discrete variables. Variables are stored in a database unique to the clinical use case in a method that facilitates comparison of current with prior results. Arria Studio was utilized for custom scripting to develop NLG outputs while adjudicating conditionals.

Discussion

The paradigm of separating "finding-recording" from "report-presentation" results in reports tailored for separate patient and physician audiences from the same radiologist work-unit according to ACR-ACOG guidelines.

SSIN05-06 Investigation of Using Deep Learning to Predict Patient Eye-Lens Dose During Neuro-interventional Procedures

Participants
Jacob Collins, Buffalo, NY (*Presenter*) Researcher, Canon Medical Systems Corporation
Chao Guo, MS, Amherst, NY (*Abstract Co-Author*) Research support, Canon Medical Systems Corporation
Alexander R. Podgorsak, MS, Buffalo, NY (*Abstract Co-Author*) Nothing to Disclose
Stephen Rudin, PhD, Buffalo, NY (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation
Daniel Bednarek, PhD, Buffalo, NY (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation

For information about this presentation, contact:

jdcollin@buffalo.edu

PURPOSE

The dose to the lens of the patient's eyes varies for each projection view during fluoroscopically-guided neuro-interventional procedures. An estimation of lens dose can be obtained using Monte-Carlo (MC) simulation for each exposure projection but MC cannot provide real-time feedback to the interventionalist. To obtain real-time update, deep learning (DL) models were investigated as a means to estimate the patient lens dose for the given exposure conditions.

METHOD AND MATERIALS

Monte Carlo simulations were done using a Zubal computational phantom to produce a dataset of eye lens dose values that was used to train various DL models. The simulations were performed with variation of six geometric parameters: entrance field size, LAO gantry angulation, patient x, y, z head position relative to the beam isocenter, and whether right or left eye. The dose for each combination of parameters was expressed as lens dose per entrance air kerma (mGy/Gy)). Portions of the dataset were used for testing and the rest were used for validation and training of the models. Model performance was evaluated using the metrics of mean absolute percentage error (MAPE).

RESULTS

Several different DL models were tested using various configurations of dense layers, activation functions and other factors. The best model found was a combination of eLU models derived from k-fold cross validation methods. The combined model has each k-fold model make a prediction, and then takes the median of their predictions to generate one final prediction. Using this combined model method led to lower overall error (MAPE < 8%) and more accurate predictions compared to a single model. Furthermore, prediction time for the combined model was about 30 ms, while MC simulation time was in the range of hours.

CONCLUSION

A DL model is able to accurately infer the lens dose for a set of given geometric exposure parameters. This work shows that deep learning is a viable option for lens dose estimation for fluoroscopically-guided neuro-interventional procedures and could eliminate the need for a vast database of pre-calculated factors for each specific exposure condition in a real-time dose feedback system.

CLINICAL RELEVANCE/APPLICATION

The lens of the eye is at risk for cataractogenesis during neuro-interventional procedures. Real-time display of lens dose made possible through deep learning can facilitate informed dose management.

Printed on: 05/05/21

SSMI01

Molecular Imaging (Oncology - Diagnostics and Therapeutics)

Tuesday, Dec. 1 2:00PM - 3:00PM Room: Channel 4

GI MR OI BQ

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSMI01-01 89Zr-Labeled PD-L1 PET Imaging as a Potential Biomarker to Replace Immunohistochemistry (IHC)

Participants
Huijie Jiang, PhD, MS, Harbin, China (*Abstract Co-Author*) Nothing to Disclose
Sheng Zhao, MD, Harbin, China (*Presenter*) Nothing to Disclose
Wenbin Pan, MD, Harbin, China (*Abstract Co-Author*) Nothing to Disclose
Rongjun Zhang, MA, Wuxi, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jhjemail@163.com

PURPOSE

Up-regulation of tumor PD-L1 expression can lead to a poor prognosis in colorectal cancer (CRC) patients. The clinical outcome of PD-L1 therapy is related to the expression level of PD-L1. IHC is invasive and only reflects the expression of PD-L1 in a tiny fraction of a tumor. Hence, we developed a 89Zr labeled Atezolizumab as a probe (89Zr - Df- Atz), using xenograft mice to detect whether the PET imaging can reflect tumor PD-L1 expression.

METHOD AND MATERIALS

We used Df-Bz-NCS to premodified with Atezolizumab, and then incubated with 89Zr-oxalate in HEPES buffer for 60min, purified by PD-10 column, the radiochemical purity(RCP) was measured by HPLC. 89Zr -Atz was incubated in human serum and PBS at different temperatures for 24-120h to test the stability in vitro. The same concentration of 89Zr-Df-Atz was incubated with different concentrations of CRC PD-L1 high expression cells RKO. According to the Limdo method, the immunoreactive score(IRS) was fitted. BALB/c nu/nu mice were subcutaneously implanted with CRC cells (HT29, HCT116, and RKO) with different expression levels of PD-L1, then xenograft mice were intravenously injected with an appropriate amount of 89Zr-Df-Atz 21 days later, some were euthanized within 48-120h to determine the biodistribution of organs and tumor, other mice were scanned PET imaging, and the radioactivity parameters were analyzed

RESULTS

Stability study showed that RCP was greater than 95% when 89Zr-Df-Atz was stored in 4 °C serum for 120h or 37°C serum for 48h. The fitted IRS was 88.34%, indicating that 89Zr-Df-Atz could effectively bind to tumor PD-L1, and the labeling reaction did not impair its antigen-binding ability. The biodistribution showed that liver uptake is highest in normal tissues, and the tumor-muscle ratio reached its highest point at 120h.PET imaging showed the tumor to muscle(legs) SUVmax ratio can effectively distinguish between PD-L1 high and low expression tumors($p<0.001$).

CONCLUSION

89Zr-Df-Atz allowed efficient and simple to prepare and better stability can help to further explore the various stages of colorectal cancer, which is expected to become an imaging tool to replace IHC.

CLINICAL RELEVANCE/APPLICATION

89Zr-Df-Atz's advantages herald its value for further human research, and it is expected to replace immunohistochemistry as the basis for stratification of immunotherapy patients.

SSMI01-02 Application Value of PET/MR Radiomics Features and Metabolic Parameters in Evaluating the Staging of Nasopharyngeal Carcinoma

Awards
Trainee Research Prize - Resident

Participants
Jiangtao Liang, BS,BS, Hangzhou, China (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

hzliangjt@163.com

PURPOSE

To investigate the value of PET/MR radiomics features and metabolic parameters in evaluating the TNM staging of nasopharyngeal carcinoma (NPC).

METHOD AND MATERIALS

The PET/MR imaging data of 100 NPC patients from a medical center were collected. The patients were randomly divided into training group (n = 70) and test group (n = 30). The pathological and clinical diagnosis results were used as the gold standard for diagnosis. We measured the metabolic parameters (SUVmax, MTV, TLG) of the NPC primary focus, and used AK software to extract the most relevant radiomics features to NPC staging. To compare the differences of the parameters and features of different stages, and evaluate the diagnostic efficacy of statistically significant parameters and features through the ROC curve in NPC staging.

RESULTS

We extracted 6 and 3 radiomics features most relevant to the staging of NPC from T2WI and PET images, respectively. The AUCs of the training and test group were 0.849 and 0.833 in the T2WI model, while they were 0.840 and 0.815 in the PET model. The MTV, TLG, T2WI radiomics feature (MinIntensity) and PET radiomics feature (GLCMEntropy_angle0_offset4) had statistically significant differences between and within groups of T stages ($P < 0.05$). With the increase of T stage, the mean value of MinIntensity decreased gradually, while the others increased gradually. The four had higher diagnostic efficiency in differentiating T-stage(AUC:0.785-0.956). The TLG and PET radiomics feature (GLCMEntropy_angle0_offset4) had statistically significant differences between and within groups in clinical stages ($P <0.01$). With the increase of clinical staging, the mean value of the two gradually increased, and they had higher diagnostic efficacy in differentiating clinical stage (AUC:0.775-0.953). The comparison between groups showed that the T2WI radiomics feature (GLCMEntropy_AllDirection_offset1_SD) was smaller in the patients with lymph node metastasis ($P <0.05$).

CONCLUSION

PET/MR radiomics features and metabolic parameters were of great value in evaluating T-stage and clinical stage of NPC, but they had limited value in N-stage. In the future, radiomics features are expected to be a more economical tool for predicting the staging of NPC.

CLINICAL RELEVANCE/APPLICATION

PET / MR examination can be performed when the local invasion and distant metastasis of nasopharyngeal carcinoma need be understood at the same time.

SSMI01-03 Imaging Early HER3-Driven Response to Pan-Receptor Tyrosine Kinase Inhibition Therapy in Gastric Cancer

Awards
Trainee Research Prize - Fellow

Participants
Shadi Abdar Esfahani, MD,MPH, Boston, MA (*Presenter*) Nothing to Disclose
Pedram Heidari, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Carolina De Aguiar Ferreira, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Umar Mahmood, MD,PhD, Winchester, MA (*Abstract Co-Author*) Co-founder, CytoSite Biopharma; Shareholder, CytoSite Biopharma; Consultant, CytoSite Biopharma; Grant, CytoSite Biopharma; ; ;

For information about this presentation, contact:

esfahani.shadi@mgh.harvard.edu

PURPOSE

To evaluate the use of HER3 PET/MRI for prediction of gastric cancer (GCa) response to afatinib, a pan-receptor tyrosine kinase inhibitor (RTKI), shortly after treatment initiation.

METHOD AND MATERIALS

A panel of GCa cell lines was assessed for baseline level of total and phosphorylated RTKs including EGFR, HER2, HER3 and their downstream signaling nodes. Cell viability was assessed in 0-72 hrs of treatment with 0.01-1 μM Afatinib. HER3-expressing afatinib-sensitive (NCI-N87) and afatinib-resistant (SNU16) cells were selected for comparing quantitative changes in RTKs and downstream nodes 0-72 hrs after treatment with afatinib. Murine xenograft models of NCI-N87 and SNU16 GCa were developed (n=20 nude mice/group). PET/MRI with HER3 targeting peptide,68Ga-HER3P1, was performed before and 3 days after treatment with Afatinib 10 mg/kg, or vehicle PO Daily (n=10/group). Temporal changes in HER3 PET uptake (SUVmax and SUVmean) between baseline and day 3 were correlated with HER3 changes in tumor tissue by immunofluorescence microscopy. Tumor growth curves of control and treated groups were compared over 3 weeks. $P<0.05$ was considered statistically significant.

RESULTS

Treatment with afatinib 100nM resulted in significantly increased total HER3 expression in NCI-N87 cells and reduction of pHER3 and all other RTKs and downstream nodes over 72 hrs, while a complete opposite profile was observed in SNU16 cells (total HER3 at 72 h afatinib / baseline: 3.7 ± 0.22 vs. 0.48 ± 0.72 in NCI-N87 vs. SNU16, $p<0.001$). 68Ga-HER3P1 PET/MRI in NCI-N87 tumors showed significantly increased SUVmean on day 3 of treatment compared to baseline, and no significant uptake change in resistant SNU16 tumors (SUVmean in Day0 v.s Day3: 1.6 ± 0.56 vs. 3.85 ± 0.69, $p<0.05$ in NCI-N87, 1.72 ± 0.73 vs. 1.5 ± 0.69, $p=0.09$ in SNU16). HER3 expression changes were confirmed with immunofluorescence microscopy of tumor tissues. Tumors growth trajectory over 3 weeks was concordant with PET and histopathology results (tumor volume in treated vs. control: 11.2 ± 16.6 mm3 vs. 293 ± 79.35 mm3, $p<0.05$ in NCI-N87, 178.3 ± 91.2 mm3 vs. 281.9 ± 34.9 mm3, $p=0.2$ in SNU16).

CONCLUSION

HER3 PET imaging detects rapid quantitative changes of HER3 expression and predicts response to RTKI therapy in GCa.

CLINICAL RELEVANCE/APPLICATION

HER3 PET imaging could predict response to pan-RTK inhibitors within few days after initiation of treatment and help with early management plans.

SSMI01-04 Optical Imaging of Radiofrequency Hyperthermia-Enhanced Oncolytic Therapy for Hepatic Cancer

Participants
Guanhui Zhou, MD, Seattle, WA (*Presenter*) Nothing to Disclose
Xuefeng Kan, MD,PhD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Junhui Sun, MD,PhD, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Feng Zhang, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Xiaoming Yang, MD, PhD, Mercer Island, WA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

xmyang@uw.edu

PURPOSE

To investigate the feasibility using indocyanine green (ICG)-based optical imaging (OI) to assess efficacy of radiofrequency hyperthermia (RFH)-enhanced oncolytic therapy for hepatic cancer.

METHOD AND MATERIALS

This study included (1) optimizing ICG dose for intracellular uptake by rat hepatic cancer cells (MCA-RH7777); (2) optimizing ICG time-window for ICG-enhanced OI; and (3) validating the feasibility using ICG-based OI to assess efficacy of RFH-enhanced oncolytic therapy (LTX-315) for treatment of same cancers. In optimizing ICG dose and time-window, tumor cells were treated with various ICG concentrations (0 to 200 μg/mL) and different incubation times (0 min to 48 h). The half maximal inhibitory concentration (IC50) of LTX-315 was quantified by MTS assay. ICG-cells were divided into four study groups (n=6/group) with different treatments: (1) RFH alone at 42°C for 30?min; (2) oncolytic therapy with LTX-315; (3) combination therapy of RFH+LTX-315; and (4) saline. MTS assay, fluorescence microscopy, and flow cytometry were used to compare cell viabilities and apoptosis. OI of ICG-cells was performed using both Bruker optical/x-ray imaging and an interventional micro-OI needle. The ICG-cell signal intensities (SI) were statistically compared among various cell groups.

RESULTS

ICG taken up by cancer cells was linearly increased from 0 to 100 μg/mL with the optimized concentration at 100 μg/mL, while ICG-SI reached the peak at 24 hours. IC50 of LTX-315 was 25.4 μM. MTS assay and apoptosis analysis demonstrated the lowest cell viability and highest apoptosis in combination therapy, compared to other three groups ($p<0.001$). ICG-enhanced interventional OI showed a significantly decreased SI in combination therapy, which was confirmed by the "standard" optical/x-ray imaging (Figure).

CONCLUSION

This study demonstrates the feasibility of ICG-based OI to assess efficacy of RFH-enhanced oncolytic therapy for hepatic cancers, which may open a new avenue to further develop a new intraoperative OI technique, to instantly guide complete tumor kill at the ablated tumor margin, a current clinical problem of persistence post-ablation of medium-to-large tumors.

CLINICAL RELEVANCE/APPLICATION

This study has established ground works to further develop an intraoperative real-time optical imaging technique, to instantly assess complete ablation of medium-to-large tumors.

SSMI01-05 Fluciclovine Detection of Primary Prostate Cancer at the Sextant Level and Correlation of SUVmax with Gleason Grades

Awards
Trainee Research Prize - Resident

Participants
Jed J. Kendall, MD,PhD, Atlanta, GA (*Presenter*) Nothing to Disclose
Akinyemi A. Akintayo, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Akinyemi A. Akintayo, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Olayinka A. Abiodun-Ojo, MD,MPH, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Mehrdad Alemozaffar, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Faisal Saeed, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Adeboye Osunkoya, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Martin J. Sanda, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
David M. Schuster, MD, Decatur, GA (*Abstract Co-Author*) Institutional Research Grant, Nihon Medi-Physics Co, LtdInstitutional Research Grant, Blue Earth Diagnostics LtdInstitutional Research Grant, Advanced Accelerator Applications SAInstitutional Research Grant, Telix Pharmaceuticals IncInstitutional Research Grant, FUJIFILM Holdings CorporationConsultant, Syncona LtdConsultant, AIM Specialty Health, IncConsultant, Global Medical Solutions Taiwan

For information about this presentation, contact:

jjkenda@emory.edu

PURPOSE

Our aim is to evaluate the reliability of fluciclovine PET uptake parameters in predicting tumor presence and grade at the sextant level in patients with primary prostate cancer.

METHOD AND MATERIALS

29 surgically eligible primary prostate cancer patients were diagnosed using standard of care PSA tracking and 12 core trans-rectal prostate tissue biopsies. Prior to prostatectomy the patients were evaluated with fluciclovine PET/CT imaging and each prostate lesion was radiographically identified. Furthermore, the SUVmax uptake parameter from each prostate sextant was recorded. Following each prostatectomy, the entire prostate was submitted for sextant-to-sextant pathological Gleason grading. Imaging from the fluciclovine PET/CT was compared against the post-surgical pathology results of each prostate. Every tumor containing prostate sextant was given a post-surgical Gleason grade. ANOVA statistical method was used to determine correlation between prostate sextant fluciclovine SUVmax and pathological Gleason grade. Sextants with less than 10% tumor volume per path analysis were excluded from analysis.

RESULTS

Fluciclovine was able to predict the presence of prostate tumor per post-surgical pathological sextant analysis with 85% sensitivity, 81% specificity, 95% PPV, and 54% NPV. Prostate sextants with higher Gleason grades demonstrated a higher mean SUVmax. Furthermore, ANOVA analysis demonstrated statistical significance (p >0.001) between Gleason grade SUVmax means. However, the SUVmax per Gleason grade demonstrated a high degree of variability.

CONCLUSION

Fluciclovine is able to detect the presence of primary prostate cancer with accurate localization to the sextant level making fluciclovine PET/CT a valuable pre-surgical planning tool. Furthermore, fluciclovine SUVmax values correlate significantly with Gleason grade groups of primary tumors.

CLINICAL RELEVANCE/APPLICATION

Our research demonstrates a corrleation between Fluciclovine SUVmax and post-surgical primary prostate cancer gleason grade. Given that our current gold standard methods in primary prostate cancer diagnosis and grading are unreliable and often underestimate true post surgical tumor grade, fluciclovine PET/CT will be a useful analytic tool in assuring proper tumor grading in the pre-surgical planning phase.

SSMI01-06 Overall Survival After 177Lu-PSMA-617 Molecular Radiotherapy in Patients with Metastatic Castrate-resistant Prostate Cancer: Post-hoc Analysis of a Prospective Phase II Trial

Participants
Jeremie Calais, MD, Los Angeles, CA (*Presenter*) Consultant, RadioMedix, IncConsultant, Blue Earth Diagnostics LtdConsultant, Progenics Pharmaceuticals, IncConsultant, Johnson & JohnsonConsultant, Curium SASConsultant, General Electric Company
Wesley R. Armstrong, BS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Jeannine Gartmann, PharmD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Pan Thin, BS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Kathleen Nguyen, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Vincent Lok, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Laura Gosa, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Roger Slavik, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Magnus Dahlbom, PhD, Los Angeles, CA (*Abstract Co-Author*) Research Consultant, Syntermed, Inc
Ken Herrmann, Munich, Germany (*Abstract Co-Author*) Co-founder, SurgicEye GmbH; Stockholder, SurgicEye GmbH; Consultant, Sofie Biosciences; Consultant, Ipsen SA; Research Grant, Ipsen SA; Consultant, Siemens AG; Research Grant, Advanced Accelerator Applications SA;
Matthias J. Eiber, MD, Vaterstetten, Germany (*Abstract Co-Author*) Nothing to Disclose
Wolfgang Fendler, Munich, Germany (*Abstract Co-Author*) Nothing to Disclose
Johannes Czernin, MD, Los Angeles, CA (*Abstract Co-Author*) Stockholder, Trethera Corporation Board Member, Trethera Corporation

For information about this presentation, contact:

JCalais@mednet.ucla.edu

PURPOSE

This was an open-label randomized prospective bi-centric single-arm phase II clinical trial of 177Lu-PSMA-617 molecular radiotherapy in patients with progressive metastatic castrate-resistant prostate cancer (mCRPC) (NCT03042312). The study was investigator-initiated under an investigational new drug approval protocol (IND#133661) with authorization of charging for investigational drug (cost-recovery, Title 21 CFR 312.8). We report here the post-hoc analysis of overall survival (OS) in a single-study site cohort (UCLA).

METHOD AND MATERIALS

Patients with progressive mCRPC (biochemical, radiographic, or clinical) after >=1 novel androgen axis drug, either chemotherapy (CTX) naïve or post-CTX, with sufficient bone marrow reserve, normal kidney function, and sufficient PSMA-target expression by PET were eligible. Patients received up to 4 cycles of 177Lu-PSMA-617 every 8±1 weeks and were randomized into 2 treatment activities groups (6.0 or 7.4 GBq). Efficacy was defined as serum PSA decline of >=50% from baseline and served as primary endpoint (hypothesis: >=40% of responders after 2 cycles).

RESULTS

43 patients were randomized to the 6.0GBq (n= 14) and 7.4GBq (n=29) treatment arms. 11/43 (26%) were CTX naïve while 10/43 (23%), 12/43 (28%), 5/43 (12%) and 5/43 (12%) had received 1, 2, 3 or 4 CTX regimens. Median baseline PSA was 29.2 ng/ml (mean 228.8, range 0.5-2082.6). 21/43 (49%) completed 4 cycles of 177Lu-PSMA-617 whereas 4/43 (9%), 13/43 (30%) and 5/43 (12%) underwent 1, 2 and 3 cycles. PSA decline of >=50% was observed in 11/43 of patients (26%) after 2 cycles and in 16/43 (37%) at any time (best PSA response). 9/43 (21%) had a PSA decline of >=90% and 23/43 (53%) had any PSA decline >0%. After a median follow-up of 19.5 months the median OS was 14.8, 15.7 and 13.5 months in the whole cohort, the 6.0GBq and 7.4GBq treatment arms, respectively (p=0.7). Patients showing a PSA decline of >=50% after 2 cycles and at any time had a longer OS: median 20.1 months vs. 13.6 (p=0.09) and 20.1 vs. 11.6 (p=0.002).

CONCLUSION

In this post-hoc analysis of a single-site cohort of 43 patients included in a prospective phase II trial the median OS after 177Lu-PSMA-617 radiotherapy in patients with progressive mCRPC was 14.8 months.

CLINICAL RELEVANCE/APPLICATION

Therapeutic application of 177Lu-PSMA-617 extended overall survival in patients with >=50% PSA response, showing promising efficacy in progressive mCRPC patients.

SSMK02

Science Session with Keynote: Musculoskeletal (Knee)

Wednesday, Dec. 2 2:00PM - 3:00PM Room: Channel 4

CT MK MR BQ

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSMK02-01 Musculoskeletal Keynote Speaker: Figuring Out the Knee - New & Hot

Participants
Ali Guermazi, MD,PhD, West Roxbury, MA (*Presenter*) Shareholder, Boston Imaging Core Lab, LLCResearch Consultant, Merck KGaAResearch Consultant, Roche, IncResearch Consultant, TissueGene, IncResearch Consultant, Galapagos, IncResearch Consultant, AstraZeneca PLCResearch Consultant, Pfizer Inc

SSMK02-02 CT-like MRI: Comparing ZTE and SPGR for Detecting Knee Osseous Abnormalities

Participants
Upasana U. Bharadwaj, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Adam Coy, MD, Burlingame, CA (*Abstract Co-Author*) Nothing to Disclose
Daria Motamedi, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Dong Sun, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Gabby B. Joseph, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Roland Krug, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Thomas M. Link, MD, PhD, San Francisco, CA (*Abstract Co-Author*) Research Grant, General Electric CompanyResearch Consultant, General Electric CompanyResearch Consultant, InSightec LtdResearch Grant, InSightec LtdConsultant, Springer NatureResearch Consultant, Pfizer Inc

For information about this presentation, contact:

upasana.bharadwaj@ucsf.edu

PURPOSE

To evaluate the utility of zero echo-time (ZTE) MRI in identifying osseous findings; and compare to an optimized spoiled gradient echo (SPGR) sequence in detecting osseous abnormalities.

METHOD AND MATERIALS

ZTE sequences of the knee were acquired in 100 consecutive patients (44 Female, 56 Male) using a 3T scanner in conjunction with standard MRI protocols. The average patient age was 40 years [13, 68] with an average BMI of 26.3kg/m2 [18.2, 41.5]. Clinical indications included pain (n=35), suspected internal derangement of knee (n=28), trauma (n=23), and evaluation of post-operative changes (n=14). In 18 patients, fractures were diagnosed. Three radiologists rated confidence in evaluating osseous abnormalities as well as image quality (e.g. artifacts, contrast) on a 5-grade Likert scale. In a subset of knees (n=57) SPGR sequences were also obtained, and diagnostic confidence in identifying osseous abnormalities was assessed, comparing ZTE and SPGR sequences. To obtain CT-like contrast, the grey values of both sequences were inverted. Significance was characterized with a dependent t-test.

RESULTS

ZTE image quality was overall rated high by all reviewers with 90% scores >= 4 using the Likert scale. The diagnostic confidence in using ZTE over SPGR for osseous abnormalities was favorable and statistically significant with a mean Likert score of 3.13 for ZTE and 2.59 for SPGR (p-value: 0.017). Diagnostic confidence in using ZTE was rated 'definitely certain' in 97%, 85%, 71% and 73% of the cases for osteophytosis, subchondral cysts, fractures, and soft tissue calcifications, respectively. In 74% of cases with osseous findings reviewer scores indicated high confidence levels (score >= 4) that ZTE improved diagnostic certainty [versus 58% of the cases without osseous findings]. In 53% of cases with osseous findings reviewers indicated that ZTE would alter patient management [versus 41% of the cases without osseous findings].

CONCLUSION

Incorporating ZTE MRI sequences in the standard knee imaging protocol was technically feasible, improved diagnostic confidence for osseous abnormalities and suggested improved patient management. In comparison to SPGR sequences, ZTE improved assessment of osseous abnormalities.

CLINICAL RELEVANCE/APPLICATION

By improving assessment of osseous abnormalities, ZTE, in comparison to CT-like SPGR sequences, was found to be clinically useful and may have an impact on patient management.

SSMK02-03 Three-dimensional Quantification of Knee Joint Space Narrowing with Weight-bearing CT: Comparison with Non-weight-bearing CT and Weight-bearing Radiography

Participants
Benjamin Fritz, MD, Zurich, Switzerland (*Presenter*) Nothing to Disclose
Jan Fritz, MD, New York, NY (*Abstract Co-Author*) Institutional research support, Siemens AGInstitutional research support, Johnson & JohnsonInstitutional research support, Zimmer Biomet Holdings, IncInstitutional research support, Microsoft

CorporationInstitutional research support, BTG International LtdScientific Advisor, Siemens AGScientific Advisor, General Electric CompanyScientific Advisor, BTG International LtdSpeaker, Siemens AGPatent agreement, Siemens AG
Sandro F. Fucentese, MD, Zurich, Switzerland (*Abstract Co-Author*) Consultant, MEDACTA International SA
Christian W. Pfirrmann, MD, MBA, Forch, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Reto Sutter, MD, Zurich, Switzerland (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

benjamin.fritz@balgrist.ch

PURPOSE

To assess the effectiveness of computer-based three-dimensional (3D) quantification of knee joint space narrowing with weight-bearing cone beam computed tomography (WB-CT), in comparison with non-weight-bearing multidetector CT (NWB-CT) and weight-bearing radiographs (WB-XR).

METHOD AND MATERIALS

Following IRB approval and informed consent, 26 patients were prospectively included. All patients underwent supine NWB-CT, upright WB-CT and WB-XR of the knee joint. Using specialized software, 3D analysis of joint space width was performed by quantifying the minimal distance of each voxel of the medial and lateral tibial surface to the femoral condyles on WB-CT and NWB-CT. Average and minimal joint space widths of NWB-CT and WB-CT were quantified. Associations with mechanical leg axis were evaluated. Minimal joint space widths were further compared to WB-XR.

RESULTS

The average joint space widths of the medial and lateral compartment were significantly different (p=0.028 and p=0.018) between WB-CT (medial: 4.7mm, lateral: 6.3mm) and NWB-CT (medial: 5.1mm, lateral: 6.8mm). On average, the minimal joint space widths (medial: 3.1mm, lateral: 5.8mm) on WB-XR were significantly wider (all p<0.001) when compared to WB-CT (medial: 1.8mm, lateral: 2.9mm) and NWB-CT (medial: 1.8mm, lateral: 2.9mm), but not significantly different (all p>=0.869) between WB-CT and NWB-CT. For patients with varus knee alignment, significant differences of average joint space widths between WB-CT and NWB-CT for the medial (3.7mm vs 4.7mm, p=0.004) and lateral (6.5mm vs 6.8mm, p=0.028) compartments existed. Also, for varus knee alignment, the minimal joint space widths were significantly different between WB-CT and NWB-CT for the medial (0.9mm vs 1.5mm, p=0.011) and lateral (2.9mm vs 2.7mm, p=0.01) compartment. On WB-CT, 25% (13/52) of the medial and lateral knee joint spaces showed bone-on-bone apposition, which was significantly higher when compared to NWB-CT (7/52, 13%, p=0.031) and WB-XR (4/52, 8%, p=0.012).

CONCLUSION

Significant differences exist for joint space widths between WB-CT, NWB-CT, and WB-XR. The combination of 3D quantification and WB-CT demonstrates significantly more areas of bone-on-bone apposition, which are underestimated or even undetectable on NWB-CT and WB-XR.

CLINICAL RELEVANCE/APPLICATION

The combination of computer-based 3D quantification and weight-bearing CT affords evaluation of the knee joint space under physiological conditions, which may serve as a more accurate CT-based biomarker for the assessment of knee cartilage integrity, thereby avoiding understaging of osteoarthritis.

SSMK02-04 MRI Appearance of MPFL Reconstructions Requiring Revision Surgery for Instability

Participants
Tony T. Wong, MD, New York, NY (*Presenter*) Nothing to Disclose
John Denning, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Michael J. Rasiej, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Matthew P. Moy, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Charles A. Popkin, MD, New York, NY (*Abstract Co-Author*) Travel support, Arthrex, Inc; Educational support, Arthrex, Inc; Educational support, Smith & Nephew plc;

For information about this presentation, contact:

ttw2105@cumc.columbia.edu

PURPOSE

To evaluate MRI appearance of medial patellofemoral ligament (MPFL) reconstruction grafts in patients requiring revision surgery for instability.

METHOD AND MATERIALS

Retrospective search for consecutive patients with knee MRI following an MPFL reconstruction between 1/1/2010 and 6/1/2019 yielded 41 patients. Exclusion criteria included patients requiring revision MPFL surgery for reasons other than instability (n=3) yielding a study group of 38 patients (22F:16M, mean 20.9 ± 8 years old, range 9-42).Two MSK radiologists assessed in consensus: MPFL graft signal (hypointense, intermediate, hyperintense, or fluid), graft thickness (mm), femoral screw (intact, broken, extruded, broken and extruded), femoral tunnel osteolysis (mm), and interval patellofemoral cartilage damage (modified Outerbridge) compared to preoperative MRI. A third MSK radiologist measured the tibial tubercle-trochlear groove distance (TT-TG) and Caton-Deschamps index (CDI). All three radiologists assessed femoral tunnel position blindly and independently with final result determined by majority consensus.Statistics included chi square, t-test, and kappa.

RESULTS

The anatomic femoral origin of the MPFL is between the adductor tubercle (AT), medial epicondyle (ME), and medial gastrocnemius origin (MG). There were 14/38 (37%) femoral tunnels within this region and 24/38 (63%) outside of this region. There were 7/38 (18%) patients that required MPFL revision for instability. All 7 that required revision were out of the anatomic region (p = 0.025) (Figure 1). Intra-reader reliability for femoral tunnel position was moderate to substantial (k = 0.42, 0.74, and 0.78). Inter-reader reliability was substantial (k = 0.62).There was no difference in mean graft thickness, femoral tunnel osteolysis, femoral screw

integrity, graft signal, TT-TG, or CDI in patients that required MPFL revision for instability vs. those that did not. None of the examined imaging or clinical factors predicted the degree or presence of patellofemoral cartilage damage.

CONCLUSION

Femoral tunnel position is more predictive of need for MPFL revision than the appearance of the graft on MRI.

CLINICAL RELEVANCE/APPLICATION

The appearance of an MPFL graft on MRI does not predict its function or integrity. Optimization of femoral tunnel positioning is important to maximize chances of graft success.

SSMK02-05 Lateral Patella Tilt and its Association with 3T MRI-defined Patellofemoral Osteoarthritis: A Longitudinal Analysis of the Osteoarthritis Initiative (OAI) Cohort

Participants
Arya Haj-Mirzaian, MD,MPH, Baltimore, MD (*Presenter*) Nothing to Disclose
Ali Guermazi, MD,PhD, West Roxbury, MA (*Abstract Co-Author*) Shareholder, Boston Imaging Core Lab, LLCResearch Consultant, Merck KGaAResearch Consultant, Roche, IncResearch Consultant, TissueGene, IncResearch Consultant, Galapagos, IncResearch Consultant, AstraZeneca PLCResearch Consultant, Pfizer Inc
Farhad Pishgar, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Frank W. Roemer, MD, Erlangen, Germany (*Abstract Co-Author*) Officer, Boston Imaging Core Lab, LLC; Researcher, Boston Imaging Core Lab, LLC; Shareholder, Boston Imaging Core Lab, LLC
Christopher Sereni, MD, Worcester, MA (*Abstract Co-Author*) Nothing to Disclose
Michael Hakky, MD, Framingham, MA (*Abstract Co-Author*) Nothing to Disclose
Shadpour Demehri, MD, Baltimore, MD (*Abstract Co-Author*) Research support, General Electric Company; Research Grant, Carestream Health, Inc; Consultant, Toshiba Corporation

For information about this presentation, contact:

ahajmir1@jhmi.edu

PURPOSE

The patellofemoral (PF) compartment is reported with the highest frequency of osteoarthritis (OA) among the knee compartments. The possible association between the PF morphologic features such as patellar tilt and PF OA has come into attention. In this study, we assessed the cross-sectional/longitudinal association of lateral patella tilt (LPT) measures with OA-related features in PF compartment.

METHOD AND MATERIALS

Recorded clinical and imaging data of all 600 participants in the FNIH project, a nested case-control study within the OAI cohort which is the largest ongoing cohort studying knee OA, were extracted and analyzed. The knee MRI sequences of all subjects were read by two musculoskeletal radiologists to measure LPT (as the angle formed between lines showing the longest patella diameter and posterior aspect of both condyles). Association of LPT measures with MRI OA Knee Scoring (MOAKS) for knee OA-related features, including cartilage damage, bone marrow lesions (BMLs), and osteophytes in addition to knee cartilage volumes at baseline, and worsening of MOAKS readings and cartilage volumes after 2-year follow-up were assessed in logistic regression models adjusted for several possible confounders (Figure), and reporting odds ratio (OR).

RESULTS

In the cross-sectional part, higher LPT was associated with lower cartilage volumes in lateral tibia, femur, and patella, in addition to higher scores of surface/thickness cartilage damage (OR=1.05(1.02-1.08) and OR=1.08(1.04-1.11)), number (OR=1.06(1.03-1.09)) and size (OR=1.06(1.03-1.09)) of BMLs, and osteophytes (OR=1.07(1.04-1.11)) in lateral PF region. However, medial PF region showed lower cartilage defects and BMLs scores and higher osteophytes scores in subjects with higher LPT. In the longitudinal study, higher LPT measures were also associated with worsening of cartilage volume in lateral tibia and BMLs scores in lateral PF region.

CONCLUSION

Higher measures of LPT is associated with the progression of OA-related features in lateral patella and trochlea (2-11% increase in odds of OA progression for each degree increase in LPT), whereas it was linked with lower odds of cartilage defects and BMLs in medial trochlea.

CLINICAL RELEVANCE/APPLICATION

Subjects with higher LPT (patellar tilt) are at increased risk of lateral PFOA incidence and progression.

SSMK02-06 A Prospective Randomized Trial of Biologic Augmentation with Mesenchymal Stem Cells in Patients Undergoing Anterior Cruciate Ligament Reconstruction

Participants
Brian Forsythe, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Ophelie Lavoie-Gagne, San Diego, CA (*Presenter*) Nothing to Disclose
Won C. Bae, PhD, La Jolla, CA (*Abstract Co-Author*) Nothing to Disclose
Yumi Jeong, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Sheronda Statum, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Enrico Forlenza, BS, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Adam B. Yanke, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Nikhil N. Verma, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose
Christine B. Chung, MD, Solana Beach, CA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

forsythe.research@rushortho.com

PURPOSE

MR findings have been shown to correspond with histological changes related to postoperative ligamentization. The purpose of this study is to correlate quantitative MR assessment of ACL graft with outcome measures in bone marrow-aspirate concentrate (BMAC), containing mesenchymal stem cells (MSCs), on graft ligamentization in patients undergoing ACL reconstruction (ACLR) with bone-patellar tendon-bone (BTB) allografts compared to a control cohort.

METHOD AND MATERIALS

A single blinded randomized controlled trial was conducted where patients received either intra-operative BMAC injection into the allograft or sham incision. Bone marrow aspirate was harvested from the anterior-superior iliac crest, concentrated via centrifuge, and a minimum of 1.25mL injected into proximal, middle, and distal sites of the allograft. T2-weighted MRI was performed at 3 and 9 months post-operatively and assessed by a musculoskeletal radiologist blinded to treatment group. Regions of interest (ROIs) were placed at the proximal, middle and distal thirds of the ACL graft and in the patellar tendon. Signal-intensity-ratios (SIRs) were calculated and compared between the two groups at both time points. Secondary outcomes included range of motion, International Knee Documentation Committee (IKDC) scores, and VR12 Mental Health (VR12) surveys. Analysis consisted of chi-square and independent t-tests with alpha set at 0.05.

RESULTS

A total of 43 patients were enrolled with 20 patients receiving BMAC and 23 controls. There were no significant differences in gender, age, or time to injury between groups. Allograft signal intensity and SIR for the inferior third of the allograft was significantly higher 3 months postop in the BMAC cohort (17.67 vs 11.83; p=0.013 and 2.73 vs 1.88; p=0.04). At 9 months post-operation, the BMAC cohort outperformed the control cohort in both clinical (flexion 133° vs 128°; p=0.02) and patient-reported outcomes (IKDC 64.2 vs 61.7; p=0.04 and VR12 57.0 vs 54.7; p=0.002).

CONCLUSION

Quantitative MR evaluation of ACL grafts at 3 months suggest an accelerated rate of ligamentization in BMAC versus control cohorts reflected by improved clinical and patient-reported outcomes at 9 months.

CLINICAL RELEVANCE/APPLICATION

The positive results of this pioneer randomized clinical trial of ACL ligamentization following BMAC injection into allograft may guide future investigations regarding effectiveness of BMAC biologic augmentation in ACLR.

Printed on: 05/05/21

SSMK08

Musculoskeletal (Shoulder)

Thursday, Dec. 3 10:00AM - 11:00AM Room: Channel 4

MK MR US AI

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSMK08-01 Classification of Rotator Cuff Tears on MR Imaging using a Deep Learning Approach

Participants
Jia Cheng Yao, BSC, Ottawa, ON (*Presenter*) Nothing to Disclose
Leonid Chepelev, MD,PhD, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Yashmin Nisha, MD, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Paul Anton Reymond Prakash Sathiadoss, MBBS, Ottawa, ON (*Abstract Co-Author*) Nothing to Disclose
Adnan M. Sheikh, MD, Ottawa, ON (*Abstract Co-Author*) Speaker, Siemens AG

For information about this presentation, contact:

jyao103@uottawa.ca

PURPOSE

To assess the diagnostic accuracy of a multi-stage deep learning classifier for identifying rotator cuff tears on magnetic resonance (MR) imaging.

METHOD AND MATERIALS

This retrospective study included 200 shoulder MR exams from patients with suspected rotator cuff tears (RCTs). Studies were obtained using a balanced random sampling of full-thickness RCT, partial-thickness RCT, and normal shoulder MR studies completed between 01/01/2015 to 01/07/2019. Images were obtained on either a 1.5T or 3.0T scanner. Coronal T2 fat-saturated sequences were preprocessed and used as input to the model (6405 image slices). The model is a deep learning classifier comprised of 3 stages: 1) a slice selection network based on a pre-trained ResNet; 2) a segmentation network based on U-Net; and 3) a custom convolutional neural network for final study classification. Training labels were created based on radiologist reports and were validated by consensus read by two musculoskeletal radiologists. Data was split 64:16:20 into training, validation, and test sets using stratified random sampling. The model was evaluated using a 5-fold cross-validation strategy and tested on a single iteration of the holdout test dataset.

RESULTS

On the cross-validation data the sensitivity, specificity, and overall accuracy of the model in detecting RCTs was 76% (95% CI: 65- 85%), 81% (95% CI: 71-89%) and 79% (95% CI: 72-85%). The area under the ROC curve (AUC) was 0.86. The model correctly identified 37/40 (93%) of full-thickness RCTs and 24/40 (60%) of partial-thickness RCTs. Segmentation accuracy was moderate with a mean Dice similarity coefficient of 0.79. On the holdout dataset the sensitivity, specificity, accuracy, and AUC were 88% (95% CI: 62-98%), 75% (95% CI: 48-93%), 81% (95% CI: 64-93%) and 0.90.

CONCLUSION

The study demonstrated a moderate diagnostic accuracy for the classification of rotator cuff tears using a deep learning approach. Improvements may be expected with a larger training set and future model development.

CLINICAL RELEVANCE/APPLICATION

A deep learning classifier may be considered to aid radiologists and automatically triage patients undergoing MR imaging for suspected rotator cuff tears.

SSMK08-02 Deep Learning Approach for Segmentation of Rotator Cuff Muscles on MR Images

Participants
Martin Torriani, MD, Boston, MA (*Presenter*) Nothing to Disclose
Giovanna Medina, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Colleen G. Buckless, MS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Eamon A. Thomasson, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Luke Oh, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

mtorriani@harvard.edu

PURPOSE

To develop and validate a deep convolutional neural network (CNN) capable of (1) selecting a specific shoulder sagittal MR image (Y-view) and (2) automatically segmenting rotator cuff (RC) muscles on a Y-view. We hypothesized that a deep CNN approach can accurately perform both tasks compared to similar manual tasks.

METHOD AND MATERIALS

We created 2 models: Model A for Y-view selection and Model B for muscle segmentation. For Model A, we manually selected shoulder sagittal T1 Y-views from 258 cases as ground truth to train a classification CNN model (Keras/Tensorflow, Inception v3, 16 batch size, 100 epochs, dropout 0.2, initial learning rate 0.001, RMSprop). A top-3 success rate was used to evaluate Model A performance on 100 test cases. For Model B, we manually segmented sagittal T1 Y-views in 1,048 cases for measuring RC muscle CSA of suprapinatus, infraspinatus, and subscapularis muscles. Model B images (N=943) underwent histogram equalization and data augmentation. Model B was trained from scratch (Keras/Tensorflow, U-Net, 8 batch size, 50 epochs, dropout 0.2, initial learning rate 0.0001, softmax). Dice (F1) score compared similarity between manual vs. CNN-based segmentation on 105 test cases to evaluate Model B performance.

RESULTS

Model A performance to select an appropriate Y-view showed top-3 accuracy of 98%. Model B for RC muscle segmentation showed overall mean Dice score of 95%. Individual Dice scores for each muscle were: background 99%, supraspinatus 93%, infraspinatus 94%, and subscapularis 93%. Inspection of test case segmentations showed [a] prevalence of errors at caudal margins of subscapularis muscle, likely reflecting variable field-of-view in training images; and [b] prediction errors at fascial/adipose interdigitations, especially subscapularis and infraspinatus.

CONCLUSION

Our results show overall accurate Y-view selection and automated RC muscle segmentation using a combination of deep CNN algorithms. Accuracy was generally high and improvement of algorithm performance will focus on strategies addressing areas of common prediction errors. This workflow may serve as a basis for future models aimed at automated segmentation of rotator cuff musculature.

CLINICAL RELEVANCE/APPLICATION

Use of an automated, repeatable and prompt method to quantify RC muscle CSA is critical for clinical and surgical decision-making in shoulder orthopedics.

SSMK08-03 Newly Developed Deep Learning Reconstruction: Capability for Image Quality Improvement of MRI Obtained by Conventional Parallel Imaging and Compressed Sensing in Patients with Various Shoulder Diseases

Participants
Yuki Obama, Toyoake, Japan (*Presenter*) Nothing to Disclose
Yoshiharu Ohno, MD,PhD, Toyoake, Japan (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation; Research Grant, DAIICHI SANKYO Group; ;
Kaori Yamamoto, Otawara, Japan (*Abstract Co-Author*) Employee, Canon Medical Systems Corportion
Satomu Hanamatsu, Aichi, Japan (*Abstract Co-Author*) Nothing to Disclose
Takahiro Ueda, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Kazuhiro Murayama, MD, Toyoake, Japan (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation
Akiyoshi Iwase, RT, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Takashi Fukuba, RT, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Hirotaka Ikeda, MD, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Masato Ikedo, Otawara, Japan (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Masao Yui, Otawara, Japan (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Hiroshi Toyama, Toyoake, Japan (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation

For information about this presentation, contact:

erdbeeremilch49@gmail.com

PURPOSE

To prospectively and directly determine the capability of newly developed deep learning reconstruction (DLR) for image quality improvement on MRI obtained by conventional parallel imaging (PI) and compressed sensing (CS) in patients with different shoulder diseases.

METHOD AND MATERIALS

Thirty consecutive patients with various shoulder diseases underwent MRI at a 3T MR system by conventional PI and CS. Then, each MR data was reconstructed with and without DLR. For determination quantitative image quality improvement of each acquisition with and without DLR, signal-to-noise ratio (SNR) of humeral head, percentage of coefficient of variations (%CVs) and contrast-to-noise ratio (CNR) were determined by ROI measurements in all patients. For qualitative image quality assessment, two radiologists evaluated overall image quality, artifacts and diagnostic confidence level (DCL) by 5-point scoring system, and final value of each index was made by consensus of two readers. To compare quantitative image quality indexes, each index was compared among all methods by Tukey's HSD test. On qualitative image quality evaluation, inter-observer agreement of each index was firstly determined by weighted-kappa statistics. Then, Wilcoxon signed-rank test was performed to compare each index among all methods.

RESULTS

CS with and without DLR showed significantly shorter examination times than conventional PI (p0.05). Inter-observer agreements for overall image quality and artifact of CS with and without DLR were substantial (0.730.05).

CONCLUSION

CS can significantly reduce examination time than PI. Moreover, DLR is able to significantly improve image quality of shoulder MRI obtained by CS at a 3T system.

CLINICAL RELEVANCE/APPLICATION

CS can significantly reduce examination time than PI. In addition, DLR has a potential to significantly improve image quality of shoulder MR imaging obtained by CS at a 3T system.

SSMK08-04 Application of Through-Plane Super-Resolution Shoulder MRI for the Diagnosis of SLAP Lesions

Participants
Sang Wook Kim, BS, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Yeo Ryang Kang, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hee-Dong Chae, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung Hwan Hong, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Ja-Young Choi, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hye Jin Yoo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hyunjung Yeoh, BMedSc, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sumin Lee, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jaemin Kim, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

hdchae02@gmail.com

PURPOSE

To develop and validate a through-plane super-resolution shoulder MRI technique for the diagnosis of superior labrum anterior-to-posterior (SLAP) lesions.

METHOD AND MATERIALS

The training dataset consisted of 165 MR scans with a 3D fast spin-echo (FSE) Dixon proton-density sequence. Thick-slice image with 3 mm slice thickness was reconstructed from the original image of 1 mm slice thickness with a downsampling factor of 3, and the convolutional neural network was trained to develop thin-slice images from the thick-slice images using these image pairs. Cubic interpolation was applied, and patches were extracted prior to the network development. For the validation dataset, we used 50 separate MR scans with a 2D FSE T2-weighted sequence. The validation dataset composed of 50 patients who were arthroscopically confirmed for the presence or absence of SLAP lesions. For the quantitative evaluation, we calculated the peak signal-to-noise ratio (PSNR), mean-squared-error (MSE), and structural similarity index (SSIM). For the observer performance study, two board-certified radiologists evaluated the possibility of SLAP lesions with a 5-point Likert scale on both the original 3 mm thickness and 1 mm super-resolution images.

RESULTS

The quantitative performance of cubic interpolation was PSNR 69.75, MSE 0.0090, and SSIM 0.9756. And the performance of our proposed super-resolution method was PSNR 71.12, MSE 0.0066, and SSIM 0.9790. Among the patients in the validation dataset, 31 patients were arthroscopically diagnosed with SLAP lesions, and 19 patients were confirmed to be without a labral tear. The diagnostic accuracy of the radiology fellow was increased from AUC 0.673 for thick-slice images to AUC 0.707 for super-resolution images. And the performance of the staff radiologist was improved from AUC 0.746 to 0.775 using the super-resolution images.

CONCLUSION

Through-plane super-resolution shoulder MRI was able to develop high-resolution thin-slice images, improving diagnostic accuracy for the SLAP lesions.

CLINICAL RELEVANCE/APPLICATION

The super-resolution method can be used to increase the diagnostic accuracy of abnormalities in small structures such as labrum in shoulder MRI.

SSMK08-05 Usefulness of Shear Wave Elastography for Preoperative Evaluation of the Supraspinatus Muscle in Tendon Tears: Could It Predict the Reparability of the Torn Supraspinatus Tendon?

Participants
Eun Kyung Khil, MD, Hwaseong, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jeung Yeol Jeong, MD, Hwaseong-si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jung-Ah Choi, MD, Hwaseong, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Joonsuk Park, MD, Hwaseong-si, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

nizzinim@gmail.com

PURPOSE

To evaluate the supraspinatus (SST) muscle quality in tendon tears using shear wave elastography (SWE), and to analyze the correlation between muscle elasticity and tendon reparability and other measuring tools for muscle quality on MRI.

METHOD AND MATERIALS

46 patients (mean age: 62.02[±8.67], range 45-79, 26 men, 20 women) with SST tears were prospectively recruited and underwent preoperative MRI and US, including SWE from May 2019 to April 2020. Using SWE, the elasticity value(kPa) of the SST muscle and the ratio (SST/trapezius muscles) were determined. Two radiologists evaluated the degree of fatty degeneration of the SST muscle using Goutallier's grade (GG), occupation ratio (OCR), and muscle atrophy grade (MA) on MRI; interobserver agreement was measured by Kappa statistics and intraclass correlation coefficient. Tendon reparability was divided into grades 1 to 4 according to the degree of tendon repair, and was subdivided into group I (complete or near complete repair, grade 1 and 2, n=41) and II (incomplete repair and repair failure, grade 3 and 4, n=5). In both groups, elasticity value and ratio, and other measuring tools (GG, OCR, MA) were compared and analyzed for correlations using Spearman or Pearson's correlation analysis.

RESULTS

Of the SWE values, the elasticity ratio showed a significant difference between the two groups (group I and II: 1.92[±0.85], 3.14[±1.12], respectively, $p=0.05$); the cut off value was 2.58. Other values, including GG, OCR, and MA also revealed significant differences between the two groups ($p<0.01$), with substantial to almost perfect interobserver agreements (0.86, 0.94, 0.78,

respectively, *p <0.001*).For correlation analyses, the elasticity value showed a weak to moderate correlation with GG and MA (r=0.37, 0.49, *p<0.01*). The elasticity ratio showed moderate correlations with GG, OCR, and MA (r=0.54, -0.47, 0.50, *p<0.001*) and showed a weak correlation with tendon reparability (r=0.38, *p=0.01*).

CONCLUSION

In the preoperative evaluation of the SST muscle quality using SWE, especially elasticity ratio, showed moderate correlation with the existing muscle evaluating tools and was significantly increased in the patient group with incomplete reparability.

CLINICAL RELEVANCE/APPLICATION

SWE may be useful to predict the tendon reparability by evaluating muscle quality in patients with SST tendon tear.

SSMK08-06 Magnetic Resonance Neurography (MRN) Mapping of Suprascapular, Long Thoracic and Axillary Nerve Constrictions in Parsonage-Turner Syndrome (PTS)

Participants
Sophie C. Queler, New York, NY (*Presenter*) Nothing to Disclose
Scott Wolfe, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Joseph Feinberg, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Steve K. Lee, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Darryl B. Sneag, MD, Plainview, NY (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

We hypothesized that intrinsic, hourglass-like constrictions (HGCs) of the most involved nerves in PTS would cluster to specific anatomic locations.

METHOD AND MATERIALS

An IRB-approved, retrospective review of an MRN database of 132 PTS patients (diagnosed by history/physical exam and electromyography) was performed to identify cases of suprascapular (SSN), long thoracic (LTN), and/or axillary nerve (AXN) involvement. An MSK-trained radiologist reviewed MRN exams performed from July 2016-March 2020. All MRN exams were acquired at 3.0T using 32-channel coil arrays and combined 2D and 3D T2-weighted, fat-suppressed sequences. The locations of severe (i.e. >90% reduced caliber), focal (<1cm long) HGCs were defined in 2 ways: 1) general anatomic region; 2) manually measured distance from osseous landmark (SSN: suprascapular notch; AXN: base of coracoid process).

RESULTS

Sixty cases were identified and 5 excluded due to inadequate SNR (4) or motion artifact (1). The final cohort comprised 55 subjects (15F; $\bar{x}$age 45 years) with SSN (21, 38%), LTN (16, 29%), AXN (8, 15%), SSN+AXN (9, 16%) and SSN+LTN (1, 2%) involvement. In total, 61 HGCs were identified in 40 subjects. Of the remaining 15 subjects, 12 had clinical LTN involvement with poor nerve visualization on MRN.SSN HGCs (n=44) were, on average, 3.5 cm proximal to the suprascapular notch (interquartile range, IQ: 2.7) and localized to retroclavicular (71%), supraclavicular (23%) or infraclavicular (7%) regions. AXN HGCs (n=13) were, on average, 3.0 cm (IQ: 3.4) distal to the base of the coracoid process in regions defined by the anteroinferior margin of the subscapularis muscle (69%), quadrilateral space (15%) or area medial to the coracoid (15%). LTN HGCs (n=8) were in the infraclavicular/retropectoral region (63%), along the posterolateral border of the middle scalene muscle (25%) or along the inferior chest wall (13%).

CONCLUSION

Severe HGCs of the most commonly involved nerves in PTS tend to cluster in particular anatomic regions, which suggests that certain sites may predispose the nerve to developing HGCs due to biomechanical stress and/or ischemia. Further investigation into locoregional anatomy, including fascial planes and vasculature supply, is warranted.

CLINICAL RELEVANCE/APPLICATION

Recognizing the anatomic localization patterns of HGCs in PTS may aid diagnostic recognition of these sites on imaging and shed light on disease pathophysiology.

SSMK09

Musculoskeletal (Elbow, Wrist, Hand)

Friday, Dec. 4 5:00PM - 6:00PM Room: Channel 4

CT ER MK MR US OI

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSMK09-01 The Flexed Elbow Valgus External Rotation (FEVER) MRI View for UCL Evaluation in Throwing Athletes

Participants
Pamela J. Lund, MD, Scottsdale, AZ (*Presenter*) Nothing to Disclose
Gary L. Waslewski, MD, Scottsdale, AZ (*Abstract Co-Author*) Nothing to Disclose
Mari Schenk, MD, Scottsdale, AZ (*Abstract Co-Author*) Nothing to Disclose
Ken Crenshaw, MS, Phoenix, AZ (*Abstract Co-Author*) Nothing to Disclose
Graham Munday, ARRT,BS, Malvern, PA (*Abstract Co-Author*) Educator, Siemens AG
Cheryl E. Vanier, PhD, Henderson, NV (*Abstract Co-Author*) Nothing to Disclose
Thomas Knoblauch, MS, Las Vegas, NV (*Abstract Co-Author*) Nothing to Disclose
Travis H. Snyder, DO, Las Vegas, NV (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

msqq75@gmail.com

PURPOSE

The FEVER MRI view was designed to produce valgus stress on the ulnotrochlear joint (UT) and yield high-resolution images of the UCL in throwing athletes. We hypothesized that the FEVER view would show ulnotrochlear joint space widening due to valgus stress compared to the standard MRI adding functional ligament information and improving reader confidence for UCL evaluation.

METHOD AND MATERIALS

Two readers reviewed the standard elbow MRI (standard) and standard plus FEVER view (FEVER) of 39 MLB pitchers, measured the ulnotrochlear joint space, evaluated the UCL for injury grade, signal type, location, periligamentous edema and retraction and recorded confidence scores. FEVER was performed with the shoulder immobilized in external rotation, shoulder and elbow flexed to 90°, forearm externally rotated and hand supinated. The elbow was elevated with two sandbags and 2 sandbags (7.6 lbs) were placed on the distal forearm to produce valgus stress. Oblique coronal PDFS, 2 mm UCL images were aquired. Data analyses compared UT joint space differences, inter-rater reliabilities, imaging findings and confidence scores on standard and FEVER.

RESULTS

78.9% increase in UT joint space was found between the standard and FEVER, with average increase of 1.7 mm (0.3 - 3.9 mm) ($p<0.001$). Inter-rater agreement on normal or abnormal UCL was seen in 36 of 39 (92.3%) subjects for both standard and FEVER. Three additional patients were diagnosed with UCL abnormalities on FEVER. Reader confidence was significantly increased on FEVER compared to standard with overall confidence difference of 1.08 for reader 1 and 0.77 for reader 2 ($p<0.001$). The FEVER view trended toward more abnormal UCLs, higher injury grades, more distal tears, and higher signal compared to standard view. Retraction and periligamentous edema were observed 12.8% and 10.8% less frequently on FEVER compared to the standard. 95% of subjects had discomfort level <5 on a 10 point scale.

CONCLUSION

The FEVER elbow MRI view added to standard elbow imaging produces elbow valgus stress with increased reader confidence for UCL evaluation in professional baseball pitchers compared to the standard elbow MRI alone.

CLINICAL RELEVANCE/APPLICATION

This study indicates that the FEVER view is a practical, reproducible addition to standard MRI imaging that produces elbow valgus stress which may provide functional UCL information and improve MRI evaluation of the UCL in throwing athletes.

SSMK09-02 T2 Mapping of the Articular Cartilage of the Elbow Joint at 3.0 Tesla MRI in Asymptomatic Volunteers: A Feasibility and Reproducibility Study

Participants
Joonsuk Park, MD, Hwaseong-si, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jung-Ah Choi, MD, Hwaseong, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Eun Kyung Khil, MD, Hwaseong, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Woo Rim Seo, MD, Hwaseong, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the feasibility and reproducibility of T2 relaxation time measurements at cartilages of the elbow joint in asymptomatic individuals at 3.0 T MRI.

METHOD AND MATERIALS

This prospective study was approved by our IRB and written informed consent was obtained. Thirty elbow joints in seventeen asymptomatic volunteers without history of trauma or surgery of the elbow (age range: 22-34 years, mean age: 27.8 year, 9 men, 8 women) underwent MR imaging, including T2 mapping, using 3.0 T scanner from July 2019 to September 2019. Regions of interest were manually drawn on the cartilages of radiocapitellar joints on sagittal images and T2 measurements were made on radial and capitellar cartilages, which were divided into anterior, middle and posterior portions. Two radiologists performed the measurements, one of them twice at two-week intervals. Intra- and inter-observer reproducibility were analyzed using 2-way mixed-effect intraclass correlation coefficients (ICCs).

RESULTS

The mean cartilage T2 values on anterior, central and posterior portion of radial head were 29.0±5.1, 29.8±7.1 and 29.2±5.8 msec, respectively, while those of capitellum were 27.1±7.9, 21.9±7.1 and 25.2±7.9 msec, respectively. Overall mean cartilage T2 values of radial head and capitellum were 29.3±6.1 msec and 24.7±7.9 msec, respectively. Using 2-way mixed-effect intraclass correlation coefficients, intra-observer agreement was good for T2 values of cartilage of radial head (anterior, central, posterior: 0.782, 0.762, 0.606, respectively; mean 0.733) and capitellum (anterior, central, posterior: 0.808, 0.808, 0.809, respectively; mean 0.817). Inter-observer agreement for cartilage T2 values was good for radial head (anterior, central, posterior: 0.841, 0.901, 0.747, respectively; mean 0.841) and capitellum (anterior-, central-, posterior-, 0.805, 0.901, 0.892; mean 0.867).

CONCLUSION

T2 mapping of radiocapitellar joint cartilage on 3T MRI was feasible and demonstrated good to excellent inter- and intrarobserver agreements, except for posterior portion of radial head, which showed moderate intra- and interobserver agreements.

CLINICAL RELEVANCE/APPLICATION

This study may serve as a baseline study for further research on elbow joint cartilage pathophysiology.

SSMK09-03 Dermal Rim Sign on MRI STIR as a Diagnostic Correlate of Dermal Backflow on Lymphoscintigraphy in Patients with Upper Extremity Lymphedema

Participants
Geunwon Kim, MD,PhD, Boston, MA (*Presenter*) Nothing to Disclose
Martin P. Smith, MD, Boston, MA (*Abstract Co-Author*) Research Grant, Bracco GroupResearch Grant, Bayer AGConsultant, Bayer AGResearch Consultant, General Electric Company
Kevin J. Donohoe, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
John A. Parker, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Dhruv Singhal, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Leo L. Tsai, MD,PhD, Boston, MA (*Abstract Co-Author*) Co-founder, Agile Devices Inc Stockholder, Agile Devices Inc Research Consultant, Agile Devices Inc

For information about this presentation, contact:

gkim6@bidmc.harvard.edu

PURPOSE

As new surgical options are available to treat lymphedema, MRI has emerged as a potential primary diagnostic tool for assessment. Dermal backflow is considered a gold-standard diagnostic feature of lymphedema but requires lymphoscintigraphy. A specific pattern of superficial subcutaneous edema seen on non-contrast STIR MR images, which we termed the dermal rim sign (DRS), may provide an alternative method of diagnosis that is more accessible and less invasive. The goal was to determine if DRS on MRI is predictive of dermal backflow seen on lymphoscintigraphy in patients with secondary upper extremity lymphedema.

METHOD AND MATERIALS

Bilateral upper extremity MRI and lymphoscintigraphy were performed on patients referred from the lymphedema clinic between March and October 2018. The sensitivity and specificity of DRS in detecting dermal backflow were calculated, and the locations of the sign and dermal backflow were compared. Correlation between DRS, ICG lymphography, bioimpedance spectroscopy ratio and MRI Lymphedema Staging was calculated. Linear weighted interobserver agreements on the presence of dermal backflow on lymphoscintigraphy, and the location of DRS on MRI were calculated.

RESULTS

33 patients were included in the analysis. 91.1% of patients had history of breast cancer. The average age was 58.4 ± 10.5 years old (range 31-75), with a mean symptom duration of 4.7 ± 4.4 years. The mean BMI (kg/m2) was 30.5 ± 7.0. DRS was seen in 32 out of 33 patients that demonstrated dermal backflow on lymphoscintigraphy. DRS was absent in all 11 symptomatic limbs that did not demonstrate dermal backflow on lymphoscintigraphy. Sensitivity and specificity of DRS for dermal backflow were 96.6% [95% confidence interval (CI):81.7%-99.9%], and 75.0% [CI:47.6%-92.7%], respectively. Positive and negative predictive values were 87.5% [CI:74.9%-94.3%] and 92.3% [CI:63.1%-98.8%]. Interobserver agreement on the extent of DRS on MRI was 0.92 [CI:0.85-1]. DRS also correlates with worse MRI Stage, ICG lymphography and bioimpedance ($p<.05$, $p<.001$, $p<.001$, respectively).

CONCLUSION

The dermal rim sign correlates highly with dermal backflow and widely used clinical measures and may be used as a noninvasive diagnostic MRI marker of lymphatic dysfunction and lymphedema.

CLINICAL RELEVANCE/APPLICATION

The dermal rim sign seen on MRI may be used as a surrogate for dermal backflow, which is seen on lymphoscintigraphy.

SSMK09-04 Foveal Triangular Fibrocartilage Avulsion of the Distal Radioulnar Joint: How Accurate Is MR Arthrography?

Participants
Matthias Streif, MD, Basel, Switzerland (*Presenter*) Nothing to Disclose
Filippo del Grande, MD, Lugano, Switzerland (*Abstract Co-Author*) Institutional research collaboration, Siemens AGSpeaker, Siemens

AGSpeaker, Bayer AG
Alexandre Kaempfen, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Felix Amsler, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Anna Hirschmann, MD, Basel, Switzerland (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Matthias.Streif@usb.ch

PURPOSE

Instabilities of the distal radioulnar joint (DRUJ) are clinically indistinct and require selective testing by DRUJ arthroscopy and a hook test of the foveal attachment of the triangular fibrocartilage complex (TFCC). We investigated if avulsion of the foveal attachment (Atzei 3) and the volar and dorsal stabilizing ligaments of the TFCC can be sufficiently diagnosed on MR arthrography (MRA) to predict instability of the DRUJ.

METHOD AND MATERIALS

In this retrospective monocenter study 37 patients with ulnar sided wrist pain (instability group; mean age 38.6 ±11.2 years; 13 female; 24 male) underwent arthroscopy with a positive hook test and 3T MRA between 2013 and 2019. Twelve patients with negative hook test and 37 patients without ulnar sided wrist pain comprised the control group. Two fellowship-trained musculoskeletal radiologists independently evaluated all MRA in a random distribution and blinded to clinical and surgical data as follows: foveal TFCC attachment, dorsal and volar radioulnar ligament (intact, scaring, partial/full avulsion). A 15-point score with ligament integrity results was created to calculate sensitivity, specificity and accuracy. Height-to-length ratio (HLR) of the TFCC was measured. ANOVA was calculating for HLR differences between groups ($p<0.05$). Interrater agreement was calculated (weighted kappa, κ).

RESULTS

Partial avulsion of the foveal TFCC was evident in 30% (11/37), full avulsion in 62% (23/37). Additional foveal scaring was detected in 30% (11/37). Dorsal radioulnar ligament tears were detected in 70% (16/37 partial avulsion, 10/37 full avulsion) and volar ligament tears in 49% (11/37 partial avulsion, 7/37 full avulsion). A positive hook test could be predicted with a score of at least 5 of 15 points with a sensitivity, specificity and accuracy of 76%, 100% and 89%, respectively. HLR did not reveal significant differences between groups ($p=0.486$). Interrater agreement was excellent for HLR (ICC, 0.92), good for foveal insertion (κ, 0.72) and poor for dorsal (κ, 0.29) and volar (κ, 0.20) radioulnar ligaments.

CONCLUSION

Foveal avulsions of the TFCC can be accurately detected using MRA. Presence of additional volar and dorsal ligament tears increased the likelihood of a foveal detachment.

CLINICAL RELEVANCE/APPLICATION

Detection of foveal avulsions using MRA aid surgeons in precisely selecting patients with clinical indistinct instability of the DRUJ and indicate adequate therapy of the TFCC.

SSMK09-05 Comparison of 3T and 7T MRI for Direct Visualization of Finger Pulley Injuries - An Ex-vivo Study

Participants
Rafael Heiss, Erlangen, Germany (*Presenter*) Speakers Bureau, Siemens AG
Christoph Lutter, Bamberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Michael Uder, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Armin Nagel, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas Bayer, MD, Erlangen, Germany (*Abstract Co-Author*) Nothing to Disclose
Frank W. Roemer, MD, Erlangen, Germany (*Abstract Co-Author*) Officer, Boston Imaging Core Lab, LLC; Researcher, Boston Imaging Core Lab, LLC; Shareholder, Boston Imaging Core Lab, LLC

PURPOSE

To compare image quality and diagnostic performance of 3T and 7T magnetic resonance imaging (MRI) protocols for direct depiction of finger pulley ruptures using anatomic preparation as the reference.

METHOD AND MATERIALS

30 fingers from 10 human cadavers were examined at 3T and 7T before and after being subjected to singular and multiple iatrogenic pulley ruptures. MRI protocols were comparable in duration. Two experienced radiologists evaluated the MRIs and defined the location and morphology of finger pulley lesions. Image quality was graded according to a 4-point Likert scale. The diagnostic performance was assessed with anatomic preparation as gold standard. Interobserver agreement was calculated by using Cohen's Kappa coefficients (κ).

RESULTS

7T MRI was more sensitive in the detection of A2, A3 and A4 pulley lesions compared to 3T MRI at 3T (100% vs. 95%), but less specific (98% vs. 100%). In the assessment of A3 pulley lesions sensitivity of 7T was superior to 3T MRI (100% vs. 83%), whereas specificity was lower (95% vs. 100%). Image quality assessed before iatrogenic rupture was comparable with 2.7 for 7T, 2.5 for 3T. After pulley rupture image quality was rated with 2.8, both for 3T and 7T. Interobserver variability at 7T ($\kappa=0.90$) was superior to 3T ($\kappa=0.80$).

CONCLUSION

MRI at 3T and 7T allows direct visualization and characterization of traumatic A2, A3 and A4 pulley lesions with higher agreement rates for 7T.

CLINICAL RELEVANCE/APPLICATION

High field MRI allows direct visualization of pulley ruptures, which is a modern approach for the pre-surgical evaluation compared to indirect techniques such as ultrasound depending of bowstringing.

SSMK09-06 Color-Coded Virtual Noncalcium Dual-Energy CT for the Depiction of Scaphoid Bone Marrow Edema: a Multireader Diagnostic Accuracy Study

Participants
Christian Booz, MD, Frankfurt am Main, Germany (*Presenter*) Speaker, Siemens AG
Ibrahim Yel, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Felix C. Muller, Herlev, Denmark (*Abstract Co-Author*) Employee, Siemens AG
Lukas Lenga, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Simon S. Martin, MD, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Moritz H. Albrecht, MD, Frankfurt am Main, Germany (*Abstract Co-Author*) Speaker, Siemens AG
Katrin Eichler, MD, Frankfurt am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Julian L. Wichmann, MD, Erlangen, Germany (*Abstract Co-Author*) Speaker, General Electric Company Speaker, Siemens AG
Thomas J. Vogl, MD, PhD, Frankfurt , Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

boozchristian@gmail.com

PURPOSE

To evaluate the diagnostic accuracy of a dual-energy CT virtual non-calcium (VNCa) technique for the assessment of scaphoid bone marrow edema in patients with acute wrist trauma.

METHOD AND MATERIALS

Data from consecutive 141 patients (70 male) with acute wrist trauma who had undergone clinically indicated third-generation dual-source CT and 3-Tesla MRI examinations of the wrist within two days between April 2019 and March 2020 were retrospectively analyzed. Six radiologists, blinded to MRI and clinical data, independently evaluated conventional grayscale dual-energy CT series for the presence of fractures; after 8 weeks, readers reevaluated all cases using color-coded dual-energy CT VNCa reconstructions for the presence of bone marrow edema for three scaphoid zones according to the Mayo classification. Quantitative analysis of CT numbers on VNCa reconstructions was performed by a seventh blinded radiologist. Results from MRI evaluated by two separate blinded experienced radiologists (20 and 32 years of experience in musculoskeletal imaging) served as standard of reference.

RESULTS

MRI revealed a total of 101 traumatic bone marrow edemas in 121 regions (25 distal, 72 central, 24 proximal). In the qualitative analysis, VNCa reconstructions yielded high overall sensitivity (96%), specificity (97%), positive predictive value (92%), negative predictive value (98%) and accuracy (96%) for the assessment of scaphoid bone marrow edema. Inter-reader agreement was excellent (κ=0.92). Receiver operating characteristic curve analysis revealed an area under the curve of 0.968 (distal), 0.965 (middle) and 0.961 (proximal). CT numbers obtained from VNCa were significantly different with and without edema (P<.001). A cut-off value of -22 HU provided an overall sensitivity of 92% and specificity of 93% for the differentiation of bone marrow edema.

CONCLUSION

Dual-energy CT VNCa reconstructions yield excellent diagnostic accuracy for the assessment of scaphoid bone marrow edema in patients with acute wrist trauma by enabling direct color-coded visualization.

CLINICAL RELEVANCE/APPLICATION

Scaphoid bone marrow edema can be accurately visualized using color-coded VNCa reconstructions. Therefore, dual-energy CT may be useful for enhanced fracture diagnosis in the presence of contraindications for MRI, or when MRI may be limitedly available.

Printed on: 05/05/21

SSNM01

Nuclear Medicine (Nuclear Medicine and PET)

Tuesday, Dec. 1 3:30PM - 4:30PM Room: Channel 4

GU NM MI

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSNM01-01 Phase Ib Intra-individual Comparison Study of Osteoblastic Metastases Using 10x Faster Whole-body Na18F Digital Photon Counting PET/CT

Participants
Chadwick L. Wright, MD,PhD, Columbus, OH (*Presenter*) Nothing to Disclose
Katherine Binzel, PhD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
Yu-Lung Hsieh, PhD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
Edmund Folefac, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
Dayssy A. Diaz-Pardo, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
Daniel G. Stover, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose
Michael V. Knopp, MD, PhD, Columbus, OH (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

knopp.16@osu.edu

PURPOSE

In this Phase Ib intra-individual comparison trial, we evaluate the clinical feasibility of a 10x faster whole-body sodium fluoride-18 (Na18F) PET approach using digital photon counting PET detector (dPET) technology for the qualitative and quantitative assessment of osteoblastic metastatic disease and compare to standard PET image acquisition times (60 - 120 s/bed).

METHOD AND MATERIALS

Investigational whole-body Na18F dPET/CT imaging (Vereos, Philips) was performed in 70 oncologic patients using a target Na18F dose of 185 MBq. At 75 min post injection, dPET acquisitions were performed using a 10x faster acquisition time of 9 s/bed followed by dPET acquisitions using standard 90 s/bed at 80 min post injection. All dPET image data sets were reconstructed using Time-of-Flight and standard-definition approaches (voxel volume = 4x4x4 mm3). A blinded reader panel using an Intellispace Portal workstation evaluated by matched pair comparison the overall image quality, background quality, and lesion detectability.

RESULTS

All patients had evaluable dPET data sets (n = 70) for qualitative and quantitative assessment of 18F biodistribution and osteoblastic activity. Faster 9 s/bed dPET acquisitions demonstrated comparable 18F-avidity in both normal bone and osteoblastic lesion conspicuity when compared to standard acquisitions with no discordant osteoblastic lesions. Average SUVmean were comparable for 9 s/bed and 90 s/bed acquisitions for background skeletal muscle (0.6 ± 0.1 and 0.7 ± 0.1, respectively) and normal vertebral bone (6.0 ± 1.1 and 6.6 ± 1.2, respectively). Average SUVmax of 134 osteoblastic lesions were also comparable for 9 s/bed and 90 s/bed acquisitions (29.8 ± 27.1 and 34.9 ± 28.7, respectively and not significantly different).

CONCLUSION

There remains an unmet clinical need to significantly reduce PET image acquisition times for oncologic patients with symptomatic osseous disease. This Phase Ib study demonstrates the clinical feasibility of 10x faster whole-body Na18F PET imaging of osteoblastic disease with dPET technology.

CLINICAL RELEVANCE/APPLICATION

Digital photon counting PET detector technology enables 10x faster whole-body Na18F PET (total imaging time ~3 min) with no loss of lesion detectability, image quality or quantitative accuracy.

SSNM01-02 Impact of PSMA PET/CT on SRT Planning: Preliminary Results From a Randomized Phase III Trial

Participants
Jeremie Calais, MD, Los Angeles, CA (*Presenter*) Consultant, RadioMedix, IncConsultant, Blue Earth Diagnostics LtdConsultant, Progenics Pharmaceuticals, IncConsultant, Johnson & JohnsonConsultant, Curium SASConsultant, General Electric Company
Wesley R. Armstrong, BS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Amar U. Kishan, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Kiara M. Booker, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Johannes Czernin, MD, Los Angeles, CA (*Abstract Co-Author*) Stockholder, Trethera Corporation Board Member, Trethera Corporation
Nicholas Nickols, MD, Los Angeles, CA (*Abstract Co-Author*) Research Grant, Johnson & Johnson Research Grant, Varian Medical Systems, Inc Research Grant, Bayer AG Consultant, Genes Sciences Inc Consultant, Progenics Pharmaceuticals, Inc

For information about this presentation, contact:

JCalais@mednet.ucla.edu

jcallais@mednet.ucla.edu

PURPOSE

This trial's purpose is to evaluate the success rate of salvage radiotherapy (SRT) for recurrent prostate cancer after prostatectomy with versus without planning based on PSMA PET.

METHOD AND MATERIALS

This is a Randomized, controlled, prospective, open label, phase 3 clinical trial with institutional funding. 193 patients are randomized to proceed with standard SRT allowing for any conventional imaging aside from PSMA PET/CT (control arm 1) or undergo a 68Ga-PSMA-11 PET/CT scan prior to SRT planning (investigational arm 2). The primary endpoint is the success rate of SRT measured as biochemical progression-free survival (PFS) at 5 years. We hypothesized that the incorporation of PSMA PET to SRT planning will improve 5-year PFS survival by 20%: 60% in Arm 1 and 80% in Arm 2. We report the preliminary results of the impact of PSMA PET on SRT planning by comparing the pre-randomization RT plans prospectively obtained on surveys to the actually delivered RT plans.

RESULTS

153 patients were enrolled from 09.06.2018 to 01.24.2020. 7/75 patients (9%) in the control arm dropped-out the study to undergo a PSMA PET at another institution. After a median follow-up of 10.6 months delivered RT plans were obtained in 44/68 (65%) and 50/78 (64%) of patients of the control and the PSMA arms, respectively. In these, median PSA at enrollment was 0.42 ng/ml (IQR 0.20-1.75) in the control and 0.22 ng/ml (IQR 0.13-0.59) in the PSMA arm. PSMA PET was positive in 24/50 (48%): 5/50 (10%) showed prostate cancer outside of the pelvis, 12/50 (24%) in pelvic nodes and 8/50 (16%) in the prostate bed only. There was a change between the intended pre-randomization RT plan and the actually delivered RT plan in 28/50 (56%) and 14/44 (32%) of the patients in the PSMA and the control arm, respectively ($p = 0.019$). SRT was aborted in favor of systemic therapy and/or metastasis directed RT for extra-pelvic M1 disease in 4/50 (8%) of the PSMA arm vs. 1/44 (2%) in the control arm ($p = 0.21$). Dose prescription and/or target volume delineation was changed in 14/50 (28%) in the PSMA arm vs 3/44 (7%) in the control arm ($p = 0.008$).

CONCLUSION

In this prospective randomized phase 3 study, PSMA PET had an impact on the RT plan in more than half of the patients. Notably, 8% of PSMA patients did not undergo SRT because the scan revealed extra-pelvic metastases.

CLINICAL RELEVANCE/APPLICATION

Long-term follow-up will show if the impact of PSMA PET on SRT planning improves PFS.

SSNM01-04 [F-18]siPSMA-14 PET/CT Acquired at 90 Minutes p.i. Without Forced Diuresis Provides Optimal Contrast for Staging and Restaging of Prostate Cancer Patients

Awards
Trainee Research Prize - Fellow

Participants
Jonathan Miksch, Ulm, Germany (*Presenter*) Advisor, SCINTOMICS GmbHShareholder, SCINTOMICS GmbHInventor, SCINTOMICS GmbHInventor, siPSMA
Vikas Prasad, Ulm, Germany (*Abstract Co-Author*) Advisor, Scintomics GmbH; Shareholder, Scintomics GmbH; Inventor, Scintomics GmbH; Inventor, siPSMA
Daniel Di Carlo, Garching, Germany (*Abstract Co-Author*) Advisor, Scintomics GmbH; Shareholder, Scintomics GmbH; Inventor, Scintomics GmbH; Inventor, siPSMA
Friedemann Zengerling, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose
Christian Bolenz, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose
Christoph Solbach, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose
Meinrad J. Beer, MD, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose
Thomas Wiegel, Ulm, Germany (*Abstract Co-Author*) Advisor, Scintomics GmbH; Shareholder, Scintomics GmbH; Inventor, Scintomics GmbH; Inventor, siPSMA; ;
Hans-Jurgen Wester, Munchen, Germany (*Abstract Co-Author*) Patent applicant, Blue Earth Diagnostics Ltd; Research Grant, Blue Earth Diagnostics Ltd; Founder, SCINTOMICS GmbH; Shareholder, SCINTOMICS GmbH; Advisory Board, SCINTOMICS GmbH;
Ambros J. Beer, MD, Ulm, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Among other tools, standardized and optimized imaging protocols help to assure the right balance between best patient compliance, optimized diagnostic performance and minimum acquisition time. With this background aimed to find the optimal time point for acquiring PET/CT using the novel PSMA-specific PET radiotracer [F-18]siPSMA-14 in prostate cancer (PCa) patients.

METHOD AND MATERIALS

47 consecutive PCa patients (69 ± 7y; GS 6-9, median (range) PSA 3.2 (0.009-1000) ng/ml) referred for PSMA-PET/CT were retrospectively analyzed. Images were acquired in 7 patients both at 60 (T1) and 120 (T3); in 40 patients images were acquired only at 90 (T2) minutes after injection of [F-18]siPSMA-14 (344.08 ± 11.7 MBq) without using furosemide. Contrast enhanced CT was performed in all patients unless contraindicated. SUVmean in a fixed size Region of interest (ROI) was drawn on normal organs and malignant lesions (prostatic lesions (PL) including intraprostatic and local residue), bone (BM), lymph node (LM) and adrenal gland(AM) metastases). T1 and T3 were considered for changes in uptake over time. Target/non target ratios (TTR) were calculated by comparig SUVmean of tumor lesions with background activity. T-test was performed to assess the significance of differences in SUVmean.

RESULTS

PL and metastatic lesions (ML) as small as up to 3 mm were visualized at all time points. The SUVmean of PL at T1, T2 and T3 was 6.9, 9.6 and 8.2. TTR of PL / bladder at T1/T3 and T2 were 0.7/0.9 and 1.9. Mean TTR at T1/T3 for LM (n=2); BM (n=2) and AM (n=1) were 21.4/24.2; 5.3/5.8; 41.2/46.8. The mean SUVmean of ML at T2 was 23.8 ± 9.6. Mean TTR at T2 for LM (n=17); BM (n=11) and AM (n=1) were 14.3; 18.6 and 30.2. Amongst normal organs, the kidneys showed highest radiotracer uptake and increased significantly ($p<0.05$) in delayed images acquired at T3 whereas in liver and pancreas the uptake reamined stable over

time.

CONCLUSION

[F-18]siPSMA-14 PET/CT images acquired at 90 minutes without furosemide-induced forced diuresis provides optimal contrast for staging and restaging of prostate cancer patients.

CLINICAL RELEVANCE/APPLICATION

[F-18]siPSMA-14 PET/CT image acquisition at 90 minutes p.i. without furosemide seems most favourable for primary staging and restaging of prostate cancer patients.

SSNM01-05 Factors Associated with Change in Management Due to Inclusion of PSMA PET CT in Pre-operative Staging of Patients with High Risk Prostate Cancer

Participants
Gregory P. Tarr, MBChB, PhD, Auckland , New Zealand (*Presenter*) Nothing to Disclose

PURPOSE

There is emerging data supporting the use of PSMA PET CT in pre-operative staging amongst patients with high risk prostate cancer. The aim of the study was to assess clinical and imaging features associated with change in management for patients scanned for this indication.

METHOD AND MATERIALS

Patients with high-risk prostate cancer undergoing Ga68 PSMA PET/CT at Mercy Radiology, Auckland, New Zealand were prospectively recruited. Conventional staging was double read in a blinded fashion by oncology fellowship-trained radiologists, who were also experienced in PSMA PET/CT. The PSMA PET/CT was subsequently read by the same radiologists. Confirmation of changes in management decision were obtained from the treating surgeon and multidisciplinary team meeting records. Ethical approval was obtained from the Health and Disability Ethics Committee. All patients gave written informed consent.

RESULTS

A total of 49 patients were scanned. Three who were otherwise eligible for radical prostatectomy elected alternative treatments, leaving 46 patients included for analysis in the study. There was change in management in 16 (34.8%) of patients. Both clinical and imaging-related variables were predictive of management changes. There was a step-wise increase in likelihood of management change with increasing Gleason score. A larger proportion of core biopsy samples positive for disease was predictive of change in management. The SUVmax of the primary lesion was also higher in patients with a change in management than those without).When these variables were included in in a stepwise logistic regression model, Gleason score emerged as the best predictor of change in management, with an adjusted odds ratio of 2.9 (95% CI 1.01 to 8.3, P=0.047) for each point increase in the Gleason scale.However, even patients in the lowest quartiles of the combination of these variables had frequent management changes, and these was no cut off point evident below which inclusion of PSMA was futile.

CONCLUSION

Factors associated with increased likelihood for management changes in patients being staged for high risk prostate cancer included higher Gleason score, numbers of cores positive, and SUVmax of the index lesion. However, even patients with low levels of these variables frequently benefited from the inclusion of PSMA in the staging algorithm. No changeN=30 Change in managementN=16 P valueGleason score6 to 8910 21 (84.0%)8 (47.1%)1 (25.0%) 4 (16.0%)9 (52.9%)3 (75.0%) 0.01Proportion of cores positive 46% ± 24% 69% ± 36% 0.021SUVmax 13.4 ± 9.7 23.7 ± 15.5 0.022

SSNM01-06 The Clinical Utility of 18F-Fluciclovine PET in Biochemically Recurrent Prostate Cancer Following Primary Radiation Therapy: Is It Helpful in Patients with a PSA Rise Less Than the ASTRO/Phoenix Criteria?

Participants
Ali Salavati, MD, MPH, Baltimore, MD (*Presenter*) Nothing to Disclose
Mehmet Gencturk, MD, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Yasemin Koksel, MD, Falcon Heights , MN (*Abstract Co-Author*) Nothing to Disclose
Allyssa Schik, MD, Minneapolis, MN (*Abstract Co-Author*) Nothing to Disclose
Peter R. Carroll, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Felix Feng, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Courtney A. Lawhn-Heath, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Thomas A. Hope, MD, San Francisco, CA (*Abstract Co-Author*) Research Grant, Koninklijke Philips NVAdvisory Board, Ipsen SAConsultant, CuriumResearcher, Advanced Accelerator Applications SA
Jerry W. Froelich, MD, Minnetonka, MN (*Abstract Co-Author*) Researcher, Siemens AG

PURPOSE

18F-FACBC PET imaging has been increasingly used in the restaging of prostate cancer patients with biochemical recurrence (BCR); however, its clinical utility in patients with low PSA levels following primary radiation therapy is still unclear. We aimed to determine the detection rate and diagnostic accuracy of 18F-FACBC PET and the patterns of prostate cancer recurrence in patients with BCR after initial radiation therapy, particularly in patients with a PSA rise below the accepted ASTRO/Phoenix definition of PSA failure (PSA nadir + 2).

METHOD AND MATERIALS

After obtaining institutional review board (IRB) approval from two tertiary institutions; imaging, clinical, and histopathology data of consecutive patients who underwent 18F-FACBC PET/CT or PET/MRI scans for elevated PSA level following initial radiation therapy were analyzed. Receiver operating characteristic (ROC) curve was used to determine the predictive value of PSA and PSA kinetic parameters for a positive 18F-FACBC PET.

RESULTS

One hundred patients were included. The median PSA was 3.3 ng/mL. The overall detection rate on a patient-level was 78%

(78/100). FACBC was positive in 62%(23/37) of cases below the ASTRO/Phoenix criteria, with a median PSA of 1.25 ng/mL. Local recurrence was the most findings, occurring in 67%(67/100) of patients, with isolated local recurrence in 56%(56/100) of cases. In 58 patients with biopsy(n=44) or composite follow-up imaging, the sensitivity and positive predictive value of 18F-FACBC PET were 91%(95%CI: 78-97%) and 89%(95%CI: 80-94%), respectively. The detection rate was 60%(18/30) in patients with PSA $\leq$ 2.0 ng/ml. In patients with PSA below the ASTRO/Phoenix criteria, the PSA velocity had the highest predictive value of a positive 18F-FACBC PET with an area under the curve (AUC) of 79%.

CONCLUSION

18F-FACBC PET identified recurrent disease with a PSA rise less than the ASTRO/Phoenix criteria in 62% of subjects. Isolated local recurrence is the most common finding, which accentuates the importance of early detection of recurrent disease after initial radiation therapy. In patients with PSA below the ASTRO/Phoenix criteria, the PSA velocity can help identify patients who would benefit from 18F-FACBC PET.

CLINICAL RELEVANCE/APPLICATION

In patients with biochemical recurrence after initial radiation therapy, 18F-FACBC PET can identify recurrent disease in majority of cases with a PSA rise less than the ASTRO/Phoenix criteria (PSA nadir + 2).

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RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SSNR03

Science Session with Keynote: Neuroradiology (Brain-Stroke Imaging 1)

Sunday, Nov. 29 8:30AM - 9:30AM Room: Channel 4

CT GU

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSNR03-01 Neuroradiology Keynote Speaker: Recent Advances in Stroke Imaging

Participants
Jeremy J. Heit, MD,PhD, Los Altos, CA (*Presenter*) Consultant, Medtronic plcConsultant, Terumo CorporationScientific Advisory Board, iSchemaView, IncMedical Advisory Board, iSchemaView, Inc

SSNR03-02 Fully-Automated Identification and Characterization of Large Vessel Occlusions on CT Angiography with 3D Convolutional Neural Networks

Awards
Trainee Research Prize - Resident

Participants
Ian Pan, MA , Cleveland, OH (*Presenter*) Consultant, MD.ai, Inc
Thi My Linh Tran, BS, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Thomas Yi, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Panpan Wang, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Shujuan Meng, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Jing Wu, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Scott Collins, RT, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Li Yang, Changsha, China (*Abstract Co-Author*) Nothing to Disclose
Ugur Cetintemel, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Jerrold L. Boxerman, MD, PhD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Ryan A. McTaggart, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Mahesh V. Jayaraman, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
John H. Woo, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Harrison X. Bai, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

ianpan358@gmail.com

PURPOSE

To develop a deep learning pipeline that identifies the series of interest within a CT angiography (CTA) head & neck study and the presence and acuity of large vessel occlusions (LVOs).

METHOD AND MATERIALS

17,550 series across 7,712 LVO-protocoled studies from Institution 1 (Inst1) were identified and labeled into 9 classes (different 3D planes, maximum intensity projections (MIPs), thin data, etc.) using DICOM metadata. The Inception-V1 3D convolutional neural network (CNN) architecture pretrained on the Kinetics dataset was used to train a series classifier and tested on a 10% holdout set. Axial arterial phase MIPs in 7,433 studies (7,332 patients) from Inst1 were obtained. Data were labeled into 3 classes via review of the original radiology report: without LVO ('normal'), chronic LVO, and acute LVO. The data were split into 10 train/validation/test (80%/10%/10%) partitions for 10-fold cross-validation. Additionally, 683 studies positive for LVO from Institution 2 (Inst2) were used as an independent test set. An Inception-V1 3D CNN was used to train a classifier for acute LVO, chronic LVO, and normal. Final predictions were made by a 3-model ensemble.

RESULTS

The series classifier achieved an accuracy of 96% and AUC of 1.0 in identifying the axial arterial phase MIP and thin data. Inst1 contained 219 (2.9%) acute LVOs, 1,011 (13.6%) chronic LVOs, and 6,203 (83.5%) normal studies. Inst2 contained 185 (27.4%) acute LVOs and 490 (72.6%) chronic LVOs. For Inst1, the cross-validated AUCs for acute LVO vs. not and LVO vs. normal were 0.824 (95% CI: 0.793, 0.853) and 0.793 (95% CI: 0.779, 0.807), respectively. For acute LVO vs. not (Inst1), the model achieved 30% specificity at a sensitivity of 95%. Similarly, sensitivity was 43% at a specificity of 95%. The series classifier achieved 98.2% accuracy on Inst2 data. Generalizability was limited to evaluating performance of acute vs. chronic LVO given data availability. For Inst1 and Inst2, the AUCs for this task were 0.655 (95% CI: 0.614, 0.694) and 0.638 (95% CI: 0.590, 0.687), respectively.

CONCLUSION

3D CNNs were effective in identifying series of interest and acute LVOs in CT angiography. At a 5% false positive rate, over 40% of acute LVOs would be successfully identified without manual intervention.

CLINICAL RELEVANCE/APPLICATION

Deep learning can facilitate prompt and fully-automated identification of acute LVOs in CTA to decrease time-to-treatment for stroke patients.

SSNR03-03 Perfusion Imaging to Select Patients With Large Ischemic Core for Mechanical Thrombectomy

Participants
Basile Kerleroux, MD, Paris, France (*Presenter*) Nothing to Disclose
Kevin Janot, MD, Tours, France (*Abstract Co-Author*) Nothing to Disclose
Cyril Dargazanli, Montpellier, France (*Abstract Co-Author*) Nothing to Disclose
Dimitri Daly Eraya, MD, Montpellier, France (*Abstract Co-Author*) Nothing to Disclose
Wagih Ben Hassen, MD, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Francois Zhu, Nancy, France (*Abstract Co-Author*) Nothing to Disclose
Benjamin Gory, Bron, France (*Abstract Co-Author*) Nothing to Disclose
Jean-Francois Hak, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Florent Gariel, Montbonnot, France (*Abstract Co-Author*) Nothing to Disclose
Gaultier Marnat, Bordeaux, France (*Abstract Co-Author*) Nothing to Disclose
Aymeric Rouchaud Rouchaud, Limoges, France (*Abstract Co-Author*) Nothing to Disclose
Geraud Forestier, Limoges, France (*Abstract Co-Author*) Nothing to Disclose
Joseph Benzakoun, Paris, France (*Abstract Co-Author*) Nothing to Disclose
Lili Detraz, Nantes, France (*Abstract Co-Author*) Nothing to Disclose
Romain Bourcier, Nantes, France (*Abstract Co-Author*) Nothing to Disclose
Pasquale Mordasini, MD,MSc, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Johannes Kaesmacher, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Gregoire Boulouis, MD, MSc, Paris, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Patients with acute ischemic stroke, proximal vessel occlusion and a large ischemic core at presentation are commonly not considered for mechanical thrombectomy (MT). We tested the hypothesis that in patients with baseline large infarct cores, identification of remaining penumbral tissue using perfusion imaging would translate to better outcomes after MT.

METHOD AND MATERIALS

Multicenter, retrospective, core lab adjudicated, cohort study of adult patients with proximal vessel occlusion, a large ischemic core volume (DWI volume >= 70ml), with pre-treatment MRI perfusion, treated with MT (2015-2018) or medical care alone (controls; before 2015). Primary outcome measure was 3-months favorable outcome (defined as a modified Rankin scale, mRs of 0-3). Core Perfusion Mismatch Ratio (CPMR) was defined as the volume of critically hypo-perfused tissue (Tmax > 6s) divided by the core volume. Multivariable logistic regression models were used to determine factors that were independently associated with clinical outcomes. Outputs are displayed as adjusted Odds Ratios (aOR) and 95% CI.

RESULTS

A total of 172 patients were included (MT n=130; Control n=42; mean age 69.0±15.4 years; 36% females). Mean core-volume and CPMR were 102.3ml (±SD 36.7) and 1.8±0.7 respectively. As hypothesized, receiving MT was associated with increased probability of favourable outcome and functional independence, as CPMR increased, a difference becoming statistically significant above a mismatch-ratio of 1.72. Similarly, receiving MT was also associated with favourable outcome in the subgroup of 74 patients with CPMR >1.7 (aOR 8.12, 95%CI [1.24-53.11], p=0.028). Overall (prior to stratification by CPMR),73 (42.4%) patients had a favourable outcome at 3 months, with no difference amongst groups.

CONCLUSION

In patients currently deemed ineligible for MT due to large infarct ischemic cores at baseline, CPMR identifies a subgroup strongly benefiting from MT. Prospective studies are warranted.

CLINICAL RELEVANCE/APPLICATION

In this cohort study of 172 patients with infarct cores >=70ml at baseline, mechanical thrombectomy was associated with significantly higher odds of favourable outcome above a core / perfusion mismatch ratio of 1.7 when compared to controls.Perfusion imaging, when demonstrating large mismatch profiles, may help to properly select patients with large ischemic core at baseline for mechanical thrombectomy.

SSNR03-04 Volumetric and Regional Atlas-Based Analysis of Diffusion MRI for Neuroprognistication in Comatose Cardiac Arrest Patients

Participants
Evan D. Calabrese, MD, PhD, San Francisco, CA (*Presenter*) Nothing to Disclose
Jason F. Talbott, MD, PhD, Novato, CA (*Abstract Co-Author*) Nothing to Disclose
Jared A. Narvid, MD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Jeffery Vitt, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Jonathan Shih, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
J. Claude Hemphill, MD, San Francisco, CA (*Abstract Co-Author*) Research support, Novo Nordisk AS Consulting, UCB SA Stockholder, Cardium Therapeutics Stock options, Cardium Therapeutics Stockholder, Ornim, Inc Stock options, Ornim, Inc Speakers Bureau, Network for Continuing Medical Education
Shital Gandhi, MD, Burlingame, CA (*Abstract Co-Author*) Nothing to Disclose
Edilberto Amorim, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To evaluate the performance of combined volumetric thresholded ADC measures and spatial distribution of diffusion abnormalities from brain MRI for neurologic prognostication in post-cardiac arrest coma (PCAC).

METHOD AND MATERIALS

We retrospectively identified 50 adult subjects who were comatose (Glasgow Coma Score <9) following cardiac arrest that had a brain MRI for neurological prognostication within 2 weeks of the enciting event. Automated image processing steps included diffeomorphic registration of patient DWI/ADC volumes to the MNI atlas template, skull stripping, and anatomic parcellation with the Harvard Oxford atlas. A custom python script was used to extract quantitative ADC values and thresholded volumes of brain tissue with ADC <650x10-6 mm2/s for each patient in each brain region. ADC values were compared between two outcome groups based

on all-cause in-hospital mortality using t-tests with a false discovery rate corrected p-value <0.05 considered significant.

RESULTS

Mean patient age was 57 (+/- 14.8). In-hospital mortality was 64% with 18 patients surviving (group 1) and 32 dying (group 2). There was a trend towards older patients in group 2 (p=0.08). Mean time to MRI was 5 days for both groups. Whole cortex ADC values were significantly higher in group 1 with a median of 822x10-6 mm2/s compared to 756x10-6 mm2/s in group 2 (p=0.008). Average volume of cortex with ADC <650x10-6 mm2/s was 10.0 mL in group 1 compared to 63.7 mL in group 2 (p=0.005). Several statistically significant regional differences in ADC values and thresholded volumes were detected throughout the brain, predominantly involving the frontotemporal cortices and insula. The largest differences in ADC between groups were in the inferior frontal gyri (860x10-6 mm2/s in group 1 versus 769x10-6 mm2/s in group 2, p=0.005). The largest differences in thresholded volumes of brain tissue with ADC <650x10-6 mm2/s were in the frontal poles (1.1 mL in group 1 versus 10.3 mL in group 2, p=0.004).

CONCLUSION

A combined approach to brain MR imaging with volumetric threshold measures of ADC and regional analyses demonstrates significant global and regional differences associated with in-hospital mortality in PCAC.

CLINICAL RELEVANCE/APPLICATION

Quantitative brain diffusion imaging analyses has the potential to improve multimodal neurological prognostication and prevent false positive prediction of poor outcomes in patients who may recover from PCAC.

SSNR03-05 Deep Learning-based Fully Automated Detection and Quantification of Acute Infarcts

Participants
Seung Hyun Hwang, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyug-Gi Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hwiyoung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Kyung Mi Lee, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Jihoon Cha, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research funded, DEEPNOID, Inc
Ja Ho Koo, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research funded, DEEPNOID, Inc
Hyun S. Choi, MD,PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Research funded, DEEPNOID, Inc
Seung-Koo Lee, MD, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

hwangsh7415@gmail.com

PURPOSE

Visual assessment on magnetic resonance image (MRI) in patients with acute infarct is not quantitative but qualitative because manual lesion segmentation is time consuming and quantitative analysis is hardly feasible in daily practice. A deep learning-based automated infarct segmentation model on diffusion weighted imaging (DWI) was developed, and infarct severity with respect to apparent diffusion coefficient (ADC) map was measured.

METHOD AND MATERIALS

DWIs and ADC maps from 394 patients with acute infarct were collected from a single institution, from January 2015 to May 2019. Total dataset was divided into three subsets; 216 for training, 24 for validation, 154 for test purposes. A convolutional neural network (CNN) based encoder-decoder model (specifically, modified 2D U-Net) was trained to segment the infarct lesion on DWIs. An ensemble approach was employed to get a better performance on small lesions. The infarct severity w.r.t ADC values were measured within predicted lesions and stratified to four categories according to ADC value (no stroke symptoms, minor stroke, moderate stroke, severe stroke). The segmentation performance was evaluated in terms of dice coefficient, and compared with U-Net. The lesion volume estimated by our model was compared to that manually derived by radiologists.

RESULTS

Our model achieved dice coefficient superior to U-Net. Dice coefficient was 0.8440 for our model, and 0.8233 for U-Net. After ensemble approach, our model scored 0.8575 in test dataset with standard deviation (SD) of 0.0657 (0.8944 ± 0.1783 SD with excluding outliers). The ensemble model showed 83 % sensitivity, and 99 % specificity. Average volume difference between the lesions estimated by our model and those by radiologists was 0.2531 ml. The ADC value of >620 was set as a cutoff for 'no stroke symptoms' category, and the other categories were determined at 100 intervals in terms of ADC value. Fig.1 shows an example of the result. (a) original image, (b) true label, (c) prediction of our model, (d) prediction of U-Net, (e) ADC value of predicted lesion (four different levels of ADC values are depicted by colormaps)

CONCLUSION

Our deep learning-based model showed the feasibility for detecting and quantifying acute infarcts.

CLINICAL RELEVANCE/APPLICATION

An automatic deep learning-based infarct segmentation model on diffusion weighted imaging (DWI) was developed and expected to help clinicians with 24-hour availability.

SSNR03-06 Outcomes After Endovascular Thrombectomy in Patients with Acute Basilar Artery Occlusion: A Meta-Analysis

Participants
Mihir Khunte, New Haven, CT (*Presenter*) Nothing to Disclose
Xiao Wu, San Francisco, CA (*Abstract Co-Author*) Research Grant, Koninklijke Philips NV
Ajay Malhotra, MD, New Canaan, CT (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Ajay.malhotra@yale.edu

PURPOSE

To estimate the rates of 90-day good outcomes (modified Rankin Scale (mRS) 0-2) and mortality after endovascular thrombectomy (EVT) in patients with acute basilar artery occlusion (BAO) by performing a meta-analysis

METHOD AND MATERIALS

A systematic review and meta-analysis were performed with a comprehensive literature search in 4 major medical databases from 01/01/2015 to 04/03/2020: Ovid Embase, Ovid MEDLINE, Web of Science, and Cochrane Central. A senior radiologist with over 10 years' experience reviewed reports for inclusion. Two separate screeners independently reviewed all included studies, performed full-text screen and extracted data from the final studies.

RESULTS

The literature search returned a total of 4,338 results. After de-duplication, the abstracts of 2,652 manuscripts were screened resulting in 189 papers identified for full-text screening. Finally a total of 23 studies published since 01/01/2019 with 2,244 patients were included in the final analysis. The pooled proportions from all 23 studies of good outcomes after thrombectomy was 31.4% and 33.3% in the fixed- and random-effects models respectively, with a range from 15.0% to 64.3%. The pooled risk of mortality after thrombectomy was 32.8% in fixed-effects model and 29.8% in the random-effects model, with a range from 9.5% to 46.2%. Subgroup analysis with 3 prospective studies showed a pooled rate of excellent outcomes (mRS 0-1) of 20.8% in both the fixed- and random-effects models. The pooled proportions of good outcomes (mRS 0-2) was 27.7% in both the fixed- and random-effects models. The pooled risk of mortality after thrombectomy was 43.8% in fixed-effects model and 36.9% in the random-effects model.

CONCLUSION

Our study suggests EVT to be a safe and efficacious treatment for patients with acute BAO. However, there is significant heterogeneity among the included studies and only 3 prospective studies, urging for more prospective randomized trials to compare EVT with medical management,

CLINICAL RELEVANCE/APPLICATION

Endovascular thrombectomy is a safe and efficacious treatment for patients with acute BAO, with favorable long-term outcomes.

Printed on: 05/05/21

RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SSNR10

Science Session with Keynote: Neuroradiology (Brain Tumor Imaging)

Monday, Nov. 30 2:00PM - 3:00PM Room: Channel 4

NR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSNR10-01 Neuroradiology Keynote Speaker: Recent Advances in Brain Tumor Imaging

Participants
Ramon F. Barajas JR, MD, Portland, OR (*Presenter*) Nothing to Disclose

SSNR10-02 Radiomics and Machine Learning Approach to Prediction of Survival in Glioblastoma Treated with PD-L1 inhibition Immunotherapy: A Multicenter Study

Awards
Trainee Research Prize - Fellow

Participants
Elizabeth George, MD, San Francisco, CA (*Presenter*) Nothing to Disclose
Elizabeth E. Flagg, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Andrew J. Park, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Ralph Venhaus, New York, NY (*Abstract Co-Author*) Nothing to Disclose
David A. Reardon, MD, Durham, NC (*Abstract Co-Author*) Advisory Board, AbbVie Inc; Advisory Board, Amgen Inc; Advisory Board, Bristol-Myers Squibb Company; Advisory Board, Cavion LLC; Advisory Board, Celldex Therapeutics, Inc; Research support, Celldex Therapeutics, Inc; Advisory Board, Merck KGaA; Advisory Board, F. Hoffmann-La Roche Ltd; Speaker, F. Hoffmann-La Roche Ltd; Advisory Board, Inovio Biomedical Corporation; Research support, Inovio Biomedical Corporation; Advisory Board, Juno Therapeutics, Inc; Advisory Board, Merck & Co, Inc; Speaker, Merck & Co, Inc; Advisory Board, Midatech Pharma PLC; Research support, Midatech Pharma PLC; Advisory Board, Momenta Pharmaceuticals, Inc; Advisory Board, Novartis AG; Advisory Board, NovoCure Ltd; Advisory Board, Mateon Therapeutics, Inc; Advisory Board, Regeneron Pharmaceuticals, Inc; Advisory Board, Stemline Therapeutics, Inc; Research support, Incyte Corporation; ;
Raymond Y. Huang, MD, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Elizabeth.George@ucsf.edu

PURPOSE

Clinical trials assessing the efficacy of immunotherapy in glioblastoma has brought to light challenges in early identification of responders. We developed radiomics models derived from pre- and post-treatment MRI to predict survival outcomes of patients with glioblastoma on PD-L1 inhibition immunotherapy.

METHOD AND MATERIALS

This is a post-hoc study of 113 patients with glioblastoma from a multicenter trial (NCT02336165) assessing the efficacy of durvalumab (monoclonal antibody against PD-L1) with or without radiation or bevacizumab. T2-FLAIR-hyperintense and enhancing tumor volumes of interest (VOI) were segmented from pre- and immediate post-treatment MRI, and 10 shape, 72 histogram, and 160 texture features (total 484 imaging features) were extracted. A random forest algorithm was applied to data (radiomic features, treatment arm, and demographics) from a subset of sites to train a model to predict long overall survival (OS) and progression free survival (PFS) followed by testing on the data from the remaining sites (Table). Model performance was assessed using area under the receiver operating characteristic curve (AUC). Radiomic score threshold was defined to maximize sensitivity and specificity. Cox proportional hazard and Kaplan Meier analyses were performed on the testing data.

RESULTS

The study cohort mean age was 55.2 ± 11.5 years and was majority male (69%). The median PFS was 106 days (IQR: 56-150.5 days) and median OS was 207.5 days (IQR: 150.5-393.5 days). Pre-treatment MRI features alone had poor predictive value for OS and PFS. Post-treatment MRI features had high predictive value for OS (AUC=0.74-0.84 in training and AUC=0.71-86 in testing cohort, Figure) and PFS (AUC=0.64-0.72 in training and AUC=0.73-0.78 in testing cohort). Higher post-treatment MRI based radiomic score was associated with shorter OS (HR:2.63-6.49) and shorter PFS (HR:3.29-5.67) in the testing cohort (Figure).

CONCLUSION

We developed and validated a radiomics-based ML model for prediction of long OS and PFS from multi-center immediate post-treatment MRI in patients with glioblastoma on PD-L1 inhibition immunotherapy.

CLINICAL RELEVANCE/APPLICATION

Radiomics and ML derived imaging-based model from multi-center post-treatment MRI can identify long survivors and responders in patients with GBM on PD-L1 inhibition immunotherapy.

SSNR10-03 Voxel-Wise and Patient-Wise Correlation of 18F-FDOPA PET and Physiologic MRI in Treatment-Naïve Diffuse Gliomas with Different Molecular Subtypes

Participants
Hiroyuki Tatekawa, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Akifumi Hagiwara, MD, Tokyo, Japan (*Abstract Co-Author*) Nothing to Disclose
Jingwen Yao, MBBS,MS, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Talia C. Oughourlian, Loa Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Issei Ueda, Kitakyusyu, Japan (*Abstract Co-Author*) Nothing to Disclose
Hiroyuki Uetani, Amakusa, Japan (*Abstract Co-Author*) Nothing to Disclose
Catalina Raymond, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Albert Lai, MD, PhD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Timothy F. Cloughesy, MD, Los Angeles, CA (*Abstract Co-Author*) Consultant, Tocagen Inc; Consultant, Karyopharm Therapeutics, Inc; Consultant, GW Pharma; Consultant, KIYATEC Inc; Consultant, AbbVie Inc; Grant, AbbVie Inc; Consultant, Boehringer Ingelheim GmbH; Consultant, VBI Vaccines Inc; Consultant, Deciphera Pharmaceuticals, LLC; Consultant, VBL Therapeutics ; Consultant, Agios Pharmaceuticals, Inc; Grant, Agios Pharmaceuticals, Inc; Consultant, Merck & Co, Inc; Consultant, F. Hoffmann-La Roche Ltd; Consultant, Genocea Biosciences, Inc; Consultant, Celgene Corporation; Consultant, Eli Lilly and Company; Consultant, Bristol-Myers Squibb Company; Grant, Bristol-Myers Squibb Company; Consultant, Cortice Biosciences, Inc; Consultant, NovoCure Ltd; Consultant, Sumitomo Dainippon Pharma Co, Ltd; Grant, Sumitomo Dainippon Pharma Co, Ltd; Consultant, Human Longevity; Consultant, Insys Therapeutics; Consultant, Sierra Oncology; Consultant, Pfizer Inc; Consultant, Notable Labs; Stock options, Notable Labs; Consultant, MedQIA Imaging Core Laboratory; Grant, Amgen Inc; Grant, DNAtrix; Grant, Deciphera Pharmaceuticals, LLC; Grant, AstraZeneca PLC; Grant, Kazia; Grant, Tocagen Inc; Grant, OrbusNeich; Grant, Karyopharm Therapeutics, Inc;
Phioanh L. Nghiemphu, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Linda M. Liau, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Whitney B. Pope, MD, PhD, Los Angeles, CA (*Abstract Co-Author*) Speaker, Guerbet SA Research funded, Guerbet SA Speaker, Bracco Group
Noriko Salamon, MD, Los Angeles, CA (*Abstract Co-Author*) Nothing to Disclose
Benjamin M. Ellingson, MS, PhD, Los Angeles, CA (*Abstract Co-Author*) Research Consultant, MedQIA Imaging Core Laboratory; Research Consultant, F. Hoffmann-La Roche Ltd; Research Consultant, Tocagen Inc; Research Consultant, Boston Scientific Corporation; Research Consultant, Amgen Inc; Research Grant, Siemens AG; Research Grant, F. Hoffmann-La Roche Ltd

PURPOSE

To identify correlations of gliomas between 18F-FDOPA uptake and physiologic magnetic resonance imaging (MRI), including relative cerebral blood volume (rCBV) and apparent diffusion coefficient (ADC), with different molecular subtypes, and to evaluate their prognostic values.

METHOD AND MATERIALS

Sixty-eight treatment-naïve glioma patients who underwent 18F-FDOPA PET and physiologic MRI between 2007 and 2019 were retrospectively selected (isocitrate dehydrogenase wild type [IDHwt], 36; mutant 1p/19q non-codeleted [IDHm-non-codel], 16; and mutant codeleted [IDHm-codel], 16). Fluid-attenuated inversion recovery hyperintensity area was segmented and used as a region-of-interest. For voxel-wise and patient-wise analyses, Pearson's correlation coefficients (rvoxel-wise and rpatient-wise) between normalized SUV (nSUV), rCBV, and ADC were evaluated. Cox regression analysis was performed to investigate the associations between overall survival (OS) and the rvoxel-wise, max/median nSUV, median CBV, or median ADC.

RESULTS

For IDHwt and IDHm-non-codel gliomas, nSUV demonstrated significant positive correlations with rCBV (rvoxel-wise = 0.25 and 0.31, and rpatient-wise = 0.50 and 0.70, respectively), and negative correlations with ADC (rvoxel-wise = -0.19 and -0.19, and rpatient-wise = -0.58 and -0.61, respectively) in both voxel-wise and patient-wise analyses. IDHm-codel gliomas only demonstrated a significant correlation between nSUV and ADC in voxel-wise analysis (rvoxel-wise = 0.18). In the Cox regression analysis, only rvoxel-wise between nSUV and rCBV (hazard ratio (HR) = 28.82) or ADC (HR = 0.085) had significant associations with OS for IDHwt.

CONCLUSION

IDHm-codel gliomas showed unique patterns of correlations between amino acid PET and physiologic MRI. Stronger correlation of nSUV and rCBV or ADC may result in worse prognosis in IDHwt.

CLINICAL RELEVANCE/APPLICATION

The correlation of physiologic images in IDHm-codel gliomas was different from that in IDHwt or IDHm-non-codel gliomas, reflecting the unique heterogeneous oligo-components.

SSNR10-04 Functional Connectivity Profile of Solid Tumor Predicts Overall Survival in Patients with Gliomas

Awards
Trainee Research Prize - Resident

Participants
Giulia Sprugnoli, MD, Sinalunga, Italy (*Presenter*) Nothing to Disclose
Laura Rigolo, BA,MA, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Meghan J. Faria, BS, Cumberland, RI (*Abstract Co-Author*) Nothing to Disclose
Parikshit Juvekar, MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Nicola Sverzellati, MD, Parma, Italy (*Abstract Co-Author*) Consultant, PAREXEL International CorporationConsultant, Biomedic SystemConsultant, F. Hoffmann-La Roche LtdConsultant, Boehringer Ingelheim GmbHConsultant, GalapagosAdvisory Board, F. Hoffmann-La Roche LtdAdvisory Board, Boehringer Ingelheim GmbHSpeaker, F. Hoffmann-La Roche LtdSpeaker, Boehringer Ingelheim GmbH
Alexandra J. Golby, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Emiliano Santarnecchi, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

giulia.sprugnoli@studenti.unipr.it

PURPOSE

Gliomas have recently been found to be integrated into brain circuitry via active synapses (Venkatamarani 2019). To explore the functional integration between solid tumor and healthy brain tissue in humans, we used resting-state functional magnetic resonance imaging (rs-fMRI).

METHOD AND MATERIALS

54 patients with newly diagnosed and recurrent glioma were included. Lesions were manually segmented (Fig1A, neurological convention) and rs-fMRI was analyzed via seed-to-voxel analysis using the solid tumor mask as seed region, and interpreted according to known topologies of Resting-State fMRI Networks (RSN). A regression model between Functional Connectivity (FC) of the solid tumor with respect to the rest of the brain and overall survival (OS) was performed (covariates: age and gender).

RESULTS

Solid tumor masks of newly diagnosed gliomas (n=18) displayed a pattern of significant FC with occipital cortices and bifrontal regions ($p<0.05$; Fig1B), overlapping with the Fronto-Parietal Control Network, Ventral Attention Network (VAN) and the Visual Network (Fig1B). Recurrent gliomas (n=36) showed FC with bilateral fronto-parietal regions ($p<0.05$), overlapping with VAN and Dorsal Attention Network (DAN)(Fig1D). Highly significant ($p<0.001$) predictors were obtained for FC of solid tumor and: (i) bilateral frontal ($r=0.96$; OS variance explained by FC, $R2=92\%$) and (ii) right occipito-temporal regions ($r=0.90$; OS variance explained by FC, $R2=82\%$) in newly diagnosed high-grade gliomas (HGG; Fig1C); (iii) right frontal areas in HGG patients at recurrence ($r=0.72$; OS variance explained by FC, $R2=52\%$)(Fig1D). FC patterns of multiple control regions, e.g. S1, did not show any significant relation in both groups (Fig1C-D). A regression model including FC predictors and clinical (e.g., KPS, tumor size) and demographic ones (age, gender) highlighted tumor-to-brain FC as the best absolutely predictor of survival, outperforming age and genetic profile (IDH-status) by a factor of 2.

CONCLUSION

We found significant FC between solid tumor and healthy brain structures, resembling well-known RSN. Moreover, the FC profile of solid tumor predicts OS in both newly diagnosed and recurrent HGG, possibly reflecting the recently postulated integration of gliomas into brain network responsible of HGG aggressiveness.

CLINICAL RELEVANCE/APPLICATION

Functional imaging could help deepen our understanding of glioma pathophysiology and guide development of new therapies.

SSNR10-05 Diffusion MRI With Spherical B-Tensor Encoding Increases Glioma Tumor Conspicuity

Participants
Jan Brabec, MD, Lund, Sweden (*Presenter*) Nothing to Disclose
Filip Szczepankiewicz, PhD, Lund, Sweden (*Abstract Co-Author*) Nothing to Disclose
Patrik Brynolfsson, Lund, Sweden (*Abstract Co-Author*) Nothing to Disclose
Bjorn Lampinen, Lund, Sweden (*Abstract Co-Author*) Nothing to Disclose
Natalia Ondkova, Wels, Austria (*Abstract Co-Author*) Nothing to Disclose
Faris Durmo, Lund, Sweden (*Abstract Co-Author*) Nothing to Disclose
Anna Rydelius, Lund, Sweden (*Abstract Co-Author*) Nothing to Disclose
Linda Knutsson, Lund, Sweden (*Abstract Co-Author*) Nothing to Disclose
Pia C. Maly Sundgren, MD, PhD, Lund, Sweden (*Abstract Co-Author*) Nothing to Disclose
Markus Nilsson, PhD,MSc, Lund, Sweden (*Abstract Co-Author*) Shareholder, Random Walk Imaging AB

For information about this presentation, contact:

jan.brabec@med.lu.se

PURPOSE

To compare the DWI contrasts with spherical B-tensor encoding against conventional to assess its potential in the clinical evaluation of gliomas.

METHOD AND MATERIALS

MRI at 3T was performed in 33 patients (45 examinations) with gliomas (low/high grade = 8/25) using a prototype B-tensor sequence with TR/TE=5300/80 ms/ms, resolution=2.3×2.3×2.3mm3, b-values up to 2.0 ms/µm2 for linear (LTE) and spherical (STE) B-tensors. LTE corresponds to conventional diffusion encoding. STE is insensitive to the shape of microscopic structures and enables separation of the anisotropic (MKA) and isotropic (MKI) components of the total kurtosis. Regions in gliomas exhibiting high signal at b=2.0 ms/µm2 (i.e. characterized by 'reduced diffusivity') were delineated on the co-registered STE and LTE images and contralateral normal-appearing white matter (NAWM) on co-registered post-Gd T1w MPRAGE images. Signal-intensity ratios (SIR) between the regions and NAWM were calculated for both LTE and STE images where only those with SIR>1.2 were further considered as 'enhancing'.

RESULTS

Out of 45 glioma examinations, 23 (51 %), 22 (47 %) and 26 (58 %) were enhancing on Gd-T1w-, LTE- and STE-images, respectively. Across all cases, the SIR for enhancing regions was significantly higher for STE than for LTE (medians 1.8 vs. 1.4; $p<10-4$; Wilcoxon signed rank test). Moreover, in 10 cases (corresponding to 40 %), the SIR for STE was above 2 but none of the LTE cases reached such high contrast. That is because the majority (62 %) of total kurtosis of enhancing regions in gliomas is attributed to the isotropic component (MKI=0.67, MKA=0.4) whereas the majority (76 %) in white matter to the anisotropic component (MKI=0.29, MKA=0.98). In the figure, part A shows a glioma with enhancing region (yellow arrow) that is more visible on STE than LTE (SIR=1.4 vs. 1.1; within the slice). Part B compares the SIR for all cases. Part C shows a non-enhancing glioma. In the STE image, the signal from white matter tracts (red arrows) is suppressed making the tumor (yellow arrows) more visible.

CONCLUSION

B-tensor encoding enables more specific assessment of enhancing regions (high signal at high b-values) and produces higher

contrast to white matter for tissues with a high isotropic component such as in glioma tumors.

CLINICAL RELEVANCE/APPLICATION

This could improve detection, reduce scan times, and benefit planning of pre-operative biopsy or post-surgical radiation and its evaluation.

Printed on: 05/05/21

SSNR11

Neuroradiology/Head and Neck (Head and Neck Tumor Imaging)

Wednesday, Dec. 2 5:00PM - 6:00PM Room: Channel 4

GI US VA OI IR AI

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSNR11-01 Subtraction Iodine Imaging Using Area Detector CT for Improving Tumor Delineation and Measurability of Size and Depth of Invasion in Tongue Squamous Cell Carcinoma

Participants
Takashi Hiyama, MD, Kashiwa, Japan (*Presenter*) Nothing to Disclose
Hirofumi Kuno, MD, PhD, Kashiwa, Japan (*Abstract Co-Author*) Nothing to Disclose
Shioto Oda, MD, Kashiwa, Japan (*Abstract Co-Author*) Nothing to Disclose
Tatsushi Kobayashi, MD, Kashiwa, Japan (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

medtak39@gmail.com

PURPOSE

Tumor size (TS) and depth of invasion (DOI) are essential for the T classification of tongue cancers but cannot often be assessed on CT because of dental artifacts. Subtraction iodine imaging (SII) may accelerate contrast enhancement and reduce artifacts. The aim of this study was to investigate whether adding SII to CT improves tumor delineation and measurability or not.

METHOD AND MATERIALS

After institutional review board approval, we enrolled 59 consecutive patients (37 men, 22 women; median age, 63 years) who underwent contrast-enhanced CT using 320-row area detector CT and 3.0 T MRI for tongue cancer and were treated with surgical resection. CT images were reconstructed with single-energy projection-based metallic artifact reduction. SII was generated by subtracting the pre- and post-contrast volume scans reconstructed using a high-resolution deformable registration algorithm. Two blinded radiologists visually graded tumor delineation on a 5-point scale (1 = definitely invisible; 2 = probably invisible; 3 = partially visible; 4 = mostly visible; 5 = wholly visible) on CTs, CT-plus-SII, and contrast-enhanced T1-weighted MRI with fat suppression (CET1WI). Score 3-5 were defined as detectable. TS and DOI were measured in measurable cases. Tumor delineation scores were compared using the Wilcoxon rank method. Correlation between the TS/DOI of each modality and those of pathology were evaluated using Spearman's correlation.

RESULTS

The tumor delineation score was highest for CET1WI, followed by CT-plus-SII and CT (medians: 4, 3, and 1, respectively, $p < 0.001$). Detectability and measurability of CT-plus-SII were superior to those of CT (36/59 [61%] vs 21/59 [36%] for detectability, 27/59 [46%] vs 17/59 [29%] for measurability), although MRI had the highest detectability (53/59 [90%]) and measurability (47/59 [80%]). The correlation of radiological and pathological TS/DOI was similar among modalities (0.83-0.88 on CT; 0.81-0.84 on CT-plus-SII; 0.79-0.90 on MRI).

CONCLUSION

Adding SII to CT may improve delineation of tongue cancers and measurability of TS and DOI, although MRI is superior. The correlation of SII with pathological measurement is no less than that of MRI.

CLINICAL RELEVANCE/APPLICATION

Adding SII to CT increases the number of diagnosable T-classifications of tongue cancers and may be beneficial for patients with contraindications for MRI.

SSNR11-02 Using Radiomics and Machine Learning to Predict CD8+ T Cell Enrichment in Primary Head and Neck Squamous Cell Carcinoma

Participants
Colin Wang, BA, Chicago, IL (*Presenter*) Nothing to Disclose
Daniel Ginat, MD, Chicago, IL (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

colin.wang@uchospitals.edu

PURPOSE

The purpose of this study is to assess whether a machine learning model constructed from radiomic analysis of standard-of-care CT imaging can predict CD8+ T-cell enrichment in head and neck squamous cell carcinoma (HNSCC) primary tumors.

METHOD AND MATERIALS

This retrospective study included 71 patients from a head and neck cancer genomics cohort. In order to identify tumors with CD8+

T-cell enrichment, a 12-gene chemokine gene expression signature consisting of chemokine CCl2, CCL3, CCL4, CCL5, CCL8, CCL18, CCL19, CCL21, CXCL9, CXCL10, CXCL11 and CXCL13 was implemented. Tumors with CD8+ T-cell enrichment based on this signature were defined as having a high T-cell-inflamed phenotype (TCIP-H), whereas tumors with no CD8+ T-cell enrichment was defined as having a low T-cell-inflamed phenotype (TCIP-L). Pre-treatment contrast-enhanced soft tissue neck CT scans were retrospectively reviewed using 3D Slicer (slicer.org) for primary lesion segmentation. The SlicerRadiomics extension (http://PyRadiomics.readthedocs.io/en/latest/) was used to extract 107 features. Ridge regression and lasso regression were applied for feature selection and model construction. Receiver operating characteristic curves were generated and the areas under the curve (AUC) for these models were compared.

RESULTS

Of the 71 total primary tumors, 38 were located in the oropharynx, 15 in the oral cavity, 14 in the larynx, and 4 in the hypopharynx. Lasso regression defined Coarseness as the most important variable, followed by SmallDependenceEmphasis, SmallAreaLowGrayLevelEmphasis, Contrast.1, and Correlation. Ridge regression defined Coarseness as the most important variable, followed by SmallDependenceLowGrayLevelEmphasis, Contrast.1, DependenceNonUniformityNormalized, and Idmn. These variables identified by lasso and ridge regression were used to create a combined logistic regression model and assessed separately. The AUC for the lasso-generated model was 0.786 (95% CI, 0.532-1.000) and the AUC for the ridge-generated model was 0.786 (95% CI, 0.544-1.000). The AUC for the combined model was 0.643 (95% CI, 0.340-0.946).

CONCLUSION

The T-cell inflammation properties of HNSCC primary tumors can be predicted using radiomic analysis of standard-of-care CT imaging.

CLINICAL RELEVANCE/APPLICATION

Radiomic analysis of standard-of-care CT imaging may be used to help identify patients with HNSCC that would respond well to immunotherapy.

SSNR11-05 Comparison of Thyroid Risk Categorization Systems and Biopsy Recommendations in a Multi-institutional Thyroid Ultrasound Registry

Participants
Jenny K. Hoang, MBBS, Baltimore, MD (*Presenter*) Spouse, Employee, Merck & Co, Inc
William D. Middleton, MD, Saint Louis, MO (*Abstract Co-Author*) Nothing to Disclose
Jill E. Langer, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Kendall Schmidt, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Laura B. Gillis, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
John A. Watts V, MD, MS, Greensboro, NC (*Abstract Co-Author*) Nothing to Disclose
Randall W. Snyder III, MD,MA, Voorhees, NJ (*Abstract Co-Author*) Nothing to Disclose
Rachita Khot, MD, Charlottesville, VA (*Abstract Co-Author*) Nothing to Disclose
Jonathan D. Kirsch, MD, Branford, CT (*Abstract Co-Author*) Consultant, FUJIFILM Holdings Corporation
Franklin N. Tessler, MD, Birmingham, AL (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jennykh@gmail.com

PURPOSE

Current studies comparing biopsy recommendations for thyroid nodules have been weighted towards nodules recommended for biopsy. In these studies, the American College of Radiology (ACR) TI-RADS biopsy recommendation rate (BRR) is 55% compared to 70 to 83% for other guidelines. We hypothesized that the difference would be even greater if the BRR was assessed for all nodules detected on ultrasound. This study aimed to compare the ACR TI-RADS biopsy recommendation rate with other guidelines for nodules reported on diagnostic thyroid ultrasound.

METHOD AND MATERIALS

7 radiology practices prospectively submitted thyroid ultrasound reports to the ACR TI-RADS registry between October 2018 and March 2020 for low-risk patients undergoing routine thyroid sonography. Data were collected using a structured reporting template with fields for ACR TI-RADS' five ultrasound categories plus nodule size.The nodules were categorized according to criteria from ACR TI-RADS, the American Thyroid Association guidelines (ATA), European TI-RADS (EU-TIRADS) and Korean TI-RADS (K-TIRADS) to compare BRRs.

RESULTS

Complete data were available in 33687 nodules in 13600 patients. The median size was 1.2 cm. ACR TI-RADS classified 47%, 30%, and 8% of nodules as TR4, TR3, and TR5, respectively (Table 1). The distribution of risk categories for ATA, EU-TIRADS, and K-TIRADS was similar. ACR TI-RADS recommended 8773 (26%) biopsies, which was the lowest BRR (Table 1). Recommended biopsies by ATA, European TIRADS, and Korean TIRADS were 17421 (52%), 11681 (35%), 19224 (57%) and 16857 (50%), respectively. The proportion of TR3 and TR4 nodules that were recommended for biopsy was lower for ACR TI-RADS compared to other systems at 18% and 30%, respectively. At the high suspicion level (TR5), the BRR was similar for all guidelines at 65-71%.

CONCLUSION

The distribution of nodules in risk categories are similar for all systems, but ACR TI-RADS recommends 25-50% fewer biopsies because it has higher biopsy size thresholds in the TR3 and TR4 categories.

CLINICAL RELEVANCE/APPLICATION

When ACR TI-RADS is applied to low-risk patients undergoing routine thyroid sonography, the biopsy recommendation rate is 26%, and 25-50% less compared to other risk categorization systems.

SSNR11-06 Characterization of Head and Neck Paragangliomas by Multiparametric MR Imaging: A Comparison with Other Deep Soft-tissue Tumors of the Neck

Participants
Emina Arsovic, Paris, France (*Presenter*) Nothing to Disclose
Samia Akkari, Marseille, France (*Abstract Co-Author*) Nothing to Disclose
Ugo Scemama, Marseille, France (*Abstract Co-Author*) Nothing to Disclose
Marion Montava, Marseille, France (*Abstract Co-Author*) Nothing to Disclose
Jean-Pierre Lavieille, Marseille, France (*Abstract Co-Author*) Nothing to Disclose
Nicolas Fakhry, Marseille CEDEX 5, France (*Abstract Co-Author*) Nothing to Disclose
David Taieb, Marseille, France (*Abstract Co-Author*) Nothing to Disclose
Arthur D. Varoquaux II, MD, Marseille, France (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify quantitative MR biomarkers that allow distinction between paragangliomas and other deep soft-tissue tumors of the neck.

METHOD AND MATERIALS

The study was approved by an institutional review board. A retrospective review of 50 patients with head and neck paragangliomas (HNPGL) evaluated by both 18F-DOPA PET/CT, and time-resolved MRA sequences, between 2009-2019 was performed. A control group of 33 patients, investigated during the same period, was also analyzed, including nerve sheath tumors, metastatic lymph nodes from squamous cell carcinomas or from UCNT, arterio-venous malformations, and temporal bone meningiomas. MR parameters were extracted from dynamic contrast enhancement (DCE) sequences and diffusion weighted imaging (DWI) was assessed for each lesion. The image quality of DCE was scaled (1-3). A gold standard was obtained for all cases.

RESULTS

Sixty lesions HNPGL lesions were included, 20 with germline mutations in one of the SDH genes (SDHx) and compared to 36 vascular space lesions. All semi-quantitative parameters extracted from time intensity-curves were significantly different between HNPGL and other vascular space tumors, including wash-in obtained par linear regression, time-to-peak, and wash-out. Nerve sheath tumours exhibited higher ADC values than lymph nodes. Classification and a regression tree (CART) distinguished HNPGL from other tumors with a high accuracy. The features were also shown and formed distinct groups on principal component analysis. No significant difference was observed between sporadic and SDHx mutated HNPGL.

CONCLUSION

Our study identifies a multiparametric MRI signature of paragangliomas that provides a strong impetus for switching from qualitative to quantitative analysis of deep soft-tissue tumors of the neck.

CLINICAL RELEVANCE/APPLICATION

Multiparametric MRI signature of paragangliomas provides a strong impetus for switching from qualitative to quantitative analysis of deep soft-tissue tumors of the neck.

Printed on: 05/05/21

SSNR14

Neuroradiology (Neuro Spine Imaging)

Thursday, Dec. 3 8:30AM - 9:30AM Room: Channel 4

CT PH

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSNR14-01 Early Renal Pelvis Opacification on Postmyelography-CT as an Indicator for Increased CSF Resorption in Spontaneous Intracranial Hypotension

Participants
Eike I. Piechowiak, MD, Bern, Switzerland (*Presenter*) Nothing to Disclose
Tomas Dobrocky, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Jan Gralla, MD, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess renal contrast opacification on postmyelography CT (PMCT) as a marker for cerebrospinal fluid (CSF) resorption in patients with suspected spontaneous intracranial hypotension (SIH)

METHOD AND MATERIALS

A total of 111 patients with suspected SIH were retrospectively reviewed and divided into two groups according to spinal imaging; with spinal longitudinal extrathecal CSF collection (SLEC) group (SLEC +), and without SLEC group (SLEC -). Twenty non-SIH patients served as controls. PMCT images from all patients were evaluated for renal pelvis density in Hounsfield units (HU). Additionalnumber of meningeal cysts, and the presence of the hyperdense paraspinal vein were analysed.

RESULTS

Of the 111 SIH patients 71 (64%) presented with an SLEC and 40 (36%) without. The adjusted renal pelvis density was significantly higher in suspected SIH in both groups (SLEC (+) and SLEC (-)) than in non-SIH controls (absolute difference: 75 and 50 HU respectively; both $p<0.001$). There was a tendency to higher renal pelvis density in the SLEC (+) group compared to the SLEC (-) group but these differences were not significant. No CSF-venous fistulas were found.

CONCLUSION

Increased renal opacification of contrast was observed in SIH patients, both with and without epidural CSF collection. In the latter, renal opacification may be considered a surrogate for increased CSF resorption. Whether CSF-venous fistulas occult to imaging or increased resorption via spinal arachnoid granulations may be the underlying pathology remains unclear.

CLINICAL RELEVANCE/APPLICATION

Spinal CSF loss as the reason for spontaneous intracranial hypotension (SIH) has multiple reasons. It is widely believed that SIH is most commonly triggered by CSF leakage from the intrathecal into the epidural compartment. This is usually due to an osteodiscogenic microspur (calcified disc protrusion or spondylophyte) penetrating the dura, or less frequently to a rupture of a spinal nerve root diverticulum. Alternative pathomechanisms like the CSF venous fistula, may also be demonstrated on imaging. But there are still patients with the classic appearance of SIH, clinically and in imaging, where neither one of these two entities could be demonstrated. We hypothesize that another form of CSF loss exists besides a dural leak and a CSF-venous fistula, an increased CSF resorption possibly via spinal arachnoid granulations.

Special Note

This paper has received the Kuo York Chynn Neuroradiology Research Award. This award is funded in perpetuity by the Chynn Family Foundation. Through the Chynn Family Foundation, Emil William Chynn, MD, FACS, MBA will guide future distributions to support research in radiology.

SSNR14-02 The PATCH Trial: A Randomized Controlled Trial of CT Fluoroscopy-Guided Targeted Autologous Blood and Fibrin Glue Patching for Treatment of Cerebrospinal Fluid Leaks in Spontaneous Intracranial Hypotension.

Participants
Timothy J. Amrhein, MD, Durham, NC (*Presenter*) Nothing to Disclose
Peter G. Kranz, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Linda L. Gray, MD, Raleigh, NC (*Abstract Co-Author*) Nothing to Disclose
Michael D. Malinzak, MD,PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Sheng Luo, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Jeffrey G. Jarvik, MD, Seattle, WA (*Abstract Co-Author*) Author with royalties, Wolters Kluwer nv; Co-editor, Springer Nature; Royalties, Springer Nature
David F. Kallmes, MD, Rochester, MN (*Abstract Co-Author*) Research support, Terumo CorporationResearch support, Medtronic plcResearch support, Sequent Medical, IncResearch support, Benvenue Medical, IncResearch support, General Electric CompanyConsultant, General Electric CompanyConsultant, Medtronic plcConsultant, Johnson & Johnson

For information about this presentation, contact:

timothy.amrhein@duke.edu

PURPOSE

Spontaneous intracranial hypotension (SIH) is a debilitating condition caused by spinal CSF leaks. The presumed optimal therapy is imaging-guided targeted epidural blood and fibrin glue patching. Despite widespread adoption, the efficacy of this procedure remains uncertain without any randomized controlled trials (RCT). The purpose of this study was to determine if randomization and blinding are feasible for a sham RCT in SIH.

METHOD AND MATERIALS

This feasibility sham RCT employed a single-center, parallel, blinded, crossover design. Patients were screened from 12/17-10/19. Inclusion criteria: 1) adult, 2) met ICHD-3 criteria for SIH, 3) prior brain MRI, 4) HIT-6 score>56, 5) myelogram positive for CSF leak. Exclusion criteria: 1) recent blood patch, 2) allergy to contrast/fibrin glue, 3) inability to consent/follow up, 4) pregnancy. Participants were assigned 1:1 using block randomization to either: 1) CT fluoroscopy-guided targeted blood and fibrin glue patching, or 2) a simulated procedure without patching. Patients and outcome assessors were blinded. Effectiveness of blinding was assessed via Bang Blinding Index. Participant data and outcome measures were obtained at baseline and at 2 weeks, 1 month, and 4 months after the procedure. Primary outcome measure was HIT-6 at 1 month. Crossover rate between arms was assessed. Brain MRI at 2 months was compared with baseline to assess for changes in SIH signs using the Dombrocky score. T-test statistics were used.

RESULTS

584 were screened, 83 met eligibility criteria, 68 declined to participate, 15(18.1% eligible) were enrolled and randomized (Fig). 47% (7/15) of participants did not know their intervention arm. Of the 53%(8/15) that guessed, 75%(6/8) were incorrect. 100%(7/7) in the sham arm crossed over vs. 0%(0/8) in the patch arm ($p<0.001$). No patients were lost to follow up prior to the primary outcome. Mean reduction in HIT-6 at 1 month was 11.5(+-5.5) in the patch arm vs. 7.9(+-7.2) sham ($p=0.29$). Mean reduction in MRI Dombrocky score was 4.3(+-3.5) points in the patch arm vs. 1(+-4.3) in sham ($p=0.15$).

CONCLUSION

Randomization and blinding were successful for the PATCH feasibility trial. These results will form the basis for a future definitive multicenter RCT.

CLINICAL RELEVANCE/APPLICATION

There are currently no RCTs determining the efficacy of epidural blood patching in SIH. This study confirms the feasibility of the planned multi-center RCT designed to meet that need.

SSNR14-03 Longitudinal Comparison of Radiologists and Other Specialists in the Performance of Lumbar Puncture Procedures

Participants
Derek R. Johnson, MD, Rochester, MN (*Presenter*) Nothing to Disclose
Mikki Waid, PhD, Reston, VA (*Abstract Co-Author*) Nothing to Disclose
Danny Hughes, PhD, Reston, VA (*Abstract Co-Author*) Nothing to Disclose
Andrew B. Rosenkrantz, MD, New York, NY (*Abstract Co-Author*) Nothing to Disclose
Richard Duszak JR, MD, Atlanta, GA (*Abstract Co-Author*) Advisor, Ethos Medical, Inc; Shareholder, Ethos Medical, Inc

For information about this presentation, contact:

johnson.derek1@mayo.edu

PURPOSE

To assess disparities over time between lumbar puncture procedures performed by radiologists vs. non-radiologists with regard to volume, day of week, and patient complexity.

METHOD AND MATERIALS

Carrier claims files were obtained for a 5% national sample of Medicare beneficiaries from 2005 to 2017. Lumbar puncture procedures were classified by billing physician specialty, day of week (weekday vs weekend), and patient complexity (using the Charlson comorbidity index). Statistical analysis included Pearson chi-square and independent samples t-tests.

RESULTS

Between 2005 and 2017, 34,408 lumbar puncture procedures were identified. Over this period, the percentage of all lumbar punctures performed by radiologists increased from 40% to 54%, while the percentages performed by emergency medicine physicians fell from 19% to 15% and by neurologists and neurosurgeons together fell from 25% to 15%. In 2017, radiologists performed the majority of lumbar punctures on weekdays (56%) and a plurality of those performed on weekends (38%). Radiologists performed the majority of lumbar punctures in high-complexity patients each year, and the proportion of all procedures in complex patients performed by radiologists increased from 44% to 56% over the study period.

CONCLUSION

Radiologists are performing an increasing percentage of lumbar puncture procedures in the Medicare population. Radiologists now perform the majority of lumbar punctures, particularly on weekdays and in complex patients.

CLINICAL RELEVANCE/APPLICATION

The continuing shift in lumbar puncture responsibility from other specialists to radiologists has implications for workflows, cost, radiation exposure, and training.

SSNR14-04 Dysfunctional Myodural Bridges in Patients with Connective Tissue Disease - New Evidence on Ultrasound of the Atlanto-axial Subarachnoid Space

Participants
Michael D. Beland, MD, Providence, RI (*Presenter*) Nothing to Disclose
Abigail W. McElroy, DVM,MS, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Kendall M. Lane, BA, Providence, RI (*Abstract Co-Author*) Nothing to Disclose
Petra Klinge, MD, Providence, RI (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

mbeland@lifespan.org

PURPOSE

Myodural bridges have been described in various species as connective tissue structures thought to stabilize the dural sac during head and neck movements and to promote cerebrospinal fluid motion. A recent study published on horses with EDS demonstrated abnormalities in myodural bridge collagen via histology and transmission electron microscopy. The purpose of this study was to evaluate the feasibility of performing ultrasound (US) of cervical spine subarachnoid (SA) space in humans and evaluate for possible difference in patients with connective tissue disorder (CTD).

METHOD AND MATERIALS

Twenty healthy controls and 20 patients with CTD were enrolled. Exclusion criteria included severe cervical spine abnormalities, Chiari malformation or decompression, active CSF leak, history of idiopathic intracranial hypertension or hydrocephalus. All participants were screened using the Beighton score for joint hypermobility. US was performed at the atlanto-axial level with the head and neck positioned in neutral (90°), flexion (54°), and extension (105°). The width of the SA space was measured 3 times in each position by a single radiologist.

RESULTS

The SA space was more likely to be wider in extension than neutral in the control population vs. CTD population (P<.001). The control population demonstrated a 21.0% increase in SA space from neutral to extension, while the CTD population had a 1.1% decrease in SA size (P=.022). Controls had an average Beighton score of 1.05, while the average score for CTD patients was 6.0 (P<.001). Increased Beighton scores were associated with a decreased absolute change in SA width when moving from neutral to extension (P=.022).

CONCLUSION

This study demonstrates the SA space at the atlanto-axial level does not increase in extension in patients with CTD as it does in control patients without CTD. This may be secondary to increased laxity of the myodural bridges in extension in patients with CTD. Further study is needed to determine the role of altered myodural bridge dynamics in chronic headache in the CTD population.

CLINICAL RELEVANCE/APPLICATION

Ultrasound can be used for dynamic assessment of the atlanto-axial subarachnoid space. Additionally, this study is the first to suggest functional evidence of altered myodural bridge dynamics in the human CTD population, specifically dural in-folding in head extension.

SSNR14-06 Deep Learning-Based Radiomics Can Predict the Neurological Prognosis of Acute Cervical Spinal Cord Injury

Participants
Sho Okimatsu, MD, Chiba, Japan (*Presenter*) Nothing to Disclose
Satoshi Maki, MD,PhD, Chiba, Japan (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

s.okimatsu@icloud.com

PURPOSE

Acute traumatic cervical spinal cord injury (SCI) has a devastating impact on patients' lives and there is a great need for prognostic biomarkers in the acute phase. It is challenging to predict neurological outcomes of acute SCI considering the spinal shock and heterogeneous nature of the injury. It's inconclusive if certain MRI characteristics in SCI can predict neurologic outcomes. Deep learning-based radiomics (DLR) were developed to quantify radiographic characteristics automatically using convolutional neural networks (CNN) and potentially permit the prognostic stratification of patients. The purpose of this study was to assess the ability of DLR to predict the neurological prognosis of patients with cervical SCI.

METHOD AND MATERIALS

We retrospectively reviewed data from patients with cervical SCI who had undergone MRI within 24 hours after injury and whose American spinal cord injury association Impairment Scale (AIS) at 1 month after injury was known. Exclusion criteria were death, and cases with thoracolumbar spinal cord injury or impaired consciousness. A total of 217 patients were enrolled and 284 MR images collected. Patients whose AIS was A or B were analyzed altogether due to the small number of cases with these scores. Sagittal T2-weighted images were used for the CNN training and validation. MR imaging protocols were not standardized for each medical center. The deep learning framework Tensorflow was used to construct the CNN architecture. The concordance rate between the AIS predicted by DLR and the actual AIS was evaluated by 5-fold cross validation using a quadratic Cohen's weighted K coefficient.

RESULTS

The number of patients whose AIS at 1 month after injury was A/B, C, D, and E was 29, 46, 90 and 51, respectively (Table. 1). Table. 2 shows the confusion matrix of the ground truth and predicted AIS. One hundred and thirty-one out of 284 (46.1%) MRI images were predicted correctly and 249 out of 284 (87.7%) images were predictable within one off from the correct AIS. The weighted K coefficient between the actual and predicted AIS was 0.52, which indicates moderate agreement.

CONCLUSION

The present study demonstrates that prediction of the short-term neurological prognosis of acute cervical spinal cord injury using

DLR is feasible.

CLINICAL RELEVANCE/APPLICATION

Deep learning-based radiomics using MRI images can robustly predict neurological prognosis of acute cervical spinal cord injury.

SSNR16

Science Session with Keynote: Neuroradiology/Head and Neck (Neuro AI: Image Interpretation)

Saturday, Dec. 5 2:00PM - 3:00PM Room: Channel 4

CH CT MR OI SQ AI

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSNR16-01 Neuroradiology Keynote Speaker: AI in Neuroradiology, Are We There Yet?

Participants
Kambiz Nael, MD, Los Angeles, CA (*Presenter*) Medical Advisory Board, Canon Medical Systems Corporation

SSNR16-02 Longitudinal Transfer Learning-based Machine Learning for Diagnosis and Prognosis on Mild Cognitive Impairment Patients for Alzheimer's Disease with Incomplete Multi-Modality Imaging Data

Participants
Jing Li, PhD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Teresa Wu, Gilbert, AZ (*Abstract Co-Author*) Nothing to Disclose
Kewei Chen, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Dave Weidman, MD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Yi Su, PhD, Tucson, AZ (*Abstract Co-Author*) Nothing to Disclose
Fleming Y. Lure, PhD, Rockville, MD (*Presenter*) Stockholder, Shenzhen Zhiying Medical Imaging

For information about this presentation, contact:

f.lure@hotmail.com

PURPOSE

Incomplete multi-modality images (MRI, FDG-PET, and Amyloid-PET) and other clinical variables can significantly hinder accurate diagnosis and prognosis of mild cognitive impairment (MCI) patients due to Alzheimer's Disease (AD). We developed a novel longitudinal transfer learning-based machine learning model (LML) for incomplete multi-modality images at baseline and follow-up. This study investigates the efficacy of LML for diagnosis and prognosis of MCI.

METHOD AND MATERIALS

214 MCI patients from ADNI database were included: 97 MCI due to AD, 26 and 46 MCI converting to AD within 2 and 6 years, respectively. Patients were divided into four sub-cohorts based on the imaging available: MRI only; MRI & FDG-PET; MRI & Amyloid-PET; and all three modalities. Based on expectation-maximization statistics to estimate common parameters to facilitate knowledge transfer learning (TL), we developed an LML model to train with incomplete longitudinal multi-modality imaging to avoid the negative transfer for diagnosis and prognosis of MCI due to AD for up to 6 years. We also compared the results with a separate model (SM) of each cohort using logistic regression only.

RESULTS

For diagnosis of MCI due to AD at baseline, 87 out of 214MCI were Amyloid-beta positive at baseline. LML achieved 0.89 area under the curve (AUC), 0.91 sensitivity (SN), and 0.88 specificity (SP). This is a significant improvement over baseline images without TL. For prognosis of MCI at baseline during 2-year conversion, 26 out of 214 converted to AD, LML achieved 0.83, 0.82, and 0.90 for AUC, SN, and SP, respectively, for this heavily imbalance dataset; whereas SM model achieved 0.79, 0.43, and 0.95 for AUC, SN, and SP, respectively. For prognosis during 6-year conversion, LML achieved 0.83 AUC, 0.92 SN, and 0.85 SP for predicting the conversion. Using longitudinal images, the performance of LML improved to 0.86 AUC, 0.94 SN, and 0.88 SP.

CONCLUSION

We successfully developed a novel LML to diagnose and prognose MCI with varying availability of imaging modalities from MRI, FDG-PET, and Amyloid-PET. The LML achieved much better accuracy than the competing model, using each cohort for the diagnosis and prognosis.

CLINICAL RELEVANCE/APPLICATION

The results demonstrate that the longitudinal transfer learning-based machine learning model can assist physicians to improve early diagnosis and early detection of AD from multi-modality imaging, even when some modalities may be missing.

SSNR16-03 Deep Movement: Deep Learning of Movie Files to Aid Management in Endovascular Thrombectomy

Participants
Brendan Kelly, BMBCh, Dublin, Ireland (*Presenter*) Nothing to Disclose
Edward H. Lee, MS,BS, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Mesha L. Martinez, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Vivek Yedavalli, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Yuhao Huang, MD, Standford, CA (*Abstract Co-Author*) Nothing to Disclose
Chang Y. Ho, MD, Indianapolis, IN (*Abstract Co-Author*) Nothing to Disclose
Aonghus Lawlor, PhD, Dublin, Ireland (*Abstract Co-Author*) Nothing to Disclose
Ronan P. Killeen, MBBCh, Dublin 4, Ireland (*Abstract Co-Author*) Nothing to Disclose

Kristen W. Yeom, MD, Burlingame, CA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

brendan.kelly1@ucd.ie

PURPOSE

Ischemic stroke is a time dependent disease that remains a major cause of morbidity and mortality. Endovascular thrombectomy has revolutionized treatment and improved outcomes. "Time is Brain" and measures that can increase the speed of the diagnostic and treatment processes have the potential to improve patient outcomes.We developed a deep learning model that can accept video files of Digital Subtraction Angiography (DSA) of the anterior cerebral circulation and (1) classify according to the presence or absence of Large Vessel Occlusion (LVO) including M2 (2) classify the location of the occlusion and (3) assess the effect of reperfusion therapy.

METHOD AND MATERIALS

In this single center retrospective study all patients who underwent DSA for acute ischaemic stroke between 2012 and 2019 were included for analysis. Consecutive normal studies were also included to balance classes. A 2.5D deep convolutional network (Xception) was trained and tested to classify DSA videos in mp4 format. Modified Treatment In Cerebral Ischaemia (mTICI) scores were recorded and the trained model was then used on the post thrombectomy videos to identify a successful thrombectomy and grade the outcome.

RESULTS

1024 total videos comprising 287 patients were included for analysis (225 with occlusion and 62 normal, 237 for training and 50 for testing). Occlusion identification was achieved with 100% Sensitivity (CI 90.75% to 100.00%) and 91.67% Specificity (CI 61.52% to 99.79%). Accuracy of location classification was 71% for ICA, 84% for M1 and 78% for M2 occlusions. Analyzing videos post thrombectomy (n=194) the model identified successful reperfusion with 100% accuracy for ICA occlusions and 88% for M1 but only 35% for M2 occlusion. The model could also perform binary classification of post intervention videos (ICA, M1 and M2) as having an mTICI of 3 (complete antegrade reperfusion) or <3 with an AUC of 0.71.

CONCLUSION

Our deep learning model can successfully identify normal DSA videos from those with ICA, M1 and M2 occlusion, and can classify the outcome of mechanical thrombectomy for LVOs.

CLINICAL RELEVANCE/APPLICATION

This is the first model in the literature to solve an interventional radiology classification task from video input.In the interventional suite where every second counts, rapid assisted interpretation could help to reduce intervention times by aiding detection and assess the need for reintervention during real time DSA.

SSNR16-04 Deep Learning-based Identification of Frontoparietal Network and Laterality in Dynamic Resting state fMRI of Patients With Frontoparietal Brain Tumors

Participants
Shruti Agarwal, PhD, Baltimore, MD (*Presenter*) Nothing to Disclose
Craig K. Jones, PhD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Paul H. Yi, MD, Baltimore, MD (*Abstract Co-Author*) Consultant, BunkerHill Health; Shareholder, BunkerHill Health
Elham Beheshtian, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Sachin Gujar, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Jay J. Pillai, MD, Baltimore, MD (*Abstract Co-Author*) Author with royalties, Springer Nature; Author with royalties, Reed Elsevier
Haris I. Sair, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

sagarw31@jhmi.edu

PURPOSE

Identification of intrinsic brain networks and their lateralization are important parameters in analysis of clinical resting state functional MRI (rs-fMRI). The purpose of this study was to develop convolutional neural networks (CNNs) to identify frontoparietal (FP) network (FPN) and laterality in rs-fMRI performed in patients with FP brain tumors.

METHOD AND MATERIALS

45 consecutive patients with FP brain tumors (low & high-grade gliomas) who underwent preoperative fMRI for language localization and 42 healthy controls matched by age were enrolled. Independent component analysis (ICA) components were calculated using FSL MELODIC using either the first 3 minutes or first 6 minutes of rs-fMRI data, to determine whether shorter imaging acquisition could generate similar results.*FPN identification*: Sum projection map from 3 orientations (red - axial, green - sagittal, blue - coronal) of ICA components from healthy subjects' rs-fMRI were used to train and test VGG16-based CNNs to classify left-FPN, right-FPN, or not-FPN. External testing was performed on the 45 FP tumor rs-fMRI and task-fMRI (sentence completion).*Laterality categorization*: Task-fMRI of tumor patients were used to create ICA maps of FPN (both left & right FPN combined) and labelled as left lateralized or otherwise (right/bilateral), which were used to train VGG16-based CNNs and tested on resting state ICA maps of FPN.Test performance was determined with area under ROC curve (AUC) and compared using DeLong method.

RESULTS

The best-performing CNNs for FPN and laterality identification had AUCs of 0.98 & 0.75, respectively, on internal hold-out test set of healthy subjects' images with no significant difference between 3 & 6 minute acquisitions. On the external test set of FP brain tumor patients, FPN and laterality identification CNNs had AUCs of 0.89 & 0.75, respectively, with no significant difference between 3 & 6 minute acquisitions and compared to healthy subject test performance.

CONCLUSION

CNNs can identify FPN and laterality in rs-fMRI in healthy and diseased patients with FP tumors, which represents the first step of

an automated pipeline for rs-fMRI analysis for preoperative planning in brain tumor resection.

CLINICAL RELEVANCE/APPLICATION

Clinical workflows for resting state functional MR imaging (rs-fMRI) necessitate identification of regional brain networks & laterality, which can be automated with convolutional neural networks (CNNs).

SSNR16-05 Deep Learning for Automated Ultrasound Thyroid Nodule Cine Loop Segmentation and Classification

Participants
Eugene Cheah, MS, Boston, MA (*Presenter*) Nothing to Disclose
Chunshuang Wu, MD, Somerville, MA (*Abstract Co-Author*) Nothing to Disclose
Dongwen Gao, MD, Brookline, MA (*Abstract Co-Author*) Nothing to Disclose
Viksit Kumar, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Qian Li, MD, Malden, MA (*Abstract Co-Author*) Nothing to Disclose
Theodore T. Pierce, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Anthony E. Samir, MD, Boston, MA (*Abstract Co-Author*) Consultant, Pfizer IncConsultant, General Electric CompanyConsultant, PAREXEL International CorporationResearch Grant, Koninklijke Philips NVResearch Grant, Siemens AGResearch Grant, Canon Medical Systems CorporationResearch Grant, General Electric CompanyResearch Grant, Samsung Electronics Co, LtdResearch Grant, Analogic CorporationResearch support, SuperSonic ImagineResearch support, Hitachi, LtdResearch contract, Koninklijke Philips NV

For information about this presentation, contact:

echeah1@mgh.harvard.edu

PURPOSE

To evaluate the efficacy of convolutional networks (ConvNets) for ultrasound (US) cine loop thyroid nodule segmentation and malignant nodule classification.

METHOD AND MATERIALS

Over two years, this retrospective study evaluated an automated method using a fully convolutional network (FCN) using 392 US cine loops (16503 images) with 392 thyroid nodules (TNs). Exams were split into segmentation (n=200) and classification (n=192) sets. The segmentation set was divided for training (n=153) and testing (n=47). Manual delineation and labelling of TNs by two expert radiologists was the reference standard. The 2D U-Net architecture was adopted for automated cine loop segmentation and its performance was compared with manual segmentation using the Dice similarity coefficient and interquartile range (IQR). For thyroid nodule malignancy prediction, two deep convolutional neural networks (DCNNs) were trained (n=132, 92 benign, 40 malignant), validated (n=40, 28 benign, 12 malignant) and tested (n=20, 15 benign, 5 malignant) on the separate classification dataset. After an optimal representative single still image was selected by a radiologist for each cine loop the TNs were segmented on cine loops and selected static images using the FCN model above and classified as benign or malignant. The classification models were assessed by receiver operating characteristic curves and areas under the curve (AUCs).

RESULTS

In the test cohort for TN segmentation, the Dice similarity coefficient was 0.790 (IQR: 0.711-0.903) between the automated method and manual delineation. For classification, DCNN models for cine loops and static images with best validation accuracies of 0.872 and 0.767 were used for testing and evaluation. The cine loop classifier performed significantly better compared to the static image classifier (AUC: 0.833, 0.758-0.901 vs. 0.700, 0.601-0.81, p-value=0.035).

CONCLUSION

Integrated automated video TN analysis with deep learning-based segmentation and classification accurately delineates TNs in an automated fashion and substantially outperforms static image-based classification for malignancy.

CLINICAL RELEVANCE/APPLICATION

Ultrasound cine loops provide additional spatial information useful for classifying thyroid nodules. Deep learning has the potential to automate video segmentation for improved diagnostic accuracy.

SSNR16-06 TI-RADS Modification Using Artificial Intelligence Techniques May Improve Radiologists Decision Making

Participants
Aylin Tahmasebi, Philadelphia, PA (*Presenter*) Nothing to Disclose
Shuo Wang, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Kelly Daniels, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Elizabeth Cottrill, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Ji-Bin Liu, MD, Philadelphia, PA (*Abstract Co-Author*) Research Grant, General Electric Company
Jiajun Xu, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Andrej Lyshchik, MD, PhD, Philadelphia, PA (*Abstract Co-Author*) Royalties, Reed ElsevierSpeaker, General Electric CompanyConsultant, General Electric CompanyResearch support, General Electric Company Speaker, SonoScape Co, LtdConsultant, BioClinica, IncAdvisory Board, Bracco GroupResearch support, Bracco Group Research support, Canon Medical Systems CorporationResearch support, Siemens AG
John R. Eisenbrey, PhD, Philadelphia, PA (*Abstract Co-Author*) Support, General Electric Company Support, Lantheus Medical Imaging, Inc

For information about this presentation, contact:

aylin.tahmasebi@jefferson.edu

PURPOSE

To study whether combining an Artificial Intelligence (AI) model with the ACR Thyroid Imaging Reporting and Data System (TI-RADS) can improve its diagnostic performance for indeterminate thyroid nodules (ITN) characterization.

METHOD AND MATERIALS

258 ITNs that underwent ultrasound imaging and either ultrasound-guided FNA with next-generation sequencing (NGS) or post-resection pathology were sequentially selected for analysis. A Google AutoML program was employed for both automated ITN identification and subsequent classification. 211 ITNs were used for model training and 47 reserved for model/radiologist testing. Three blinded radiologists scored the images of the 47 ITNs using TI-RADS scoring. Lesions were subsequently assigned a risk level where TR1-3 were considered low risk, TR4 was at the readers discretion, and TR5 was considered high risk. When using the AI-modified TI-RADS approach, ITNs with a radiologist-assigned TR1-3 were considered low risk, TR5 considered high risk, but radiologist-assigned TR4 nodules were classified using the AI model. Diagnostic performance was evaluated against pathology or NGS results with presence of a high risk mutation conferring high risk.

RESULTS

The AI algorithm correctly located all 47 ITNs in the testing set (100% object detection). When predicting high risk, the AI model achieved sensitivity of 68.31% and positive predictive value (PPV) of 86.81% during the training and sensitivity of 73.9%, specificity of 70.8%, PPV of 70.8%, negative predictive value (NPV) of 73.9% and overall accuracy of 66.7% during the testing. Initial radiologist performance resulted in a sensitivity of 52.1±4.4%, specificity of 65.2±6.4%, PPV of 59.1±3.5%, NPV of 58.7±1.8%, and accuracy of 58.8±2.5%. AI-modified TI-RADS demonstrated improvements in all criteria with a sensitivity of 53.6±17.6% (p=0.87), specificity of 83.3±7.2% (p=0.06), PPV of 75.7±8.5% (p=0.13), NPV of 66.0±8.8% (p=0.31), and accuracy of 68.7±7.4% (p=0.21).

CONCLUSION

AI-modified TI-RADS improved the performance of both radiologists and AI alone when classifying ITNs referred for biopsy. This approach may help more accurately identifying truly high risk nodules needing further evaluation and treatment.

CLINICAL RELEVANCE/APPLICATION

Incorporation of AI into TI-RADS improved all diagnostic criteria relative to the traditional TI-RADS, this may help in more accurate identification of truly high risk nodules for further evaluation.

Printed on: 05/05/21

SSPD05

Science Session with Keynote: Pediatrics (Fetal Imaging)

Tuesday, Dec. 1 5:00PM - 6:00PM Room: Channel 4

MR OB PD US SQ

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSPD05-01 Pediatrics Keynote Speaker:

Participants
Mariana L. Meyers, MD, Aurora, CO (*Presenter*) Nothing to Disclose

SSPD05-02 Fetal Lung Shear Wave Elastography in Lamb Model of Congenital Diaphragmatic Hernia

Participants
Ryne Didier, MD, Philadelphia, PA (*Presenter*) Nothing to Disclose
Abby C. Larson, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Anush Sridharan, PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Jonathan Chang, MD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Laura Poznick, BA, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Holly L. Hedrick, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose
Emily A. Partridge, MD,PhD, Philadelphia, PA (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

Changes in lung development and compliance are observed in both lungs of fetuses with left-sided congenital diaphragmatic hernia (CDH). Assessment of fetal lung stiffness by SWE has not been performed in fetal models of left-sided CDH. The purpose of this study was to evaluate right lung elastography values in fetal lambs with and without diaphragmatic hernia.

METHOD AND MATERIALS

Following IACUC-approved protocols, 3 fetal lambs underwent surgical left-sided CDH creation at 70-78 days gestational age (GA). At 135-141 days GA (term=145 days), animals with CDH and 4 control animals were evaluated in simulated fetal surgery. A Siemens Sequoia ultrasound system with a linear 10L4 transducer optimized for shear wave elastography (SWE) was used to evaluate the peripheral right lower lobe stiffness of each animal at an imaging depth of 1-3 cm (Figure 1). Mean lung stiffness (kPa) was compared between the groups using a one-way ANOVA. Post-mortem evaluation confirmed the presence of CDH. Total lung weight (TLW), total lung volumes (TLV), and lung weight/body weight (LW/BW) were also compared between groups with Welch's t tests.

RESULTS

A total of 122 SWE measurements of the peripheral right lung were analyzed, of which 47 were in fetuses with CDH and 75 were in controls. There was a statistically significant increase in mean lung stiffness in CDH animals compared to controls (4.03 ± 1.19 kPa vs. 3.13 ± 0.56 kPa, $p<0.001$). Additionally CDH animals demonstrated decreased mean TLW, TLV, and LW/BW when compared to controls (72.8g vs. 139.7g; $p=0.01$, 155.9mL vs. 219.7mL; $p=0.17$, and 1.7% vs. 2.5%; $p=0.04$, respectively).

CONCLUSION

Using SWE, increased right lung stiffness values are identified in fetal lambs with CDH which correspond with decreased lung weight and volume.

CLINICAL RELEVANCE/APPLICATION

SWE can potentially be utilized as a noninvasive technique to evaluate CDH severity and potentially serve as an imaging correlate for underlying pathologic findings.

SSPD05-03 Atlas-based Tractography Demonstrates Developmental Trajectories and Emerging Asymmetries in the Fetal Cerebral White Matter

Awards
Trainee Research Prize - Resident

Participants
Fedel Machado, MD, Boston, MA (*Presenter*) Nothing to Disclose
Clemente Velasco-Annis, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Onur Afacan, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Simon K. Warfield, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Ali Gholipour, PhD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Camilo Jaimes Cobos, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Shadab Khan, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Bahram Marami, London, ON (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To characterize tract-specific developmental trends and emerging asymmetries using an atlas of fetal brain diffusion and tractography.

METHOD AND MATERIALS

Retrospective analysis of a spatiotemporal atlas of fetal brain diffusion constructed using motion-corrected DTI from 60 normal fetuses, evenly distributed between 24 and 38 weeks of gestational age (GA). For each GA-week, a compound data set was created using between 5 and 13 fetuses. Deterministic ROI-based tractography was performed, with supervision from a pediatric neuroradiologist. We delineated: forceps major (purple*), forceps minor (yellow*), superior (SCP) and middle (MCP) cerebellar peduncles, corticospinal tracts (CST) (blue*), fornix, uncinate fasciculi (UF), inferior fronto-occipital fasciculi (IFOF) (green*) and inferior longitudinal fasciculi (ILF) (*depicted in Figure). Tract volume and FA were measured. Differences in laterality were compared using a Wilcoxon signed rank-test. A linear regression analysis evaluated GA and anatomic tracts as predictors of volume and FA.

RESULTS

The SCP and cingulum were not identified in the 24 and 25 GA-week atlas. Otherwise, all tracts were identified in the atlas for 24 and 25 GA and all other weeks. With increasing GA, the tracts became less compact and more arborized. The volume of the left ILF (median 3.746 IQR 2.2ml) and left cingulum 0.411 IQR 0.375ml) were significantly higher ($P < 0.02$, both) than that of the contralateral tracts (median 3.58 IQR 1.423ml and median 0.254 IQR 0.276ml, respectively). The FA of the right IFOF (median 0.1229 IQR 0.0119) was significantly higher ($P = 0.036$) than that of the left (median 0.1195 IQR 0.0116). Age and tract were significant predictors of volume (all $P < 0.001$) except for forceps minor and ILF. Similarly, age and tract were significant predictors of FA (all $P < 0.001$) except for forceps minor.

CONCLUSION

Fetal DTI atlas-based tractography show complex tract-specific development trajectories and emerging asymmetries in white matter tracts.

CLINICAL RELEVANCE/APPLICATION

Diffusion-atlas tractography provides a robust method to study normal development and could enhance our ability to detect abnormalities in utero.

SSPD05-04 Evaluation of Sulcal Developmental Asymmetry in Fetal Cerebral Isolated Ventricolomegalia by Fetal Magnetic Resonance Imaging and Post-Delivery Outcomes

Awards
Trainee Research Prize - Resident

Participants
Sepideh Sefidbakht, MD, Powel, OH (*Abstract Co-Author*) Nothing to Disclose
Pooya Iranpour, MD, Shiraz, Iran (*Abstract Co-Author*) Nothing to Disclose
Saeed Esmailian, MD, Shiraz, Iran (islamic Rep. Of) (*Presenter*) Nothing to Disclose
Bijan Bijan, MD, Sacramento, CA (*Abstract Co-Author*) Nothing to Disclose
Pedram Keshavarz, MD, Shiraz, Iran (islamic Rep. Of) (*Abstract Co-Author*) Nothing to Disclose
Sina Bagheri, Shiraz, Iran (islamic Rep. Of) (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

esmailian@sums.ac.ir

PURPOSE

To evaluate sulcal asymmetry in fetuses with 'Isolated' ventriculomegaly using Fetal MRI. To compare degree of asymmetry with post-delivery outcome

METHOD AND MATERIALS

Our Institutional Ethics Committee approved this retrospective study. All participants provided informed consent. Out of 658 Fetal MRI's performed in our tertiary referral center, 67 fetuses with isolated ventriculomegaly (ventricular width >=10mm no other structural anomaly seen in ultrasound or MRI) and 77 fetuses with normal brains based on prenatal ultrasound and MRI were included in the study. Fetal MRI images were retrospectively and blindly reviewed by two radiologists. Sulcal development was scored based on Kriakopoulou and using Van der Knapp scoring method for each side separately. Asymmetry score is defined as sum of right side cortical development scores minus left side CDS divided by number of visible sulci Post-delivery developmental outcomes were assessed using ASQ Questionnaires obtained at least one year post-delivery.

RESULTS

The mean gestational ages were 28.6±6.3 weeks and 28.4±6.1 respectively in the fetuses with and without ventriculomegaly (p= 0.9).The mean sulcal development score was 3.6±1.1 And 4.5±1.3 respectively for fetuses with and without ventriculomegaly (p= 0.03). The mean asymmetry scores were 1.4±1.0 and 0.2±1.0 for fetuses with and without Ventriculomegaly(0.001). The mean ventricular size was 14.4 ±11.2 mm in fetuses with ventriculomegaly. The ASQ score was 11.3 ± 9.8 month and 22.6 ± 12.8 month in fetuses with and without VMG. At year 2 of age, only 39% of the children with prenatal isolated ventriculomegaly seen in fetal MRI had a normal neurodevelopment. Also 8% of fetuses with ventriculomegaly underwent neonatal death

CONCLUSION

The fetuses with VMG had significant delay in sulcation and development comparing to the control fetuses. Sulcal asymmetry was more common in fetuses with ventriculomegaly who had delayed development, comparing to those with ventriculomegaly but normal developmental outcome.

CLINICAL RELEVANCE/APPLICATION

Because of the heterogeneous and uncertain prognosis of mild Ventriculomegaly, counseling the parents is a dilemma. Sulcal asymmetry might help determine prognosis in fetuses with ventriculomegaly.

SSPD05-05 Automated Fetal Brain Volumetry on Clinical Fetal MRI Using Convolutional Neural Network

Awards
Trainee Research Prize - Medical Student

Participants
Carol B. Tran, BA, El Cerrito, CA (*Presenter*) Nothing to Disclose
Jeffrey Rudie, MD, PhD, San Francisco, CA (*Abstract Co-Author*) Nothing to Disclose
Orit A. Glenn, MD, Palo Alto, CA (*Abstract Co-Author*) Nothing to Disclose
Christopher P. Hess, MD, PhD, San Francisco, CA (*Abstract Co-Author*) Research, Siemens AG; Consultant, General Electric Company;
Andreas M. Rauschecker, MD,PhD, Mill Valley, CA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

CarolBN.Tran@ucsf.edu

PURPOSE

Fetal MRI allows assessment of in vivo brain development and identifies abnormalities not adequately visualized by other imaging modalities. Global and regional volume assessments are critical for characterizing fetal brain development. We sought to develop a deep learning-based method for automated fetal brain segmentation and volume quantification from single-shot fast spin echo T2-weighted fetal MRIs.

METHOD AND MATERIALS

We adapted a U-Net convolutional neural network (CNN) architecture for analysis of fetal brain MRIs. After re-sampling 2D fetal brain acquisitions to 1x1x1mm 3D volumes using linear interpolation, the network was trained to automatically segment the brain using data from 39 randomly sampled, normal fetal brain MRI scans of singleton pregnancies. Training was performed in 3 acquisition planes (axial, coronal, sagittal) where available, treating each acquisition as an independent training sample, for 113 total training volumes. During testing, the U-Net output was processed by taking the largest contiguous cluster of voxels and discarding remaining predicted voxels. Performance was evaluated on 10 test MRIs (in 3 acquisition planes, for 30 total test samples) using Dice scores and volume assessments compared to manual segmentations.

RESULTS

The CNN resulted in highly accurate segmentations of fetal brains (20-36 gestational weeks). On independent test samples, overlap between segmentations predicted by U-Net and by human reference standard was near-perfect (median Dice 0.95 in each acquisition plane, interquartile range across all test samples 0.94-0.96). The method generated total brain volumes highly correlated with manual measurements (r=0.997) and with low error (root median squared percentage error 2.4%). Gestational age and brain volume were significantly correlated (Spearman rho=0.94, p<0.001).

CONCLUSION

A 3D U-Net produced highly accurate automated segmentations of fetal brains on MRIs acquired in 3 planes. The method has potential to provide accurate volumetric data that can be incorporated into assessments of fetal neurologic development. We plan to retrospectively generate a normative database of >1500 fetal brain volumes across gestational ages collected at our institution.

CLINICAL RELEVANCE/APPLICATION

Automated deep learning methods can achieve accurate segmentations of fetal brain MR imaging and provide accurate quantitative estimates of fetal brain volume across a wide range of gestational ages.

SSPD05-06 The Evaluation of Placental Vascularization by MV-Flow and Power Doppler in Normal and Growth Restricted Fetuses

Participants
Wei Xia, Wuhan, China (*Presenter*) Nothing to Disclose
Jianbo Shao, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Xinlin Chen, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

176778380@qq.com

PURPOSE

To evaluate the placental vascularization by MV-Flow which is a novel visualization technology and power Doppler for low-velocity vessels in normal and intrauterine growth restricted fetuses.

METHOD AND MATERIALS

Placental vascularization sonography by MV-Flow and power Doppler were performed on 126 normal fetuses and 22 fetuses with intrauterine growth restriction (IUGR) between 11 and 41 weeks. The indices in relation to placental vascularization by MV-Flow (Ratio) and power Doppler (vascularization index (VI), flow index (FI) and vascularization flow index (VFI)) were obtained in each placenta, as well as the other indirect indices. A comparison of placental vascular indices between IUGR group and normal controls was assessed.

RESULTS

No significant difference of Ratio was observed among automatic circular graph, automatic rectangular graph and manual measurement obtained by MV-Flow. Ratio values in the upper, middle and lower parts of the placenta were lower in IUGR groups than that of normal group (30.9±15.1 vs 45.3±15.0, p<0.0; 33.0±17.1 vs 44.3±14.9, p<0.01; and 32.3±16.9 vs 48.3±13.2, p<0.01; respectively). The measurements of VI and VFI of the IUGR groups were lower than that of the normal group (8.9[3.7-12.6] vs 12.7[9.3-16.1], p<0.01; 9.0[3.4-11.6] vs 12.1[8.4-16.7], p<0.01; respectively). On the other hand, the placental volume was higher than that of the normal group (130.2[80.4-187.3] vs 97.4[52.7-126.5], p<0.01). The measurement of middle cerebral artery resistance index (MCA-RI) of the IUGR groups was lower than that of the normal group (0.75[0.65-0.82] vs 0.81[0.76-0.85],

p<0.01). Ductus venosus resistance index (DV-RI) and ductus venosus pulse index (DV-PI) of the IUGR groups were higher than that of the normal group (0.58[0.52-0.68] vs 0.46[0.38-0.61], p<0.01 and 0.71[0.64-1.07] vs 0.54[0.44-0.76], p<0.01, respectively).

CONCLUSION

MV-Flow provide a relatively stable and alternative method for evaluating placental vascularization. Compared with power Doppler, MV-Flow might have a more widely application in placenta during the whole pregnant period regardless of the placental location.

CLINICAL RELEVANCE/APPLICATION

MV-Flow provide a relatively stable and alternative method for evaluating placental vascularization. Compared with power Doppler, MV-Flow might have a more widely application in placenta during the whole pregnant period regardless of the placental location.

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SSPH02

Physics (Spectral/Dual Energy CT: Part I) (In Joint Sponsorship with the American Association of Physicists in Medicine)

Monday, Nov. 30 10:00AM - 11:00AM Room: Channel 4

CT PH RS BQ

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSPH02-01 High-Resolution Material Decomposition in Dual-Layer Flat-Panel CBCT Using a Model-Based Iterative Method

Participants
Wenying Wang, Baltimore, MD (*Presenter*) Nothing to Disclose
Yiqun Ma, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Matthew Tivnan, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Junyuan Li, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Grace J. Gang, PHD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Minghui Lu, PhD, Hayward, CA (*Abstract Co-Author*) Scientist, Varian Medical Systems, Inc
Josh Star-Lack, PhD, San Jose, CA (*Abstract Co-Author*) Manager, Varian Medical Systems, IncScientist, Varian Medical Systems, Inc
Richard Colbeth, PhD, Los Altos, CA (*Abstract Co-Author*) Sr. Vice President, Varian Medical Systems, Inc
Wojciech Zbijewski, PhD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Siemens AG
Joseph W. Stayman, PhD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Canon Medical Systems Corporation; Research Grant, Carestream Health, Inc; Research Grant, Elekta AB; Research Grant, Fischer Medical; Research Grant, Medtronic plc; Research collaboration, Koninklijke Philips NV; Research collaboration, Varex Imaging Corporation; Research Grant, Siemens AG; Research Grant, General Electric Company;

For information about this presentation, contact:

wenying.wang@jhmi.edu

PURPOSE

In this work, we investigate a cone-beam CT (CBCT) system equipped with a dual-layer flat-panel detector for high-resolution spectral CT imaging. We apply a novel model-based material decomposition (MBMD) method that integrates the layer-specific spatial- and spectral-resolution properties.

METHOD AND MATERIALS

A prototype dual-layer flat-panel detector is investigated with a 200 μm CsI scintillator top layer that collects relatively low-energy measurements and a 550 μm CsI scintillator bottom layer for a relatively high-energy channel. Both channels use a-Si detector panel consisting of 2880 x 2880 of 150 μm pixels. A 1 mm copper filtration layer is sandwiched between the two layers to improve spectral separation. Due to the different scintillator thicknesses, two layers exhibit different spatial blur. An MBMD method is proposed for direct estimation of material density distribution from the measurements with specific channel-dependent blur kernels included in the forward model. Presuming the measurements follow a multivariate Gaussian distribution, a penalized-weighted least-squares objective function is derived and optimized iteratively using Newton's method. Two custom phantoms were 3D-printed and immersed in 50 mg/mL iodine solution, presenting various line-pairs or trabecular structures in iodine. Each was scanned with 720 views over 360 degrees with no pixel binning. Water and iodine density volumes (400 x 400 x 5, 110 μm cubic voxels) were estimated using three different methods: image-domain decomposition (IDD) from FBP reconstructions, MBMD with an idealized model (iMBMD), and MBMD with system blur modeling (bMBMD).

RESULTS

Compared with the IDD result, the MBMD results exhibit significant noise reduction with standard deviation decreased by 30% and improve spatial resolution. Modulation at 3.5 lp/mm in iMBMD result increases by 34%, which is further improved in bMBMD result by 200%.

CONCLUSION

A prototype dual-layer flat-panel CBCT system was investigated with custom high-frequency phantoms. The proposed MBMD extends the high-resolution capability of this technology with system blur modeling, taking advantage of the high-resolution low-energy channel.

CLINICAL RELEVANCE/APPLICATION

Dual-layer flat-panel CBCT systems enable high-resolution spectral imaging in vascular and orthopedic applications. The proposed MBMD method with system blur modeling can improve spatial resolution.

SSPH02-02 Simultaneous Dual-contrast Biphasic Liver Imaging with Iodine and Gadolinium Using Photon-counting-detector CT: A Feasibility Animal Study

Awards

Trainee Research Prize - Fellow

Participants
Liqiang Ren, PhD, Rochester, MN (*Presenter*) Nothing to Disclose
Nathan Huber, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Kishore Rajendran, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Joel G. Fletcher, MD, Rochester, MN (*Abstract Co-Author*) Grant, Siemens AGConsultant, Medtronic plcConsultant, Takeda Pharmaceutical Company LimitedGrant, Takeda Pharmaceutical Company Limited
Cynthia H. McCollough, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Siemens AG
Lifeng Yu, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To develop a dual-contrast single-scan protocol for biphasic liver imaging with iodine and gadolinium, and to evaluate its feasibility in a swine using a research whole-body photon-counting-detector CT (PCD-CT) system.

METHOD AND MATERIALS

A dual-contrast CT protocol was developed on the PCD-CT system for simultaneously acquiring two phases of liver contrast enhancement, with iodine enhancement corresponding to the late arterial phase and gadolinium enhancement to the portal-venous phase. The quantification accuracy of iodine and gadolinium from a single scan was first evaluated in a phantom study, which also served as the calibration reference for material decomposition of in vivo swine PCD-CT data. A test bolus scan was performed in the swine to determine the time-attenuation curves for both late arterial and portal-venous phases, based on which the injection timing for the two contrast agents was calculated. A gadolinium contrast (Magnevist, 64 mL, 8 mL/s) bolus was intravenously injected, followed by a iodine contrast bolus (Omnipaque 350, 40mL, 5 mL/s), with a 17-second time interval. PCD-CT scan was performed 12 seconds after the initiation of the iodine contrast injection to simultaneously capture the late arterial phase (iodine) and the portal-venous phase (gadolinium). All PCD-CT scans were acquired with 80 kV and energy thresholds of 25, 35, 50, and 55 keV to provide optimal material separation and quantification. To suppress noise magnification during material decomposition, a convolutional-neural-network (CNN)-based de-noising method was applied.

RESULTS

Hepatic arteries containing iodine and veins containing gadolinium could be delineated from each other with misclassification between two contrast materials less than 0.9 mg/mL. Compared to the original images, better distinctions between two liver phases were achieved for the CNN de-noised PCD-CT data with about 60% noise reduction in the contrast-specific images after material decomposition.

CONCLUSION

The feasibility of performing biphasic liver CT imaging in a single multi-energy CT scan using a dual-contrast (iodine and gadolinium) injection protocol was demonstrated in a swine study.

CLINICAL RELEVANCE/APPLICATION

Simultaneous biphasic liver imaging using PCD-CT may allow for improved diagnosis with perfect alignment of the anatomical structure in the two phases.

SSPH02-04 Detectability and Separability of Iodine and Gadolinium Based Contrast Media in Photon-Counting CT

Participants
Jayasai R. Rajagopal, BA, Durham, NC (*Presenter*) Nothing to Disclose
Faraz Farhadi, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Ayele Negussie, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Pooyan Sahbaee, Bethesda, MD (*Abstract Co-Author*) Employee, Siemens AG
Babak Saboury, MD, MPH, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
William F. Pritchard JR, MD,PhD, Bethesda, MD (*Abstract Co-Author*) Research collaboration, Koninklijke Philips NVResearch collaboration, Boston ScientificResearch collaboration, BTG International LtdResearch collaboration, Siemens AGResearch collaboration, XACT RoboticsResearch collaboration, W. L. Gore & Associates, IncResearch collaboration, Celsion Corporation
Ashkan A. Malayeri, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Elizabeth C. Jones, MD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric CompanyResearch Grant, Siemens AGAdvisory Board, medInt Holdings, LLCLicense agreement, 12 Sigma TechnologiesLicense agreement, Gammex, Inc

For information about this presentation, contact:

jayasai.rajagopal@nih.gov

PURPOSE

To evaluate the detection limits and compare signal separability of iodine and gadolinium in photon-counting (PCCT) computed tomography

METHOD AND MATERIALS

A 20 cm water phantom (QRM, Germany) containing vials of iodine (0.125-10 mg/mL) or gadolinium (0.125-12 mg/mL) was imaged at a tube voltage of 140 kV and tube currents between 14-300 mAs using an investigational scanner (CounT, Siemens, Germany). Two PCCT modes were used: macro (2 bins - 20, 52 keV), and chess (4 bins - 20, 50, 70, 90 keV). Thresholds were selected based on simulations. An additional set of scans were completed with an energy integrated (EID) CT system for detectability comparison. Regions of interest (ROIs) were drawn within vials and contrast values measured. Detection limits were determined using the contrast-to-noise ratios of contrast, using reference values of 5 and 2.5 as cutoffs, derived from the Rose criterion. Separability was measured by calculating the area under the curve (AUC) of multivariate receiver operating characteristic (ROC) curves between vials of iodine and gadolinium with equivalent concentrations.

RESULTS

For both iodine and gadolinium, macro mode showed the highest contrast-to-noise ratio, with a 21.9% and 89.5% advantage over

EID and 10.9% and 22.5% advantage over chess for iodine and gadolinium respectively. In terms of separability, macro mode showed higher separability than chess with a reference AUC of 0.93 compared to 0.77, respectively, for 2 mg/mL concentration levels.

CONCLUSION

For the scan conditions studied, a two bin photon-counting mode showed better contrast-to-noise ratio, lower detection limits, and superior separability between iodine and gadolinium signals when compared to a four bin photon-counting mode.

CLINICAL RELEVANCE/APPLICATION

The ability of spectral CT systems to detect and separate signal from different contrast media enables further clinical opportunities including multi-contrast imaging.

SSPH02-05 A Cascaded Deep-learning Reconstruction Method for Rapid kV-switching dual-energy CT with Sparse-kV Sampling

Participants
Ruoqiao Zhang, PhD, Vernon Hills, IL (*Presenter*) Employee, Canon Medical Systems Corporation
Liang Cai, Vernon Hills, IL (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Qiulin Tang, PhD, Vernon Hills, IL (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Akshay Prabhu Verleker, MS,PhD, Otawara, Japan (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Yuto Hamada, RT, Tochigi, Japan (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Hiroki Taguchi, Otawara, Japan (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Jian Zhou, PhD, Vernon Hills, IL (*Abstract Co-Author*) Scientist, Canon Medical Systems Corporation
Zhou Yu, Vernon Hills, IL (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation

For information about this presentation, contact:

rzhang@mru.medical.canon

PURPOSE

Traditional fast kV-switching dual-energy CT (DECT) relies on hardware approaches to collect sufficient views at each kV, which requires frequent kV switching that prohibits effective tube current modulation. To reduce dependence on frequent kV switching, we proposed a cascaded deep-learning reconstruction method for rapid kV-switching DECT, which allows for sparse kV switching while preserving resolution and effectively performing data-domain material decomposition.

METHOD AND MATERIALS

The proposed deep-learning reconstruction (DLR) method contains two deep convolutional neural networks (DCNNs), as one for sinograms and the other for images. The sinogram DCNN estimates missing views using information from adjacent same-kV views and opposite-kV view at the same location. To reduce noise and improve resolution, the image DCNN processes the FBP images as reconstructed from two decomposed basis sinograms. Both DCNNs were trained using dual-rotation DECT data. In addition, training targets for image DCNN were reconstructed using single-energy DLR method for reduced noise and enhanced resolution. For validation, we acquired kV-switching DECT data from an Aquilion ONE PRISM system (Canon Medical System Corporation, Otawara, Japan), where we achieved sparse kV sampling by switching the kV in every few views. We compare the proposed method with standard AIDR3D result of dual-rotation DECT data acquired at a similar dose level using Catphan modules.

RESULTS

The proposed method with sparse kV switching (CTDIvol=7 mGy) achieves comparable or improved image quality as that of dual-rotation DECT (CTDIvol=7.7 mGy) with standard AIDR3D method. Proposed method achieves about 35% noise reduction, comparable contrast-to-noise ratio on low contrast targets, and improved high contrast resolution as compared to traditional dual-rotation DECT method at a similar dose level.

CONCLUSION

The proposed cascaded deep-learning reconstruction for sparse-kV rapid kV-switching DECT achieves reduced noise and improved resolution as compared to dual-rotation DECT with standard AIDR3D reconstruction at a similar dose level.

CLINICAL RELEVANCE/APPLICATION

The proposed method is suitable for rapid kV-switching DECT with sparse kV sampling, which allows for efficient Automatic Exposure Control (AEC) and potentially improves dose efficiency.

SSPH02-06 A Comparison of Three Pileup Compensation Methods for Photon Counting Detectors

Participants
Scott Hsieh, Rochester, MN (*Presenter*) Research support, Siemens AG
Kris Iniewski, PhD, Saanichton, BC (*Abstract Co-Author*) Employee, Redlen Technologies

PURPOSE

Photon counting detectors (PCD) for CT have several advantages but suffer from pileup effects at high flux. Pileup compensation electronics have been proposed, but their effectiveness at improving noise in spectral tasks has not been studied. In this work, we use simulations to compare three approaches: (1) a 'pileup trigger,' using an extra energy bin at high energy which counts only during pileup; (2) a standard retrigger architecture, which continues to count at regular intervals when a comparator would otherwise be paralyzed; (3) a novel modified retrigger architecture that routes retriggered counts into secondary counters so that their information is not kept separate from regular counts.

METHOD AND MATERIALS

Photons were incident on a single PCD pixel and the signal as a function of time was calculated assuming Poisson statistics, a Gaussian response function, a 120 kVp spectrum and 15 cm of water object filtration. Bin counts were calculated as comparator threshold crossings. PCDs used five bins equally spaced between 20 and 100 keV, and the pileup trigger was a sixth bin at 130 keV. Variance in the iodine and water basis material images was estimated using the Cramer-Rao lower bound (CRLB). All systems were

compared to a PCD without pileup compensation.

RESULTS

At low flux, pileup compensation electronics had little effect. At the characteristic count rate (moderate flux), standard deviation of the iodine basis material was decreased by about 45% using either the standard or modified retrigger architecture, and the pileup trigger had no effect. At three times the characteristic count rate (high flux), the standard deviations were reduced by about 40% using either the pileup trigger or standard retrigger architecture, and 70% using the modified retrigger architecture.

CONCLUSION

Pileup compensation electronics are able to extend the useful flux range for PCDs. Some forms of compensation are more effective than others. The standard retrigger architecture may be improved through our proposed use of dedicated secondary counters.

CLINICAL RELEVANCE/APPLICATION

Photon counting CT has several potential advantages but is hampered by pileup. Our study shows that several pileup compensation methods are available that can mitigate this non-ideality.

Printed on: 05/05/21

SSPH04

Physics (Image Analysis on COVID-19) (In Joint Sponsorship with the American Association of Physicists in Medicine)

Wednesday, Dec. 2 2:00PM - 3:00PM Room: Channel 5

CT PH RS BQ AI

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSPH04-01 Performance Validation of Deep Learning-based Models for the Quantification of COVID-19 Pneumonia and Its Application to Development of Machine Learning Model for Differentiating COVID-19 Cases from ILD and Normal Cases Using Chest CT

Participants
Beomhee Park, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Kyu-Hwan Jung, Phd, Seoul, Korea, Republic Of (*Abstract Co-Author*) Shareholder, VUNO IncEmployee, VUNO Inc
Jin-Kyeong Sung, MD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Employee, VUNO Inc

PURPOSE

To evaluate the performance of two machine learning models; (i) convolutional neural network(CNN) model for the quantification of lesions related to COVID-19 pneumonia, (ii) random forest model for differentiating COVID-19 cases from interstitial lung disease(ILD) and normal cases based on the quantification result

METHOD AND MATERIALS

The CNN-based quantification model was originally developed in the earlier study to quantify ILD-related patterns and modified to predict only COVID-19 pneumonia related patterns such as ground-glass opacity(GGO), reticular patterns, and consolidation. A random forest model was trained to classify COVID-19 cases from non-COVID-19 cases based on the features calculated from the quantification result. The features used were representative CT findings of COVID-19 pneumonia; relative volume of each patterns to whole lung volume, relative volume of each pattern to all lesion volume, number of affected lobes, and binary indicator of lesion distribution(bilateral, posterior, peripheral, basal). The training set consists of 57 COVID-19 confirmed cases as positive samples and combination of 96 ILD and 496 NLST cases as negative samples. The performance of quantification and classification was evaluated with separate samples consisting of 20 COVID-19, 95 ILD, 496 NLST cases.

RESULTS

The Dice similarity coefficient for lesion quantification in COVID-19 confirmed cases was 0.685, which is compatible to the performance of a previously reported model explicitly trained to segment COVID-19 lesions. The performance of model for differentiating COVID-19 cases from NLST cases was 0.989, 1.00 and 0.956 in AUC, sensitivity and specificity, while performance of differentiating COVID-19 from ILD was lower with 0.906, 1.00 and 0.674, respectively. The most significant features for differentiating COVID-19 from ILD was the relative volume of GGO and basal distribution of lesions.

CONCLUSION

The CNN-based model developed for quantifying ILD patterns showed moderate performance for quantifying COVID-19 pneumonia lesions. While the sensitivity of detecting COVID-19 cases is high, differentiating COVID-19 pneumonia from ILD was relatively difficult due to the similarity of CT findings in two diseases.

CLINICAL RELEVANCE/APPLICATION

An automatic system for quantification and differentiation of lung disease has potential to be used as screening tool to triage patients with respiratory infection such as COVID-19.

SSPH04-02 Justification of Radiological Procedures in COVID-19 Pandemic Based on Radiation Risk Only

Participants
Francesco Ria, DMP, Durham, NC (*Presenter*) Nothing to Disclose
Wanyi Fu, BEng, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Hamid Chalian, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Ehsan Abadi, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
William P. Segars, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Rafael B. Fricks, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Pegah Khoshpouri, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric CompanyResearch Grant, Siemens AGAdvisory Board, medInt Holdings, LLCLicense agreement, 12 Sigma TechnologiesLicense agreement, Gammex, Inc

For information about this presentation, contact:

francesco.ria@duke.edu

PURPOSE

Radiologic procedures are recommended based on benefit-to-risk justification. In X-ray imaging, while the benefit is often immediate for the patient, the associated radiation risk is a longer-term effect. Such a temporal gap can bias the justification process in

imaging utilization, particularly during a spreading pandemic like COVID-19 in which fast and accurate diagnostic tools are highly needed. Chest CT and chest radiography (CXR) have shown promising results in the diagnosis and management of COVID-19, providing support to the standard RT-PCR test. However, several institutions are discouraging the use of imaging for this purpose, partly due to radiation risk. This study aims to provide quantitative data towards an effective risk-to benefit analysis for the justification of radiological studies in COVID-19 diagnosis and management to guide clinicians and decision making.

METHOD AND MATERIALS

The analysis was performed in terms of mortality rate per age group. COVID-19 mortality was extracted from epidemiological data across 159,107 patients in Italy. For radiological risk, the study considered 659 Chest CT scans performed in adult patients. Organ doses were estimated using a Monte Carlo based method and then used to calculate a risk index that was converted into a related 5-year mortality rate (SEER, NCI).

RESULTS

COVID-19 mortality showed a rapid rise for ages >30 years old (min: 0.30%; max: 30.20%). Only 1 death was reported in the analyzed patient cohort for ages <20 years old. The mortality rates based on radiation exposure decreased across age groups. The median mortality rate across all ages for Chest CT and CXR were 0.72% (min: 0.46%; max: 1.10%) and 0.03% (min: 0.02%; max: 0.04%), respectively.

CONCLUSION

Radiation risk is not the only factor that should be taken into account for justifying the use of imaging in COVID care; nonetheless, it is an essential factor of consideration. The risk associated with COVID-19, CT, and CXR exhibited different magnitudes and trends across age groups. In higher ages, COVID-19 risk far outweighed that of radiological exams. Based on risk comparison alone, CXR and Chest CT are justified for COVID-19 care of patients older than 30 and 50 years old, respectively.

CLINICAL RELEVANCE/APPLICATION

Towards a comprehensive radiological procedures risk-to-benefit assessment, CT and CXR should not be *a priori* excluded in the diagnosis and management of the COVID-19.

SSPH04-03 Virtual Imaging Trials for Novel Coronavirus Disease (COVID-19)

Participants
Ehsan Abadi, Durham, NC (*Presenter*) Nothing to Disclose
William P. Segars, PhD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Shobhit Sharma, BEng,MSc, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Francesco Ria, DMP, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Hamid Chalian, MD, Durham, NC (*Abstract Co-Author*) Nothing to Disclose
Ehsan Samei, PhD, Durham, NC (*Abstract Co-Author*) Research Grant, General Electric CompanyResearch Grant, Siemens AGAdvisory Board, medInt Holdings, LLCLicense agreement, 12 Sigma TechnologiesLicense agreement, Gammex, Inc

PURPOSE

Virtual imaging trial is a unique framework that can greatly facilitate the assessment and optimization of imaging, by emulating the experiments using representative models of patients and scanners. This study aimed to impalement and demonstrate a virtual imaging trial platform for COVID-19, enabling effective assessment and optimization of CT and X-ray radiography acquisitions for reliable imaging and management of COVID-19.

METHOD AND MATERIALS

An existing VIT platform was adapted to incorporate COVID-19 features. Using an IRB-approved protocol, confirmed COVID-19 patient cases were manually segmented for all pulmonary features related to the disease. The segmentations were verified by a cardiothoracic radiologist. The segmented features (e.g., ground glass opacity, consolidation, crazy paving) were made into 4D extended cardiac-torso (XCAT) phantoms. Within a given disease area, the texture and material of the lung parenchyma in the XCAT were modified to match the physical properties observed in the clinical images. To demonstrate the utility, the COVID-19 phantoms were virtually imaged using a scanner-specific CT and radiography simulator (DukeSim). CT and Radiography simulation included varied models of COVID-19 as a function of applied radiation dose.

RESULTS

We developed the first computational models of COVID-19 patients and demonstrated how their combination with imaging simulators for imaging studies. Qualitatively, the simulated abnormalities had realistic shapes and texture. This platform gives us the ability to image the same patients with both modalities under various parameters. For example, results showed that in the abnormal regions the contrast to noise ratio, a metric relevant to abnormality detection, were 1.6, 3.0, and 3.6 for 5, 25, and 50 mAs images, respectively.

CONCLUSION

The developed toolsets in this study provides the foundation for use of virtual imaging trials in effective assessment and optimization of CT and X-ray radiography acquisitions and analysis tools to manage COVID-19 pandemic.

CLINICAL RELEVANCE/APPLICATION

We establish a platform in which the potential utility of CT and X-ray imaging for COVID-19 management can be assessed using models of patients and scanner with a priori knowledge of ground truth.

SSPH04-04 Wireless Handheld Ultrasound for COVID-19 Infected Patients in Isolation Ward on Diagnosis and Clinical Care

Participants
Zhili Xu, PhD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Hongmei Liu, Guangzhou, China (*Presenter*) Nothing to Disclose
Bo Gao, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Li Ma, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

hongmeiliu3@163.com

CONCLUSION

Wireless handheld ultrasound results in more convenient, faster, safer and cheaper diagnosis than CT and DR, also easier to disinfect. The application of wireless handheld ultrasound contributes to increase the cure rate of COIVD-19 infection and delay the progress of this epidemic.

Background

Coronavirus disease-2019(COVID-19) is an emerging, rapidly evolving situation, which caused a large global outbreak. There have been more than 2 million reported cases of COVID-19 and 146,489 reported deaths to date (17/04/2020). CT or DR scanning is expensive and inconvenient for isolated patients. However, wireless handheld ultrasound has become the most promising imaging method for isolated patients in clinic therapy.

Evaluation

20 COVID-19 infected patients in isolation ward have been checked using wireless ultrasound. 2 patients were diagnosed as cholecystolithiasis, 1 patient as cholestasis with cholecystitis, 1 patient as enormous renal calculus with hydronephrosis, 2 patients as gouty arthritis. Besides, 2 patients were also tried to detect pneumonia and evaluate disease progression or efficacy with the wireless handheld ultrasound.

Discussion

Many patients have developed complication after the wide use of antibacterials in therapy of COVID-19 infection. Wireless handheld ultrasound can quickly diagnose complication, which will help doctors to develop suitable therapeutic regimen and decrease misdiagnosis rate. Besides, the small superficial area of wireless handheld ultrasound makes it easier for sterilization than CT or DR machine. More importantly, the limited contact area between ultrasound machine and patients will reduce the contact transmission COIVD-19.

SSPH04-05 Evaluation of Image Quality and Radiation Safety for the Non-Standard Use of Portable X-ray in Response to COVID-19 Pandemics

Participants
Sarah E. McKenney, PhD, Stanford, CA (*Presenter*) Nothing to Disclose
Marilyn Son, ARRT,RT, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Lance J. Phillips, MS, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose
Jia Wang, PhD, Stanford, CA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

semckenney@stanford.edu

semckenney@stanford.edu

CONCLUSION

By doubling the tube current with the same tube voltage, adequate diagnostic image quality of chest radiography was achieved when scanning through glass. The patient dose roughly stays unchanged due to glass attenuation of low energy x-rays. Radiation exposure due to x-ray scatter is generally well under regulatory limits in these non-standard imaging conditions.

Background

In response to a patient surge during the COVID-19 pandemic, portable x-ray equipment is used for imaging through the glass of ED isolation rooms or in outdoor triage tent areas. To maintain diagnostic image quality and radiation safety for patients and hospital staff in these conditions, we performed phantom evaluations for quantitative evaluation of image quality and exposure.

Evaluation

An anthropomorphic chest phantom was used for chest x-ray through a sliding glass door (Fig 1a). The entrance air kerma and beam half-value layer was measured and the Exposure Index (EI) was recorded. Acquisitions were performed with the glass door open (standard) and closed (through-glass) using routine techniques. The mAs was increased for the through-glass scan to match the EI of the standard scan for the anthropomorphic and an image quality phantom (IQP) to obtain contrast-to-noise ratio (CNR). Patient effective dose estimates were calculated via Monte Carlo (PCMXC20). A radiation scatter survey was performed to evaluate staff safety (Fig 1b).To facilitate patient triage and reduce potential exposure, tents were set up in a dedicated area of an outdoor parking lotand portable x-ray units were used to scan patients in one tent (Fig 1c). A radiation scatter survey was performed in surrounding locations of the tent (Fig 1d). Safe distance and caution signs were set up based on survey results

Discussion

The glass door attenuated 50% attenuation of x-ray flux. The EI for the chest phantom and CNR of the IQP was matched by increasing tube current by 50% through glass and this reduced the patient effective dose was 20%. However, in the later trial of patient scanning, tube current was increased by 100% due to the difference in phantom and patient attenuation profile.

SSPH04-06 A Sensitive Merit to Differentiate COVID-19 Cases from Others in CT Images

Participants
Yongfeng Gao, Stony Brook, NY (*Presenter*) Nothing to Disclose
Jerome Z. Liang, PhD, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
Marc Pomeroy, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
Siming Lu, MS, Westbury, NY (*Abstract Co-Author*) Nothing to Disclose
Jiaxing Tan, Staten Island, NY (*Abstract Co-Author*) Nothing to Disclose
Fanfang Han, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Elaine S. Gould, MD, Oyster Bay, NY (*Abstract Co-Author*) Consultant, Endo International plc

For information about this presentation, contact:

Jerome.Liang@stonybrookmedicine.edu

PURPOSE

Computed tomography (CT) of COVID-19 shows a relatively global effect through the whole lungs, mimicking many other lung abnormalities. This characteristic effect renders the difficulties in differentiating COVID-19 from other lung diseases. This work presents a novel method to relieve the difficulties.

METHOD AND MATERIALS

The method aims to reduce the global effect through the 3D whole lung volume into 2D domain, where the anatomic land-markers along the z-axis, denoted as Lung Marks are used to eliminate axial variable so that the cross section at each z location has similar texture patterns for normal subjects. Our experiments indicated that 30 Lung Marks are sufficient to eliminate the axial variable. The method computes texture measures from each 2D cross section and maps the measures on to the corresponding Lung Mark, resulting in a profile along the z-axis. The difference of the profiles between two different abnormalities is the proposed sensitive merit to differentiate COVID-19 cases from others in CT images.

RESULTS

To show the effectiveness of the proposed sensitive merit, 48 COVID-19 cases and 48 normal screening cases were used. Firstly, the lungs of each of the 96 cases were segmented, and the segmented whole lungs were labeled/registered to the 30 Lung Marks along the axial direction. Texture measures (traditional Haralick features) were computed from each axial cross image at the corresponding Lung Mark along the z-axis to generate the profiles of the proposed sensitive merit. A skew U shape distribution was observed in the vector distance of the texture measure between the normal and COVID-19 subjects. Individual Haralick features analysis showed the 12th feature with the most sensitivity. Histogram analysis showed higher intensity of COVID-19 subjects, which agrees with the manifestation of COVID-19, like ground glass opacity, consolidation, etc.

CONCLUSION

In this work, we presented a sensitive merit to differentiate COVID-19 cases from normal lung screen cases. The experimental results demonstrated the feasibility of the sensitive merit for the differentiating task.

CLINICAL RELEVANCE/APPLICATION

The sensitive merit will increase the efficiency for early detection of COVID-19 and management of detected COVID-19 cases.

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SSPH05

Physics (Radiation Dose: Part I) (In Joint Sponsorship with the American Association of Physicists in Medicine)

Friday, Dec. 4 3:30PM - 4:30PM Room: Channel 4

CT PH SQ BQ AI

AMA PRA Category 1 Credit ™: .75

FDA Discussions may include off-label uses.

Sub-Events

SSPH05-01 Dose Reduction Potential through the Use of Patient-Specific Tin Prefilters in Diagnostic Single Energy CT

Participants
Joerg Steidel, BSC, Heidelberg, Germany (*Presenter*) Nothing to Disclose
Joscha Maier, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan Sawall, PhD, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Marc Kachelriess, PhD, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

joerg.steidel@dkfz-heidelberg.de

PURPOSE

To assess the potential dose reduction achievable with patient-specific selectable prefilters for single energy CT applications.

METHOD AND MATERIALS

Prefilters mainly remove the low energy photons of the x-ray spectrum. Beam hardening artifacts are reduced and, most importantly, patient dose is significantly reduced since low energy photons are nearly completely absorbed in the patient and do not contribute to the image. However, to achieve similar image quality, the tube power needs to be increased with increasing prefilter thickness. Today, CT systems with 0 and 0.4, with 0 and 0.6, and with 0, 0.4, and 0.7 mm tin (Sn) prefiltration are in use. Here, the potential of using finer gradations and thicker prefilters is investigated. To do so, semiantropomorphic liver phantoms containing iodine and soft tissue contrast inserts were simulated at different sizes: 15×10 (child), 30×20 (adult) and 50×40 cm (obese). Simulations were performed with 0 to 2 mm Sn and with 30 to 150 kV tube voltage. Dose was assessed using Monte Carlo simulations of the 32 cm CTDI phantom. Contrast-to-noise ratios at unit dose (CNRD) were calculated for soft tissue contrast and iodine contrast.

RESULTS

Increasing Sn prefilter thickness yields a significant increase in soft tissue CNRD (30% dose reduction at 0.7 mm for the adult phantom, mAs increase by a factor of 7.4). Optimal tube voltage increases with patient size and is to be individually selected for each filter thickness. Depending on patient size iodine CNRD reaches a maximum at different Sn prefilter thickness (0.0, 0.2 and 0.8 mm). While no dose reduction could be achieved for the child phantom using a Sn Filter maximum dose reduction was 14% and 33% for the adult and obese phantoms. Here, mAs needed to be increased by a factor of 13 and 61 respectively. Deviating from the optimal filter thickness by 0.1 mm results in a dose increase of up to 4%.

CONCLUSION

For optimal iodine CNRD the Sn prefilter thickness should be adapted to the patient size. Soft tissue CNRD can be maximized by choosing the prefilter as thick as tube power allows to. Fine gradation of filter thickness should be available in the filter changer

CLINICAL RELEVANCE/APPLICATION

Dose reduction in clinical CT is important for patient safety.

SSPH05-02 Natural-image-based Neural Network Denoising Framework and Its Application to Photon-Counting Detector CT

Awards
Trainee Research Prize - Resident

Participants
Nathan Huber, Rochester, MN (*Presenter*) Nothing to Disclose
Andrew Missert, PHD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Hao Gong, PhD, Rochester,, MN (*Abstract Co-Author*) Nothing to Disclose
Lifeng Yu, PhD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose
Cynthia H. McCollough, PhD, Rochester, MN (*Abstract Co-Author*) Research Grant, Siemens AG
Shuai Leng, PHD, Rochester, MN (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Leng.Shuai@mayo.edu

PURPOSE

The purpose of this study is to develop a convolutional-neural-network (CNN) CT noise reduction framework that utilizes a widely accessible natural (optical) image database. For training, CNN denoising algorithms often use CT projection data and noise insertion to synthesize CT images at different dose (noise) levels. However, limited access to projection data makes it difficult to implement this approach. Here we describe a training framework that uses a public natural image database and does not require projection data access.

METHOD AND MATERIALS

The denoising framework uses transfer learning; noise realizations from repeated phantom CT scans are superimposed onto natural images to mimic CT images at different dose levels. ImageNet was used for this task because of its diverse feature space, high resolution, and low noise. Patches were extracted from ImageNet and scaled to match the Hounsfield unit range of CT images. Prior to each training epoch, noise patches were shuffled and added to natural images. The CNN was trained to remove the superimposed CT noise and restore the underlying natural image. A residual architecture was used containing 18 convolutional layers, each with 128 features, and a mean-squared-error loss function. The technique was tested on 150-micron resolution thoracic CT images acquired from 5 patients on a research photon-counting-detector (PCD) CT scanner. Noise and edge sharpness were visually assessed, noise was measured in the aorta and sharpness quantified using line profiles.

RESULTS

The CNN reduced noise by 74.2 ± 0.2 % compared to images created using filtered back projection and a sharp reconstruction kernel. Visual and line profile assessments demonstrated that fine anatomic details were preserved in the denoised images. In the shoulder, the sharp boundary of cortical bone was well maintained and noise reduction in the trabecular bone regions improved delineation of fine structures. Similar improvements were observed in lung images.

CONCLUSION

The developed CNN denoising framework provides extensive noise reduction while maintaining fine anatomic features. Because this method uses only phantom scans and publically available data, it can be easily implemented.

CLINICAL RELEVANCE/APPLICATION

The ability to implement CNN denoising methods with a widely accessible natural image database and easily acquired phantom scans makes CT denoising available to anyone working in the field.

SSPH05-03 Deep Learning Image Reconstruction (DLIR) for Evaluating Large Airways in Chest CT in Children with Ultra-low Dose

Participants
Ji Hang Sun, Beijing, China (*Presenter*) Nothing to Disclose
Haoyan Li, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Jianying Li, Beijing, China (*Abstract Co-Author*) Employee, General Electric Company
Xuan Zhang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Yun Peng, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the ability of a Deep Learning Image Reconstruction (DLIR) algorithm in evaluating large airways with ultra-low radiation dose chest CT in children.

METHOD AND MATERIALS

17 children (age range 3-12y, average 6.5±3.0years) for follow-up examination underwent ultra-low-dose plain chest CT with 80kV (3-6 years) or 100kV (7-12 years), 10mA, 0.35s rotation time and were enrolled in the study group. Images were reconstructed with the state-of-the-art Adaptive Statistical Iterative Reconstruction-V at 50% strength (50%ASIR-V) with standard kernel and DLIR at low (DL-L), medium (DL-M) and high settings (DL-H) at slice thickness of 0.625mm. These same patients underwent CT scans in routine radiation dose less than 3 months earlier were included in the control group, and the images were reconstructed with 50%ASIR-V. Two radiologists independently evaluated images for evaluating large airways in the lungs on a 5-point scales (5, excellent, 4, good, 3, measurable and acceptable, 2, identifiable and 1, not acceptable). The objective image quality of the lung parenchyma was measured and statistically compared among the 5 reconstruction groups. Finally, radiation dose was recorded for the two patient groups based on the report of ICRP103 and compared.

RESULTS

The CTDIvol and effective dose was 0.07±0.03mGy and 0.04±0.01mSv, respectively for the ultra-low dose group, 98% lower than the 3.2±0.8mGy and 2.1±0.5mSv, respectively for the control group. The image noise (in HU) of lung parenchyma of the ultra-low dose group was 50.6±10.1 with 50%ASIR-V, 57.5±11.5 with DL-L, 52.2±10.8 with DL-M, and 43.2±10.0 with DL-H images, all significantly higher than the 27.5±8.2 in the control group. However, the image quality scores for evaluating large airways were all higher than 3, with DL-H having the highest value in the ultra-low dose group at 4.7±0.3, similar to the score of 4.9±0.1 in the control group.

CONCLUSION

Ultra-low dose chest CT reconstructed with DL-H provides equal image quality for evaluating large airways in the lungs, with 98% radiation dose reduction, compared with the routine radiation dose CT scans.

CLINICAL RELEVANCE/APPLICATION

Ultra-low-dose chest CT has radiation dose level of plan X-Ray films, and together with DLIR may provide details as conventional CT.

SSPH05-04 Tin or Copper Prefilters for Dose Reduction in Diagnostic Single Energy CT?

Participants
Joerg Steidel, BSC, Heidelberg, Germany (*Presenter*) Nothing to Disclose

Joscha Maier, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Stefan Sawall, PhD, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose
Marc Kachelriess, PhD, Heidelberg, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

joerg.steidel@dkfz-heidelberg.de

PURPOSE

To analyze the impact of the prefilter material on the potential dose reduction achievable with prefilters in single energy CT applications.

METHOD AND MATERIALS

Prefilters mainly remove the low energy photons of the x-ray spectrum. Patient dose is significantly reduced since low energy photons are nearly completely absorbed in the patient and do not contribute to the image. However, to achieve similar image quality, the tube power needs to be increased with increasing prefilter thickness. Today, CT systems with additional tin (Sn) prefiltration are in use. Here, it is investigated if materials with a lower k-edge energy, such as copper (Cu), provide a dose advantage over Sn in diagnostic single energy CT. To do so, semiantropomorphic liver phantoms containing iodine and soft tissue contrast inserts were simulated at different sizes: 15×10 (child), 30×20 (adult) and 50×40 cm (obese). Scans were simulated with 0 to 2 mm prefilter thickness and 35 to 150 kV tube voltage. Dose was assessed using Monte Carlo simulations of the 32 cm CTDI phantom. Contrast-to-noise ratios at unit dose (CNRD) were calculated for soft tissue and for iodine contrast. Optimal tube voltage was selected for each filter material and thickness combination.

RESULTS

Soft tissue CNRD showed no significant difference between Sn and Cu prefilters. However, iodine CNRD for child and adult phantoms behaved significantly different. While iodine CNRD reached a maximum at low Sn thicknesses it rather increased monotonously with increasing Cu thickness. For the obese phantom both materials caused iodine CNRD to increase with increasing prefilter thickness. Using Sn no dose reduction could be achieved for the child phantom while maximum dose reduction was 14% and 33% for adult and obese phantoms respectively. Here, mAs needed to be increased by a factor of 13 and 61. Considering Cu maximum dose reduction was about 45% for all phantom sizes. However, the mAs value increased by five orders of magnitude. A 40% dose reduction was possible with a 50-fold mAs increase.

CONCLUSION

Cu prefiltration allows for significantly higher iodine CNRD than Sn prefiltration. Iodine CNRD can be maximized by choosing the Cu prefilter as thick as tube power allows to.

CLINICAL RELEVANCE/APPLICATION

Dose reduction in clinical CT is important for patient safety.

SSPH05-05 Feasibility of Performing Chest CTA in Children with Both Low Radiation Dose and Contrast Medium Dose by Using 70kVp and Deep Learning Image Reconstruction (DLIR)

Participants
Ji Hang Sun, Beijing, China (*Presenter*) Nothing to Disclose
Jianying Li, Beijing, China (*Abstract Co-Author*) Employee, General Electric Company
Xuan Zhang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Yun Peng, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To assess the feasibility of performing chest CTA in children with low radiation dose and contrast medium dose using 70kVp and Deep Learning Image Reconstruction (DLIR) algorithm.

METHOD AND MATERIALS

33 children (age range 4 month-13 years, average 5.85±4.16 years) underwent low dose chest CTA with 70kVp and auto tube current modulation, the noise index was set at 11-15 based on children's age, contrast medium (CM) dose was 0.8-1.2ml/kg. Images were reconstructed with 50% and 100% Adaptive Statistical Iterative Reconstruction-V (ASIR-V) with standard kernel and DLIR with a high setting (DL-H) at slice thickness of 0.625mm. Two radiologists in consensus evaluated images for whole image noise, vessel margin and vessel contrast separately on a 5-point scale (5, excellent, 4, good, 3, measurable and acceptable, 2, detectable and 1, not acceptable). CT value and image noise of Aorta (Ao), and back muscle on the same image slice was measured for the objective image quality. The results among the 3 reconstruction groups were statistically compared using Kruskal-Wallis and ANOVA test. Radiation dose and CM dose were recorded.

RESULTS

The average CTDIvol and DLP was 1.37±0.29mGy and 35.43±10.59mGy.cm, respectively and the CM dose was 25.43±13.32 ml. The image noises (in HU) of Ao were 29.45±7.59 with 50%ASIR-V, 20.45±6.93 with 100%ASIR-V and 19.24±5.77 with DL-H. The 100%ASIR-V images had over-smoothed vessel margins and only the DL-H images provided acceptable scores on all 3 aspects of the qualitative image quality evaluation.

CONCLUSION

It is feasible to provide acceptable CTA images with both low radiation dose and contrast dose in chest CTA in children using 70kVp and DL-H algorithm.

CLINICAL RELEVANCE/APPLICATION

double-low-dose chest CTA in children can be achieved by combining 70kVp and DL-H algorithm.

SSPH05-06 Performance Comparison of Physical Anti-Scatter Grid and AI-Based Virtual Scatter Reduction Across Patient Size

Participants
Samuel Richard, PhD, Rochester, NY (*Presenter*) Employee, Carestream Health, Inc
Xiaohui Wang, PhD, Rochester, NY (*Abstract Co-Author*) Employee, Carestream Health, Inc
Levon Vogelsang, Rochester, NY (*Abstract Co-Author*) Employee, Carestream Health, Inc

For information about this presentation, contact:

samu.richard@gmail.com

PURPOSE

To evaluate and compare the contrast and noise performance of physical anti-scatter grids with an AI-based virtual scatter suppression algorithm across patient sizes.

METHOD AND MATERIALS

Radiographic images of an anthropomorphic chest phantom (Kyoto Kagaku, Japan) were acquired with varying amounts of acrylic slabs (50cm x 50cm) placed in front and back of the phantom (Small - 0cm, Medium - 2x2.5cm and large-2x5cm) to simulate a range of patient thicknesses. Images were captured with no grid, 6:1 grid (JPI Healthcare NY, 40 line pair/cm, 130cm focal distance), 12:1 grid (JPI Healthcare NY, 40 line pair/cm, 180cm focal distance). The kVp and mAs were set such that an Exposure Index (Carestream EI) of 1300 was achieved with the 12:1 grid (Small - 100 kVp, 2.2mAs; Medium - 110 kVp, 4mAs; Large - 120 kVp, 8 mAs) and were held constant for each patient size. No-grid acquisitions were processed with a U-Net deep learning algorithm (not FDA approved) trained using high-dose low-scatter images to predict scatter and increased noise resulting from grid use. The scatter and noise prediction was subtracted from the original image. Contrast and noise and contrast-to-noise ratio (CNR) were evaluated for features in the lung and mediastinum area.

RESULTS

Feature contrast was improved with either physical and virtual grids. 12:1 grid provided the highest contrast improvement but also had the highest noise levels. The AI-based virtual grid improved contrast while maintaining lower noise levels. For the lung feature, the no-grid CNR was improved by 29-53% with the AI-based virtual grid compared to 5%-11% for 12:1 grid and 3-33% for 6:1 grid across patient size. For the mediastinum feature, CNR was improved by 4-8% with the AI-based virtual grid and 18-22% with 12:1 grid and 7-18% with 6:1 grid across patient size.

CONCLUSION

Under fixed dose, an AI-based virtual grid with noise suppression improved contrast while maintaining low-image noise levels compared to physical anti-scatter grids - resulting in a greater CNR in the lung area. Although, a virtual grid still improved the CNR for features within very high scatter-to-primary ratio areas (i.e., Mediastinum) a physical grid provided the greatest performance in that environment.

CLINICAL RELEVANCE/APPLICATION

AI-based virtual grid suppression can provide a practical compromise to physical anti-scatter grids for radiographic imaging. However, they have limitation under very high scatter conditions.

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RSNA 2020 HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SSPH06

Science Session with Keynote: Physics (Image Reconstruction) (In Joint Sponsorship with the American Association of Physicists in Medicine)

Saturday, Dec. 5 8:30AM - 9:30AM Room: Channel 4

CT MR NM PH AI

AMA PRA Category 1 Credit ™: .75

Sub-Events

SSPH06-01 Physics Keynote Speaker: Learning-based Image Reconstruction

Participants
Jeffrey A. Fessler, PhD, Ann Arbor, MI (*Presenter*) Nothing to Disclose

SSPH06-03 Metal Artifact Reduction in Ultra High Resolution CT

Participants
Katsumi Tsujioka, PhD, Toyoake, Japan (*Presenter*) Scientist, Canon Medical Systems Corporation
Yujiro Doi, RT, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Taiki Murakami, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Kyohei Yamada, Toyoake, Japan (*Abstract Co-Author*) Nothing to Disclose
Asuka Takeuchi, Toyoake, Japan (*Abstract Co-Author*) Employee, Canon Medical Systems Corporation
Yosuke Kuratani, Yokkaichi, Japan (*Abstract Co-Author*) Nothing to Disclose
Masayoshi Niwa, RT, Kuwana, Japan (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

tsujioka@fujita-hu.ac.jp

TEACHING POINTS

In recent years, a metal artifact reduction reconstruction has been developed. Also, an Ultra High Resolution CT (UHR-CT) system was developed. We report on the usefulness of the reconstruction method of metal artifact reduction in UHR-CT with self-made phantom. For the phantom, a bundle of a plurality of brass cylinders was used. In addition, artifact reduction was evaluated by CT value histogram between brass and surrounding material.Brass cylinders made it impossible to confirm the shape of the phantom due to the occurrence of metal artifacts in both conventional CT and UHR-CT. Although artifacts was reduced by metal artifact reduction reconstruction, the effect of reducing the metal artifact was more pronounced in UHR-CT than in conventional CT.We made a phantom modeling metallic bolt in orthopedic surgery, metallic denture in dental area and evaluated the artifact reduction effect by UHR-CT and metal artifact reduction reconstruction. Compared to the conventional CT, it was confirmed that UHR-CT has not only high spatial resolution but also high artifact reduction effect.

TABLE OF CONTENTS/OUTLINE

1. Elucidation of the cause of artifact occurrence in CT2. Development of phantom for evaluation3. Conducting scan parameters and experiments4. Results and discussion5. Scan technology and device performance

SSPH06-04 Single Source Helical CT Reconstruction at Pitches up to 4.0

Participants
John W. Hayes, MS, Madison, WI (*Presenter*) Nothing to Disclose
Juan Montoya, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Adam Budde, MS, Waukesha, WI (*Abstract Co-Author*) Employee, General Electric Company
Chengzhu Zhang, BS, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Yinsheng Li, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Ke Li, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose
Guang-Hong Chen, PhD, Madison, WI (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

jwhayes@wisc.edu

PURPOSE

Due to the limitation of severe limited-view artifacts in reconstructed images for a helical pitch higher than 1.5, current single source CT scanners generally operate at pitches lower than 1.5. In this work, a new reconstruction framework was developed and validated to enable single source helical CT to operate at pitches up to 4.0 without significant limited-view artifacts.

METHOD AND MATERIALS

The reconstruction framework combines a deep learning technique and the well-known Prior Image Constrained Compressed Sensing (PICCS). The method consists of 1) a conventional FBP reconstruction with limited view artifacts, 2) a deep-learning network to clean up image artifacts from the FBP reconstruction, and 3) a PICCS reconstruction using the deep learning output as prior image. Abdomen and Chest CT exams from 1332 patients were retrospectively collected. First, CT sinogram data at helical pitches of 2, 3, and 4 were simulated by forward projection of clinical CT image volumes using 16, 32, and 64 detector rows. Next, FBP reconstructions were performed for all simulated sinograms (1332 scans x 3 pitches x 3 detector systems = 2,800,000 images) and

paired with reference clinical CT images to train the deep learning network. Outputs of the deep learning network were then used as prior images in PICCS to yield the DL-PICCS images. To assess the performance of DL-PICCS, 261 additional CT exams (229 simulated + 32 experimental) were used. The objective image quality assessment metric SSIM was used to quantify DL-PICCS image quality for 50,736 axial slices in the validation cohort compared to reference images.

RESULTS

DL-PICCS images at pitch 2, 3, and 4 do not have visually noticeable image artifacts. Quantitative SSIM values for DL-PICCS images of the chest had mean of 0.998 ± 0.001 at pitch 2, 0.978 ± 0.008 at pitch 3, and 0.955 ± 0.013 at pitch 4. However, as pitch increases, some structural differences appear in the reconstructions compared to the reference as reflected in a slight drop in SSIM values.

CONCLUSION

DL-PICCS enables high quality single source helical CT image reconstruction up to pitch 4.0.

CLINICAL RELEVANCE/APPLICATION

Pitch 4.0 reconstruction can immediately help reduce dose by a factor of more than 2 compared to current clinical pitches below 2.0, and enables 64-row/4.0 cm coverage CT systems to scan the entire heart within a single heartbeat and within a single breath hold.

SSPH06-05 Convenient Hyper Parameter Selection for Bayesian Image Reconstruction by Constructing A Theory-driven Look-up Table

Participants
Yongfeng Gao, Stony Brook, NY (*Presenter*) Nothing to Disclose
Jerome Z. Liang, PhD, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose
Siming Lu, MS, Westbury, NY (*Abstract Co-Author*) Nothing to Disclose
Shaojie Chang, Xian, China (*Abstract Co-Author*) Nothing to Disclose
Amit Gupta, MD, South Setauket, NY (*Abstract Co-Author*) Nothing to Disclose
Haifang Li, Stony Brook, NY (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

Jerome.Liang@stonybrookmedicine.edu

PURPOSE

While Bayesian theory has shown great potential for count-limited medical image reconstruction in the past two decades, its wide applications in clinic has been hampered by its hyper parameter β, which is determined by a trial-error style. This work presents a method of constructing a look-up guidance table to eliminate the cumbersome trial-error style.

METHOD AND MATERIALS

By formulating the two basic terms of data fidelity and prior expectation in Bayesian theory as probability distribution functions, β becomes the ratio of the data uncertainty (or variance a) and the prior tolerance (or σ). By considering the tissue-specific textures in the to-be-reconstructed image as the figure of merit for medical diagnosis, two look-up tables were constructed to guide a steadily cooling down of the tissue texture patterns to ensure an acceptable image, mimicking the physical model of cooling down the temperature steadily for a high quality crystal. One look-up table is constructed as a-β table, where σ is treated as the temperature of the texture patterns, and the other as a-γ table, where γ is defined as the ratio of fidelity and prior terms. During table construction, human observation as well as image quality measures were used.

RESULTS

Both simulated sinograms from numerical phantoms and high-quality patient CT images and real clinical sinograms from patients were used for the look-up table construction and testing. Consistence were observed across the three type sinogram data, and also for the constructed a-β and a-γ tables. Both tables suggest smaller prior strength at starting point of iterative reconstruction process and stronger prior at the end point. For testing the simulated phantom/clinical sinograms, comparable quantity images were obtained with that using the empirical trial-error selection of hyper parameter. Testing on the real clinical sinograms, comparable quantity images were obtained.

CONCLUSION

In this work, we presented a way to avoid the empirical trial-error selection of the hyper parameter for Bayesian image reconstruction. The experimental results demonstrated the feasibility of Bayesian image reconstruction without freely adjustable hyper parameter.

CLINICAL RELEVANCE/APPLICATION

This elimination of the empirical trial-error selection of the hyper parameter will widen Bayesian reconstruction applications in clinic.

SSPH06-06 Two Orders of Magnitude Accelerated Precision Tomographic Reconstruction Compared to OS-SART: Approaching the Speed and Simplicity of Filtered Backprojection

Participants
Wolfram R. Jarisch, PhD, Potomac, MD (*Presenter*) Nothing to Disclose
Peter J Basser, PhD, Bethesda, MD (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

wolfram@cyber-inc.us

CONCLUSION

We now achieve computation speeds close to filtered backprojection with greater accuracy and precision than OS-SART. Numerical comparisons on an nVIDIA P4000 processor using cone beam reconstruction shows the new method at 79x the speed of OS-SART

used at CERN (Biguri et al.; IOP, Biomed. Phys & Eng.Expr, Vol 2 No 5).

Background

Work by Wood and Morf (IEEE BME-28, 1981) implied the inability to solve practical tomographic reconstruction with least-squares and Maximum Likelihood estimation (MLE) (Kalman Filter; Sage & Melsa; McGraw Hill, 1971). Current alternatives include: (i) ordered-subset sequential algebraic reconstruction techniques (OS-SART); and (ii) prior measurement distribution p(y) selection to regularize an approximate voxel update p(x/y), while 'unrolling' the non-linear iterative computation (Fessler, 2017; U. of Michigan: https://arxiv.org/pdf/1707.05927.pdf).

Evaluation

Frequently, a single filtered backprojection step is used to initialize an iterative reconstruction. Unfortunately, this operation is not continued, and, for example, is replaced by gradient optimization steps, trained with a problem specific cost function. In this way, optimization on a constrained density with a non-quadratic performance criterion, using only a small subspace of typically some 100 x 10^6 voxel variables, shows limited convergence (DeMan, et al. NSSMIC.2005.1596187, M11-339).

Discussion

To overcome limitations of the above methods, we proposeed and implemented a new tomographic reconstruction method. Derived from a linearized approximate Kalman filter, 'unrolling' iterations with progressive resolution, it uses filtered backprojection as an approximate systems state predictor. This approach formulates 3D image reconstruction throughout all iterations as small-signal optimal state estimation steps. Starting out with a single voxel representing the entire object density, then splitting voxels into smaller sub-voxels every few iterations, the final object density (the state) is estimated with two to three final iterations. Gradual geometric progression of the voxel resolution maintains small-signal systems linearity while only the final iterations represent significant computational effort.

Printed on: 05/05/21

SSRO04

Radiation Oncology (Radiomics)

Sunday, Nov. 29 2:00PM - 3:00PM Room: Channel 5

HP IN LM PR SQ

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSRO04-01 Prediction of Local Regional Recurrence in Early-staged Lung Cancer Patients After Stereotactic Body Radiation Therapy: CT-based Radiomic Analysis

Participants
Zekai Shu, BA, Hangzhou, China (*Presenter*) Nothing to Disclose
Jia Chen, MSc, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Wei Shen, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jin Wang, PhD, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yuanyuan Chen, PhD, Hangzhou, China (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

It is difficult to detect local regional recurrence (LRR) early for lung cancer patients who undergo stereotactic body radiotherapy (SBRT), as post-treatment radiation-induced lung injury may mimic and perplex LRR. The study aimed to explore a predictive model of LRR by using radiomic features extracted from pre-treatment radiotherapy planning CT.

METHOD AND MATERIALS

104 early-staged lung cancer patients treated with SBRT (20 with LRR) were included, who were divided into training and validation sets at a ratio of eight versus two with parallel clinical characteristics ($p > 0.1$). Radiomic features were extracted from gross tumor volume area on planning CT and were selected based on the minimum redundancy maximum relevance (mRMR) algorithm to build a prediction model (Rad-score) for LRR in training set, whose performance (concordance index (CI), areas under receiver operating characteristics curve (AUC)) were further evaluated in validation set. The optimal cutoff of Rad-score was determined by the maximum Youden index, by which patients were then divided into high and low risk groups and log-rank test was accordingly performed to distinguish the group difference in cumulative probability of LRR. Significant clinical factors in univariate cox regression together with Rad-score were included to build the final model and its performance was assessed accordingly.

RESULTS

Two radiomic features, glcmFeatS_StdS_jointAvg and glcmFeatS_StdS_clustShade, were selected into the Rad-score, achieving a CI of 0.73 (0.62-0.84), and AUC of 0.764 and 0.714 in training and validation set, respectively. And the incidence of LRR was significantly ($P = 0.005$) higher in high-risk group than low-risk group in training set. When combined with significant clinical factors (tumor location), the CI was improved to 0.78 (0.67-0.89), while its AUCs were changed to 0.832 and 0.671 in training and validation set, respectively. In contrast with low-risk group, the cumulative probability of LRR was higher in high-risk group in both training ($P < 0.001$) and validation ($P < 0.1$) sets.

CONCLUSION

Combined with clinical factors, radiomic features are capable to predict LRR at an early stage after SBRT and distinguish high-risk group from the others, facilitating earlier salvage therapy.

CLINICAL RELEVANCE/APPLICATION

Radiomic analysis can be applied in clinical practice for prognostic value of several clinical outcomes and help with physician with clinical decision.

SSRO04-02 Deep Learning based Segmentation of Clinical Target Volume and Contralateral Breast for Breast Cancer Radiotherapy

Participants
Haibin Chen, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Ya Cheng, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Shuyu Wu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Peiliang Xie, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Jun Wei, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yao Lu, PhD, Ann Arbor, MI (*Abstract Co-Author*) Nothing to Disclose
Wei Wang, Tianjin, China (*Presenter*) Nothing to Disclose

PURPOSE

To develop clinical practicable automatic segmentation method for clinical target volume (CTV), including breast CTV, CTV in the supraclavicular lymphatic region (CTV_SL) and CTV in the internal mammary lymphatic region (CTV_IM), and the contralateral breast(conbreast) in breast cancer (BC) radiotherapy (RT).

METHOD AND MATERIALS

A novel convolutional neural network with orientation attention (OANet) is developed for three CTV regions and con-breast segmentation in BC RT. OANet is an inception block based pyramidal network, which could achieve a larger perceptive field for feature extraction. To avoid the influence of similar features in the left and right (LR), anterior, and posterior (AP) direction in model training, two novel strategies are adopted in this study. 1) a direction attention map is calculated based on a formula as: APi=1-*i*/H, where i and H are the row index and image resolution along with AP directions, respectively.Then, the product of AP direction attention map and the normalized CT image is used as the input of OANet, where the CT images is clipped to the gray range of [-300, 300] and then normalized to the range of [-1, 1]; 2) a channel-specific local Dice loss is employed for the model training, which is the total of ipsilateral Dice loss for CTVs and the contralateral Dice loss for conbreast calculated based on a pair of loss masks with 1 in ipsilateral and 0 in contralateral or the opposite. The proposed method is trained and tested on 80 CT images from 80 patients with manually delineated contours of breast CTV, CTV_SL, and CTV_IM. 60 patients are used for training, and the rest are for testing. The segmentation accuracy is quantitatively evaluated by the Dice's coefficient (DSC). Higher DSC indicates more accurate OAR segmentation.

RESULTS

The proposed OANet achieved superior performance over UNet with mean DSCs improved from 78.3(±9.7)%, 78.3(±15.2)%, 77.8(±9.7) and 80.2(±12.3)% to 83.8(±8.3)%, 80.4(±13.0)%, 80.0(±7.3) and 87.2(±10.5)% for breast CTV, CTV_SL, CTV_IM, and conbreast, respectively.

CONCLUSION

The accurate quantitative and qualitative evaluation results demonstrate the proposed OANet is effective in automatic contours delineation of three CTV and conbreast for BC RT.

CLINICAL RELEVANCE/APPLICATION

The proposed CTV and conbreast automatic segmentation method is helpful for inproving the effecient and reducing the inter&intra delineater variabilities in clinical delineation work

SSRO04-03 Deep Learning-based Breast and Organs-at-risk Segmentation in CT with Uncertainty Quantification for Radiation Therapy after Breast-Conserving Surgery

Participants
Jimin Lee, Seoul, Korea, Republic Of (*Presenter*) Nothing to Disclose
Hyungjoo Cho, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Sung-Joon Ye, PhD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Doo Ho Choi, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Won Park, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Haeyoung Kim, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Won Kyung Cho, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Hee Jung Kim, PHD, Seoul, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

heejung0228.kim@samsung.com

PURPOSE

To investigate a novel Deep Learning-based breast and organs-at-risk (OARs) segmentation technique in CT with uncertainty quantification for radiation therapy after breast-conserving surgery

METHOD AND MATERIALS

The whole dataset consisted of CT images and RT structure files (RS) of 400 patients who underwent radiation therapy after breast-conserving surgery. The dataset was randomly divided into 320 patients' data for training stage and the other 80 patients' data for test stage. Each 3D segmentation map (used as a target) was acquired from contours of breast and three OARs, left lung, right lung, and heart from RS reviewed by four radiation oncologists independently.To develop a Deep Learning-based auto-segmentation technique, a published 3D Convolutional Neural Network architecture (SCNAS-Net) optimized by Scalable Neural Architecture Search (SCNAS) was implemented. In the training stage, the model was trained to classify voxels of CT volume into one of four organs under 5-fold cross-validation (CV).To evaluate the segmentation performance of the trained SCNAS-Net, dice coefficients (DICE) between the outputs from the model and the targets were calculated during the test stage. In addition, we applied test time augmentation and deep ensemble to capture the data and model uncertainty respectively.

RESULTS

The trained SCNAS-Net showed superior segmentation performance for all organs. Average DICEs of five trained models from the 5-fold CV for the breast, left lung, right lung, and heart were 0.8370, 0.9801, 0.9749, and 0.9340, respectively. Although the segmentation task was much more difficult due to the various shape, volume, and location of the breast, the average DICE for the breast was significantly high. For the uncertainty quantification, the results mainly focused on the unseen or rare cases such as the presence of the heart contour. These results could improve the safety when applying our proposed method in the real clinic, by not only providing the auto-segmentation results, but also providing a mechanism to quantify risks.

CONCLUSION

The novel Deep Learning-based breast and OARs segmentation technique has been successfully developed and shown superior segmentation performance with uncertainty quantification.

CLINICAL RELEVANCE/APPLICATION

The proposed breast and OARs segmentation technique in CT can effectively reduce the time for the manual contouring of breast and OARs during radiation therapy planning.

SSRO04-04 Prediction of Pathological Complete Response after Neoadjuvant Chemoradiotherapy in Locally Advanced Rectal Cancer - T2-weighted Radiomics versus Diffusion-weighted Radiomics and Utility of Different Machine Learning Classifiers

Participants
Wenjing Peng, Beijing, China (*Presenter*) Nothing to Disclose
Hongmei Zhang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Lijuan Wan, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

pengwenching@163.com

PURPOSE

We develop and validate radiomics models based on T2-weighted imaging (T2WI) and diffusion-weighted imaging (DWI) for predicting pathologic complete response (pCR) after neoadjuvant chemoradiotherapy (nCRT)in patients with locally advanced rectal cancer (LARC) and attempt to determine the optimal machine learning method.

METHOD AND MATERIALS

A total of 170 patients were divided into a training set and a validating set in the ratio of 7:3, all of whom underwent MRI examinations before and after nCRT (pre- and post-nCRT). True response to nCRT was assessed by total mesorectal excision (TME). Radiomics features were extracted from pre- and post-nCRT T2WI and DWI. Radiomics models were developed with principle component analysis (PCA) for dimension reduction, ANOVA for feature selection and three kinds of classifiers of support vector machine (SVM), linear discriminate analysis (LDA) and random forest (RF) for the final classification. The performance was assessed via area under the receiver-operating characteristic curve (AUC), accuracy, sensitivity, specificity, positive predictive value and negative predictive value.

RESULTS

Twenty-seven of 170 patients (16%) achieved pCR. A full set of 1409 radiomics features was achieved each modality per scan. Radiomics model based on post-nCRT DWI got higher AUC compared with the other three sequences of pre-nCRT T2WI, post-nCRT T2WI and pre-nCRT DWI (AUC, 0.904 versus 0.677, 0.651, 0.599, P=0.023, 0.004, 0.012 on RF; 0.866 versus 0.581, 0.587, 0.657, P=0.068, 0.002, 0.056 on SVM; 0.858 versus 0.581, 0.587, 0.590, P=0.078, 0.001, 0.044 on LDA) in the validating cohort. RF afforded higher AUCs than SVM and LDA in most sequences, though not statistically significant.

CONCLUSION

Radiomics features based on post-nCRT DWI show a good performance in predicting pCR after nCRT in LARC. RF is potentially optimal classifier in the current cohort.

CLINICAL RELEVANCE/APPLICATION

Use of DWI radiomics may improve the confidence of radiologists in selecting patients with pCR for watch-and-wait strategy in LARC after nCRT. The exploration to identify optimal classifier is a constructive attempt, which may set a start for further research.

SSRO04-05 The Change in Radiomics for Predicting Pathological Complete Response After Neoadjuvant Chemoradiotherapy in Locally Advanced Rectal Cancer

Participants
Lijuan Wan, Beijing, China (*Presenter*) Nothing to Disclose
Hongmei Zhang, MD, Beijing, China (*Abstract Co-Author*) Nothing to Disclose
Wenjing Peng, Beijing, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

lijuanwan1993@163.com

PURPOSE

To evaluate the value of radiomic features (RFs) that were based on the change on MRI between before and after neoadjuvant chemoradiotherapy (nCRT) for predicting pathological complete response (pCR) in patients with locally advanced rectal cancer (LARC).

METHOD AND MATERIALS

A total of 172 patients with LARC were included in the retrospective study (training set=121; test set = 51). All patients were examined using MRI before and after nCRT. 1049 RFs were extracted from pre- and post-nCRT T2-weighted images, respectively. The absolute change in RF (△-RF) was calculated by subtracting RF of post-nCRT from that of pre-nCRT. The relative change in RF (△-RF%) was defined as the reduction rates from pre-nCRT to post-nCRT RF. Feature selection methods including LASSO were used to choose the key features for building the △-RF and △-RF% signature. Logistic regression was used to construct the radiomic signatures combined model. A clinical plus conventional radiological model and a combined model including clinical, conventional, and radiomic information were constructed. The diagnostic performance of different models was evaluated by receiver operator characteristic (ROC) curve analysis. Net reclassification index (NRI) was preformed to compare the predictive value of pCR between the clinical plus traditional radiological model and combined model.

RESULTS

In the △-RF and △-RF% signature, 7 RFs were retained, respectively. The △-RF and △-RF% signature, radiomic signature combined model, and clinical plus conventional radiological model yielded AUCs of 0.804-0.853 and 0.799-0.831 in training and test sets. The combined model achieved the highest AUC of 0.883 and 0.875 in training and test sets. Adding radiomics information to clinical plus conventional radiological model significantly improved the predictive value for pCR (training set: NRI=0.692, p<0.001; test set: NRI= 0.520, p=0.044).

CONCLUSION

Our study demonstrated that the change in RFs from per- and post-nCRT MRI can improve pCR prediction when integrated with clinical and conventional radiological features and thus were promising to assist in clinical decision making.

CLINICAL RELEVANCE/APPLICATION

Our study proved that the combined model including radiomics information outperformed the clinical plus conventional radiological model in predicting pCR. These findings could contribute to select patients for an organ-preserving strategy .

SSRO04-06 Application of Diffusion Kurtosis Imaging in Evaluating Treatment Response After Neoadjuvant Chemoradiotherapy in Rectal Cancer

Participants
Ziqiang Wen, Guangzhou, China (*Presenter*) Nothing to Disclose
Yiyan Liu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yan Chen, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Yuru Ma, MD,MD, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Xinyue Yang, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose
Shen Ping Yu, Guangzhou, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

medwzq@163.com

PURPOSE

To explore the feasibility and value of diffusion kurtosis imaging (DKI) in assessing treatment response quantitatively of neoadjuvant chemoradiotherapy (NCRT) for patients with rectal cancer.

METHOD AND MATERIALS

A total of 78 patients with rectal cancer received NCRT were enrolled in this study. All the patients underwent conventional diffusion-weighted imaging (b = 0, 1000mm/s2) and DKI (b = 0, 200, 600, 1000, 1500, 2000mm/s2) on MRI scanner before (pre-X) and after (post-X) NCRT. Apparent diffusion coefficient (ADC), mean kurtosis (MK) and mean diffusivity (MD) were manually measured by two radiologists independently. Based on the pathological tumor regression grade (pTRG) scores, all patients were divided into good responder group (pTRG1-2) and poor responder group (pTRG3-5). Student t test and Mann-Whitney U test were used for statistical analysis. Receiver operating characteristic curves (ROC) analysis were performed and the area under ROC curve (AUC) values were used for assessing diagnostic value.

RESULTS

For the measurements before NCRT, the difference between parameters of good responder group and poor responder group was not statistically significant. After NCRT, post-MK in good responder group was significantly lower than that of poor responder group (0.768 vs. 0.865, $P < 0.001$), while both post-ADC and post-MD were significantly higher in good responder group than that of poor responder group ($1.005\times10\text{-}3mm2/s$ vs. $0.935\times10\text{-}3mm2/s$, $P = 0.012$ and $1.951\times10\text{-}3mm2/s$ vs.$1.693\times10\text{-}3mm2/s$, $P < 0.001$). In discrimination of treatment response, post-MD derived from DKI model had a relatively high AUC (0.746), with a sensitivity of 74.19% and a specificity of 74.47%.

CONCLUSION

Post-ADC, post-MD and post-MK are able to discriminate good responders and poor responders. Post-MD derived from DKI model shows highest diagnostic performance in treatment response assessing.

CLINICAL RELEVANCE/APPLICATION

DKI model can distinguish good responder from poor responder for rectal cancer after NCRT and is recommended in the quantitative evaluation for treatment response.

SSVI05

Vascular/Interventional (Interventional Oncology: Liver Cancer)

Thursday, Dec. 3 2:00PM - 3:00PM Room: Channel 5

HP ED LM PR SQ

AMA PRA Category 1 Credit ™: .50

Sub-Events

SSVI05-01 A Study on the Effect of Inhibiting Tumor Angiogenesis After Embolization in the Treatment of Liver Cancer with Apatinib Loaded p(N-isopropyl-acrylamide-co-butyl methylacrylate) Temperature-sensitive Nanogel

Participants
Chen Zhou, Wuhan, China (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

zhouchenjr@126.com

PURPOSE

To investigate the underlying mechanism and therapeutic potential of combining transcatheter arterial embolization (TAE) with Apatinib loaded p(N-isopropyl-acrylamide-co-butyl methyl acrylate) temperature-sensitive (PIB) nanogel on suppressing rabbit VX2 liver tumor growth.

METHOD AND MATERIALS

65 VX2 tumor-burdened rabbits were randomly divided into five groups and treated transarterially with Apatinib-loaded PIB (Group PA) 0.4 ml (n=13); PIB alone (Group P) 0.4ml (n=13); iodized oil alone (Group I) 0.4ml (n=13); Apatinib solution (Group A) 0.4ml (n=13); saline (Group NS) 0.4 ml (n=13), respectively. The dose of Apatinib was 2 mg/kg. Tumor harvest, sectioning and Immuno-histochemistry, and the tumor growth rates and survival time of each group were measured. Blood samples and liver tissue were collected for pharmacokinetic analysis.

RESULTS

The tumor growth rate of Group PA was considerably lower than the other four groups (P=0.000<0.01), and the survival time was significantly prolonged (P=0.000<0.01). The result of immunohistochemistry showed that CD31 staining of Group PA was significantly lower than that of the other four groups (P=0.000<0.01). Apatinib concentration in blood falls below 10ng/ml in 10 minutes after TAE and drops below 1ng/ml after 8h. The drug was released continuously in the liver for 36 days, with the highest concentration at the tumor junction (P=0.045<0.05).

CONCLUSION

Apatinib is targeted to liver cancer tissues through PIB, achieves a slow and sustained release of the drug in the tumor, and considerably reduced the systemic drug concentration. Further experiments showed a significant prolonging survival time and inhibitory effect for tumor growth.

CLINICAL RELEVANCE/APPLICATION

This study is expected to provide new targets and therapeutic strategies for interventional treatment of HCC, and this way has a good application prospect.

SSVI05-02 Integration of 3D Quantitative Tumor Burden Analysis into the Barcelona Clinic Liver Cancer Staging System: Updated Treatment Approach to Hepatocellular Carcinoma

Participants
Tabea Borde, New Haven, CT (*Presenter*) Nothing to Disclose
Nariman Nezami, MD, Atlanta, GA (*Abstract Co-Author*) Nothing to Disclose
Fabian M. Laage Gaupp, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Lynn J. Savic, MD, Berlin, Germany (*Abstract Co-Author*) Nothing to Disclose
Tamar Taddei, MD, New Haven, CT (*Abstract Co-Author*) Nothing to Disclose
Rafael Duran, MD, Lausanne, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Christos S. Georgiades, MD, PhD, Baltimore, MD (*Abstract Co-Author*) Consultant, Boston Scientific Corporation
Kelvin K. Hong, MD, Baltimore, MD (*Abstract Co-Author*) Scientific Advisory Board, Boston Scientific CorporationScientific Advisory Board, BTG International LtdResearch support, BTG International Ltd
Julius Chapiro, MD, New Haven, CT (*Abstract Co-Author*) Research Grant, Guerbet SAConsultant, Guerbet SAResearch Grant, Koninklijke Philips NVConsultant, Koninklijke Philips NVResearch Grant, Boston Scientific Corporation

PURPOSE

To evaluate the use of enhancing tumor volume (ETV) and burden (ETB) as new criteria within the Barcelona Clinic Liver Cancer (BCLC) staging system for improved allocation of transarterial chemoembolization (TACE) for patients with intermediate and advanced stage hepatocellular carcinoma (HCC).

METHOD AND MATERIALS

This was a retrospective, HIPAA-compliant and institutional review board-approved analysis which included a total of 646 patients with HCC who underwent either conventional TACE or TACE with drug-eluting beads between 2000 and 2015 with follow-up for at least 36 months. A quantitative 3D-analysis was performed on baseline contrast-enhanced MRI to determine thresholds of ETV and ETB (ratio between ETV and liver volume). Accordingly, BCLC stage B and C patients were separately stratified by high and low tumor burden and re-assigned to new independent BCLC 'Bn' or 'Cn' cohorts by stepwise verification of median overall survival (MOS) and validation using Kaplan-Meier plots and log-rank test. Uni-and multivariate Cox regression analyses were used to identify covariates with a significant association with MOS.

RESULTS

ETV (HR 2.5 [CI 95% 2.0-3.0], p<0.001) and ETB (HR 2.1 [CI 95% 1.5-2.9], p<0.001) were identified as the strongest predictors of MOS. MOS of the patient cohort was 11 months. The ETV threshold was determined to be 65 cm3, the ETB cut-off was 4%. After reassignment of 152 low tumor-burdened BCLC stage C patients (ETV < 65 cm3/ ETB < 4%) to BCLC Bn, MOS of newly assigned BCLC Bn patients rose from 24.2 to 25.1 months, validated by a significant separation of the Kaplan-Meier curves (p < 0.001). The 59 high tumor-burdened BCLC B patients (ETV >= 65 cm3/ ETB >= 4%) still showed a survival advantage of 21.1 months when treated with TACE and remained in BCLC class Bn.

CONCLUSION

ETV and ETB were strong predictors of survival. While BCLC B patients are likely suitable for TACE regardless of tumor burden, 3D quantitative imaging may help to refine selection of appropriate BCLC stage C patients to benefit from loco-regional therapy.

CLINICAL RELEVANCE/APPLICATION

BCLC stages B and C represent highly heterogenous patient populations, and further refinement is needed to significantly improve clinical outcomes and prolong patient survival.

SSVI05-03 Primary Tumor Location is a Prognostic Factor for Intrahepatic Progression-Free Survival in Patients with Colorectal Liver Metastases Undergoing Portal Vein Embolization as Preparation for Major Hepatic Surgery

Participants
Lea Hitpass, MD, Aachen, Germany (*Presenter*) Nothing to Disclose
Maximilian F. Schulze-Hagen, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Federico Pedersoli, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Iakovos Amygdalos, PhD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Daniel Heise, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Peter Isfort, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Ulf Neumann, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Christiane K. Kuhl, MD, Bonn, Germany (*Abstract Co-Author*) Nothing to Disclose
Philipp Bruners, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose
Markus Zimmermann, MD, Aachen, Germany (*Abstract Co-Author*) Nothing to Disclose

PURPOSE

To identify prognostic factors affecting intrahepatic progression-free survival (ihPFS) in patients with colorectal liver metastases (CRLM) undergoing portal vein embolization (PVE) and subsequent right hemihepatectomy.

METHOD AND MATERIALS

A total 60 patients (mean age:61.2±9.2 years) with CRLM who underwent PVE in preparation for right hemihepatectomy between June 2011 and December 2018 were included in this study. IhPFS after PVE was calculated using the Kaplan-Meier method. Univariable and multivariable Cox regression analyses were conducted to investigate the association between the following factors and ihPFS: Patient age, laterality of the colon cancer (right- vs. left-sided), time of occurrence of hepatic metastases (synchronous vs. metachronous), baseline number and size of hepatic metastases, presence or absence of metastases in the future liver remnant (FLR) before PVE, and history of neoadjuvant or adjuvant chemotherapy. Mean follow-up was 22.7 months.

RESULTS

After PVE,10/60 patients developed progressive disease and did not proceed to surgery. The remaining 50 patients underwent hepatectomy after PVE and of those, 28 (47%) developed intrahepatic metastatic recurrence. The median ihPFS among all 60 patients was 7.8 months (0.95 CI:5.3-10.3 months). Laterality of the primary colon cancer was the only statistically significant predictor of ihPFS after PVE (hazard ratio=2.293; 95%-CI: 1.171,4.494; p=0.016), with patients with right-sided colon cancer having significantly shorter median ihPFS than patients with left-sided cancer (5.7±1.4 months vs. 10.2±1.5 months;log rank test: p=0.013). All other factors, including pre-existing tumor in the FLR, or baseline hepatic tumor number and size, did not significantly impact ihPFS

CONCLUSION

In patients undergoing PVE to prepare extensive hepatectomy for CRCLM, laterality of the primary colon cancer - as a surrogate marker for colon cancer biology - was the most important driver of intrahepatic progression-free survival. Other factors, in particular also the presence or absence of additional metastases in the FLR, were not associated with intrahepatic progression-free survival.

CLINICAL RELEVANCE/APPLICATION

Presence of metastases in the FLR should does not influence ihPFS in patients undergoing PVE in preparation of (extended) hepatectomy

SSVI05-04 Conventional Transarterial Chemoembolization (cTACE) in Malignant Hepatic Tumors: First Generation versus Second Generation of Robotic Angiograhy System for Real-Time Image Guidance Regarding Radiation Dose and Image Quality

Participants

Thomas J. Vogl, MD, PhD, Frankfurt , Germany (*Presenter*) Nothing to Disclose
Leona Alizadeh, Frankfurt, Germany (*Abstract Co-Author*) Nothing to Disclose
Nour-Eldin A. Nour-Eldin, MD,PhD, Frankfurt am Main, Germany (*Abstract Co-Author*) Nothing to Disclose
Nagy N. Naguib, MD, MSc, Frankurt, Germany (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

T.Vogl@em.uni-frankfurt.de

PURPOSE

To compare two advanced robotic angiography systems regarding radiation dose and image quality (IQ) during conventional transarterial chemoembolization (cTACE) of malignant hepatic tumors.

METHOD AND MATERIALS

One-hundred-and-six patients (57 women; 49 men; mean: 60 years; range: 50-70 years) who had undergone cTACE using two generations of robotic angiography platforms for real-time imaging guidance were divided into two groups: group 1 (first generation) vs. group 2 (second generation). Fluoroscopy-related dose and dose for digital subtraction angiography (DSA) were compared between first and second generation angiography equipment. Radiation dose was measured using an ionization chamber. IQ was assessed by three radiologists using 5-point Likert scales focusing on clinically relevant criteria. Two-sample t-test, Chi2-test and Kolmogorov Smirnov test were used for statistical analysis, and intraclass correlation coeffficient (ICC) was used for evaluating IQ

RESULTS

Does area product for fluoroscopy was significantly lower in group 2 (1.4±1.1 Gy.cm2) vs. group 1 (2.8±3.4 Gy.cm2; p=0.001). For DSA dose area product was significantly lower (p=0.003) in group 2 (2.2±1.2 Gy.cm2) vs. group 1 (4.7±2.3 Gy.cm2). Scores for DSA IQ indicated signficant improvements for group 2 by 30% vs. group 1 (p=0.004). Regarding fluoroscopy scores for IQ were 76% higher in group 2 compared to group 1 (p=0.001).

CONCLUSION

The most current generation robotic angiography equipment allows signficant dose reductions while significantly improving image qualilty in fluoroscopy and DSA image guidance during cTACe treatment of malignant hepatic tumors.

CLINICAL RELEVANCE/APPLICATION

Second generation robotic angiography technology allows cTACE of the liver at more than 50% lower radiation dose levels with better image quality vs. the first generation system.

SSVI05-05 Development of Interventional Real-Time Optical Imaging-Guided Complete Tumor Ablation Technique

Awards
Trainee Research Prize - Fellow

Participants
Xuefeng Kan, MD,PhD, Seattle, WA (*Presenter*) Nothing to Disclose
Guanhui Zhou, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Feng Zhang, MD, Seattle, WA (*Abstract Co-Author*) Nothing to Disclose
Chuansheng Zheng, Wuhan, China (*Abstract Co-Author*) Nothing to Disclose
Xiaoming Yang, MD, PhD, Mercer Island, WA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

xmyang@uw.edu

PURPOSE

To develop an indocyanine green (ICG)-enhanced interventional optical imaging (OI) for intraoperatively detecting residuals of ablated tumors.

METHOD AND MATERIALS

This study included three portions: (1) optimizing protocol for ICG-enhanced OI via serial in-vitro experiments; (2) building the interventional OI system; and (3) validating its technical feasibility via serial in-vivo experiments. For optimizing ICG protocol, 1×104 VX2 tumor cells were labeled with various ICG concentrations (0 to 125 μg/mL) and different incubation times (0 min to 48 h). ICG-VX2 cells were treated by an ablation heat at 80?. Fluorescence signal intensities (SI) of different cell groups were measured by optical/x-ray imaging and cell viability evaluated by MTS assay. For in-vivo validation, we built the interventional optical imaging system with a micro-OI needle. Then, rabbit models with hepatic VX2 tumors were randomly divided into two groups: (1) incomplete radiofrequency ablation (RFA) at 80? by partially opening the RFA electrode; and (2) complete RFA at 80? by fully opening the electrode. Pre- and post-RFA, the micro-OI needle was positioned to image liver parenchyma and tumor periphery, followed by measuring signal-to-background ratio (SBR) at six points for statistical analysis, which was correlated to final pathology confirmation.

RESULTS

Of in-vitro experiments, the optimal concentration and time-window for ICG-enhanced OI were 100 μg/mL at 24 hours. ICG SI of dead cells was significantly lower than untreated living cells (63.7±5.7 au vs. 189.3±7.6 au, $p<0.001$). Of in-vivo experiments, ICG-enhanced OI shows that SBR of residual tumor with incomplete RFA was significantly higher than ablated tumor (2.30 ± 0.08 vs. 0.58 ± 0.05, $p<0.001$), while SBR of tumors with completed RFA significantly decreased compared to pre-ablation tumors (0.59 ± 0.03 vs. 2.29 ± 0.04, $p<0.001$). These SBR changes were well correlated with 'standard' ex-vivo optical imaging and confirmed by pathology (Figure).

CONCLUSION

We are developing a new interventional oncologic technique for intraoperative real-time guidance, to ensure the complete tumor

removal during an interventional ablation session.

CLINICAL RELEVANCE/APPLICATION

This new technique may open new avenues for intraoperative optical imaging guidance, to ensure the complete tumor removal during an interventional ablation session.

SSVI05-06 Stereotactic Microwave Ablation (SMWA) of Malignant Liver Lesions Using MRI/ CT Fusion for Targeting of "Invisible" Lesions

Participants
Martin H. Maurer, MD, Bern, Switzerland (*Presenter*) Nothing to Disclose
Nando Mertineit, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Corina Kim-Fuchs, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose
Johannes T. Heverhagen, MD, PhD, Bern, Switzerland (*Abstract Co-Author*) Research Grant, Bracco GroupResearch Grant, Guerbet SAResearch Grant, Siemens AGResearch Grant, Bayer AG
Anja Lachenmayer, Bern, Switzerland (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

martin.maurer@insel.ch

PURPOSE

In thermal ablation for treating primary or metastatic liver neoplasms, advanced stereotactic navigation technology not only improves precise tumor targeting and antenna guidance but also allows approaching lesions that are not detectable on computed tomography (CT) planning scans by fusion with a prior magnetic resonance imaging (MRI). The purpose of our study was to assess the technical feasibility of MRI/CT fusion for lesions invisible on CT planning scans and its outcome in patients treated with stereotactic microwave ablation (SMWA).

METHOD AND MATERIALS

Patients who underwent SMWA between January 2015 and December 2018 were retrospectively analyzed. All liver lesions for which MRI/CT fusion was performed due to invisibility on pre-interventional CT planning scans were included and reassessed. The endpoint was successful ablation of the lesion at first follow-up imaging.

RESULTS

During the study period, 236 patients underwent 312 SMWAs with ablation of 496 lesions. Twenty-four lesions in 15 patients (mean age: 62 years; range, 43 - 80 years) were included. Following MRI/CT image fusion, all 24 lesions were sufficiently visible to perform SMWA. The first follow-up imaging showed complete ablation of 22 lesions. Two initially incompletely ablated lesions were hepatocellular carcinomas, and were successfully re-ablated afterwards.

CONCLUSION

SMWA with MRI/CT image fusion is an efficient and safe treatment option for patients with liver lesions not detectable on contrast-enhanced CT planning scans.

CLINICAL RELEVANCE/APPLICATION

Using MRI/CT image fusion may allow more patients with malignant liver lesions to benefit from locally ablative therapies even if their lesions are not visible on CT planning examinations.

RSNA 2020
HUMAN INSIGHT/VISIONARY MEDICINE
106th Scientific Assembly and Annual Meeting
November 29 to December 5

SSVI06

Vascular/Interventional (Interventional Oncology)

Saturday, Dec. 5 3:30PM - 4:30PM Room: Channel 4

CT GI GU SQ IR

AMA PRA Category 1 Credit ™: .50

FDA Discussions may include off-label uses.

Sub-Events

SSVI06-01 Magnetic Resonance Navigation System for Supra-Selective Embolization of the Liver: In Vivo Demonstration

Participants
Cyril Tous, PhD, Montreal, QC (*Presenter*) Support, Siemens AG
Ning Li, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Simon Lessard, PhD, Montreal, QC (*Abstract Co-Author*) Nothing to Disclose
Urs O. Hafeli, PhD, Vancouver, BC (*Abstract Co-Author*) Nothing to Disclose
Samuel Kadoury, PhD, Montreal, QC (*Abstract Co-Author*) Research grants from Elekta Ltd
An Tang, MD, Montreal, QC (*Abstract Co-Author*) Research Consultant, Imagia Cybernetics IncSpeaker, Siemens AGSpeaker, Eli Lilly and Company
Sylvain Martel, Montreal, ON (*Abstract Co-Author*) Nothing to Disclose
Gilles P. Soulez, MD, Outremont, QC (*Abstract Co-Author*) Speaker, Bracco Group Speaker, Siemens AG Research Grant, Siemens AG Research Grant, Bracco Group Research Grant, Cook Group Incorporated Research Grant, Object Research Systems Inc

For information about this presentation, contact:

gilles.soulez.chum@ssss.gouv.qc.ca

PURPOSE

Perform segmental liver embolization with magnetic resonance navigation (MRN) of magnetic drug eluting beads (MDEB).

METHOD AND MATERIALS

MRN was tested in 3 pigs. An injector delivered 220µm MDEB aggregates through a catheter balloon positioned in the proper hepatic artery. The magnetic force from the MRI gradient and the gravitational forces were used in combination to steer aggregates to the segmental artery feeding the tumor. Beforehand, a segmentation of the arterial tree from DSA/CTA data was performed to determine the optimal animal position to optimize gravitational force and plan the timing and orientation of steering gradients. The segmentation was co-registered with MR-angiography. The aggregate was tracked with a True-FISP before the MRN steering sequence, and its location after embolization was determined with T1 VIBE. The flow was controlled by partial inflation of the balloon catheter and measured using 2D cine-phase sequence. Finally, we simulated in 19 patients with a total of 32 nodules of hepatocellular carcinoma (HCC) the optimal patient's position for MRN.

RESULTS

After MRN in the pigs, 82% of the aggregates reached the targeted left medial lobe (Fig 1-1). Without MRN, 95% of the aggregates were heading into the right lobe (Fig 1-2). We could localize MDEB aggregate in the target segmental artery and release of MDEB in the target segment after removing the pig from the B0 field (Fig 1-5). The controlled flow dropped the velocity from 35 cm/s to 15 cm/s at systole and from 10 cm/s to 5 cm/s at diastole. Partial inflation of the balloon created a slow pulsatile flow propelling aggregates while minimizing friction force. In humans, the simulation showed that 100% of nodules could be reached within 2 bifurcations for the left lobes (14HCC), and 3 bifurcations for the right lobe (18HCC). Only 2 nodules out of the 32 (6.2%) would have been rejected for MRN.

CONCLUSION

We obtained a level of selectivity close to a super selective catheterization and superior to a lobar injection using MRN of MDEB. This concept could be apply to perform serial segmental embolization using an implantable arterial port

CLINICAL RELEVANCE/APPLICATION

Segmental liver embolization with MRN tracks MDEB from delivery to target, minimizing tissues at risk. It could eliminate the need for repeated invasive catheterization procedures and provide ability to treat diseases in the advanced-stage by combining it with intra-arterial chemotherapy.

SSVI06-02 Percutaneous Lymphatic Intervention for the Treatment of Postoperative Lymphatic Ascites Related to Pelvic Surgery: Analysis of Factors Affecting Outcome

Participants
Kyung-Min Lee, Gyeonggi-do, Korea, Republic Of (*Presenter*) Nothing to Disclose
Jinoo Kim, Suwon, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

dlrudals2332@gmail.com

PURPOSE

To assess the outcome of lymphangiography and lymphatic embolization for the treatment of postoperative lymphatic ascites occurring after pelvic surgery and to assess factors related to outcome.

METHOD AND MATERIALS

Total 72 patients (100 cases) who had undergone percutaneous lymphatic intervention between May 2015 - January 2019 for the treatment of postoperative lymphatic ascites were included (daily discharge of >500 mL). Patient demographics, extent of lymph node dissection, volume of daily discharge via surgical drains, amount of drainage at the time of drain removal and complications were retrospectively reviewed. Time interval between lymphatic intervention and drain removal were reviewed. On the lymphangiography and CT images, findings of inguinal intranodal lymphangiography and embolization techniques, and delayed complications were reviewed. Failure to remove drains due to refractory discharge or development of recurrent ascites or symptomatic lymphocele after drain removal were considered treatment failure. Logistic regression analysis was performed to identify factors related to outcome of lymphatic intervention.

RESULTS

Lymph node dissections performed during gynecologic (n=6), urologic (n=3), and rectal surgery (n=1) accounted for postoperative ascites (most commonly dissected nodal stations are both pelvic & para-aortic levels, n=66). The mean amount of discharge was 1313 mL/day (chylous in 6 patients and non-chylous in the remainder). Lymphangiography was successfully performed in 72 patient. Additional embolization was performed in 24 patients. Drains were eventually removed in 70 patients (97.2%) after a mean number of 1.36 sessions during a mean period of 13.8 days. For those in whom the drains were removed, high-output leak was successfully mitigated to low output leak of < 300 mL/day (n=70). Treatment failure was observed in 12 patients (16.7%) who developed recurrent ascites or symptomatic lymphoceles after drain removal. Chylous ascites and discharge > 300 mL/day were associated with higher re-intervention rate. Larger amount of preprocedural discharge was associated with higher likelihood of drain removal > 2 weeks. Transient lymphedema (n=3) was the only complication.

CONCLUSION

Lymphatic intervention is effective for converting high-output leaks to low-output leaks after pelvic surgery and is associated with high rate of drain removal. High-output discharge and chylous nature of discharge is associated with higher likelihood of re-intervention.

CLINICAL RELEVANCE/APPLICATION

Lymphatic intervention is effective for reducing inpatient days of postoperative lymphatic ascites patients.

SSVI06-03 Radiofrequency Ablation in Combination with an mTOR Inhibitor Restrains Pancreatic Cancer Growth Induced by Intrinsic HSP70

Participants
Shanshan Gao, Shanghai, China (*Presenter*) Nothing to Disclose
Ning Pu, PhD,MD, Shangahi, China (*Abstract Co-Author*) Nothing to Disclose
Hanlin Yin, PhD,MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Guofeng Zhou, PhD,MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Wenhui Lou, PhD,MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Lingxiao Liu, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose
Jun Yu, MD, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Xiaolin Wang, MD, Shanghai, China (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

17111320002@fudan.edu.cn

PURPOSE

To reveal the impacts on immune patterns in pancreatic cancer microenvironment, and biological behaviors of residual cancer cells post radiofrequency ablation (RFA) treatment, and then modify the current regimen to improve its therapeutic effect.

METHOD AND MATERIALS

RFA treatment was administered to preclinical murine cancer models that followed up with magnetic resonance imaging (MRI) scanning. Immune cell subtypes and related cytokines were quantified in tumor tissues, peripheral blood and spleens to uncover the immune pattern changes post RFA treatment. Then, high-throughput proteome analysis was performed after in-vitro simulation to identify differential proteins associated with RFA, whose mechanism was further validated in vitro and in vivo experiments. Finally, a combined therapy was applied in preclinical murine cancer models to observe its therapeutic effect.

RESULTS

In the preclinical murine models with RFA treatment, no significant therapeutic benefit was observed from RFA treatment. However, through analysis of the immune patterns, the proportion of tumor-infiltrating CD8+ T cells was significantly increased, while that of regulatory T cells (Tregs) was decreased post RFA treatment, which indicated as a beneficial anti-tumor environment. Concomitantly, the secretion of INF-γ was enhanced, while the TGF-ß level was declined instead after RFA treatment. Surprisingly, Ki-67 activity was apparently enhanced in residual cancer cells. To find out the reason, high-throughput mass spectrum was applied and identified the top differential protein, heat shock protein 70 (HSP70). HSP70 expression in residual cancer cells was significantly increased post RFA treatment, which promoted the pancreatic cancer growth. Mechanistically, elevated HSP70 promoted proliferation via enhancing phosphorylation of AKT and then activating mTOR signaling whose down streams p70S6k and 4EBP1 were significantly phosphorylated. Finally, RFA treatment combined with an mTOR inhibitor exerted a synergetic repressive effect on tumor growth in preclinical murine cancer models.

CONCLUSION

RFA treatment in combination with mTOR signaling blockade can not only promote antitumor immune response but also restrain residual cancer cell proliferation resulting from HSP70 induced AKT-mTOR signaling activation.

CLINICAL RELEVANCE/APPLICATION

RFA treatment in combination with mTOR inhibitor may be a promising and effective strategy for LAPC patients.

SSVI06-04 Computed Tomography-guided Percutaneous Microwave Ablation for T1a and T1b Renal Cell Carcinoma: A Single Institution Series

Participants
Evgenia Efthymiou, MBBS, Athens, Greece (*Presenter*) Nothing to Disclose
Ornella Moschovaki Zeiger, MD, Athens, Greece (*Abstract Co-Author*) Nothing to Disclose
Dimitrios Filippiadis, MD, PhD, Athens, Greece (*Abstract Co-Author*) Nothing to Disclose
Stavros Spiliopoulos, MD, PhD, Athens, Greece (*Abstract Co-Author*) Nothing to Disclose
Konstantinos N. Palialexis, MD, Agia Paraskeui, Greece (*Abstract Co-Author*) Nothing to Disclose
Alexios Kelekis, MD, PhD, Athens, Greece (*Abstract Co-Author*) Medical Advisory Board, BTG International Ltd; Medical Advisory Board, Merit Medical Systems, Inc ; Research Grant, Shenzhen Mindray Bio-Medical Electronics Co, Ltd
Nikolaos L. Kelekis, MD, Athens, Greece (*Abstract Co-Author*) Spouse, Speaker, Actelion Ltd

For information about this presentation, contact:

efthymiouevgenia@gmail.com

PURPOSE

Percutaneous ablation is an established technique for the treatment of small localized renal tumors, especially in the elderly population and co-morbid patients. Although microwave ablation offers theoretical advantages over the other ablation techniques (radiofrequency, cryoablation), there is a lack in literature concerning the mid and long term results. The aim of our study was to assess the effectiveness, safety, mid and long term efficacy of microwave ablation in T1a and T1b renal tumors.

METHOD AND MATERIALS

Institutional databases retrospective research identified 58 patients who underwent computed tomography guided, percutaneous microwave ablation for localized, biopsy proven (T1N0M0) renal cancer. Mean patient age was 71.2 years. Tumor stage was T1a in 66.7% and T1b for 33.3 % of the cases. The mean maximum tumor size was 3.4 ± 1.1 cm (range 0.8 to 5.9 cm). Contrast-enhanced computed tomography or magnetic resonance imaging was used for post-ablation follow-up. Patient and tumor characteristics, microwave technique, complications and pattern of recurrence were evaluated.

RESULTS

A second ablation due to residual tumor was performed in 5/58 (8.5%) patients. The mean progression free survival time from last ablation was 85.3 months. The cumulative progression free rate for 1, 6, 12 and 36 months were 96%, 93%, 93% and 93% respectively. The mean survival time from the last ablation was 28 months (SD= 26) with median equal to 16 months. Metastasis occurred in 2 (3.45%) patients. Grade 1 complications (minor hematoma requiring nothing but observation) were recorded in 4 (6.8%) patients.

CONCLUSION

Percutaneous microwave ablation of Renal Cell Cancer is a safe and efficacious technique for the treatment of T1a and T1b renal tumors, with low tumor recurrence rates and satisfactory long term outcomes.

CLINICAL RELEVANCE/APPLICATION

Percutaneous MWA ablation seems to be an attractive alternative to radiofrequency and cryoablation for T1 renal tumors.

SSVI06-05 Yttrium-90 Radioembolization as a Possible New Treatment for Brain Cancer: Results at Two Years for Proof of Concept and Safety Analysis in a Canine Model

Awards
Trainee Research Prize - Medical Student

Participants
Sasicha Manupipatpong, BS, Baltimore, MD (*Presenter*) Nothing to Disclose
Alexander S. Pasciak, MD, Houston, TX (*Abstract Co-Author*) Research Grant, BTG International Ltd
Ferdinand K. Hui, MD, Baltimore, MD (*Abstract Co-Author*) Speakers Bureau, Terumo Corporation; Speakers Bureau, Penumbra, Inc; Stockholder, Blockade Medical, Inc
Rebecca Krimins, DVM,MS, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Larry Gainsburg, Baltimore, MD (*Abstract Co-Author*) Nothing to Disclose
Matthew R. Dreher, PhD, Rockville, MD (*Abstract Co-Author*) Director, Biocompatibles International plc
Dara L. Kraitchman, DVM, PhD, Baltimore, MD (*Abstract Co-Author*) Research Grant, Galil Medical Ltd
Clifford R. Weiss, MD, Baltimore, MD (*Abstract Co-Author*) Grant, Siemens AGGrant, Boston Scientific CorporationGrant, Medtronic plcConsultant, Medtronic plc

For information about this presentation, contact:

smanupi1@jhmi.edu

PURPOSE

To evaluate the safety and feasibility of Y-90 endovascular radiosurgery (ER) in the treatment of glioma in a canine model: an update on clinical outcomes to date since RSNA 2019.

METHOD AND MATERIALS

Three healthy research dogs (R1-3) and five client-owned dogs on anti-epileptics with spontaneous, intra-axial brain masses (P1-5) received unilateral Y-90 glass microsphere infusions in either the PCA (R1), MCA (R2), or ICA (R3, P1-5), followed by Y-90 PET/CT. R1-3 had neurological exams as clinically indicated, and a 4-week post-ER MRI. P1-4 had serial neurological exams, 1-, 3-, and 6-month MRIs, and were subsequently followed indefinitely by our study veterinarians for symptomatic management.

RESULTS

As of RSNA 2019, P1, P3, and P4 remained grossly asymptomatic (11-, 8-, and 6-months post-procedure), P2 had been euthanized per owner request at 5-months post-procedure, and P5 passed away 15 hours post-procedure.At 12-months post-procedure, P1 developed left thoracic limb proprioceptive delay in addition to her existing left rear limb proprioceptive delay as observed at her 6-month follow-up, though this did not suggest significant change in the known right cortical lesion. A 12-month MRI was performed, which showed no interval change of the right frontal lobe mass. P1 remains seizure-free at 13 months.P3 remained asymptomatic until 10 months post-procedure, when his seizures returned. As of 11-months post-procedure, an attempt to medically manage them with an increased antiepileptic dose is underway.At 6-months post-procedure, the volume of P4's mass began trending towards pre-treatment size and seizure activity returned. Seizure activity continues to worsen despite increased anti-epileptic medication at 9 months post-procedure.

CONCLUSION

Y-90 ER in the canine brain is technically feasible and caused no permanent neurologic deficits. Four of five patient dogs had favorable dosimetric, radiologic, and long-term clinical outcomes, with three dogs currently alive 7-12 months beyond the 63-day mean survival time associated with their original diagnosis and symptomatic treatment. Long-term outcomes, histopathology, and a larger sample size are needed to better understand brain Y-90 ER efficacy.

CLINICAL RELEVANCE/APPLICATION

Glioblastoma is the most common and aggressive type of brain tumor, with a median survival time of 15 months. Y-90 ER may provide increased treatment efficacy with decreased neurotoxicity.

SSVI06-06 Pre-Treatment Computed Tomography-Guided Fiducial Localization of Pulmonary Nodules: Feasibility, Safety and Recurrence-Free Survival

Participants
Nathan Elie Frenk, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Shaunagh McDermott, FFR(RCSI), Boston, MA (*Presenter*) Nothing to Disclose
Florian J. Fintelmann, MD, Boston, MA (*Abstract Co-Author*) Consultant, Jounce Therapeutics, Inc; Research support, BTG International Ltd
Melissa C. Price, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Harald Ott, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Ashok Muniappan, MD, Boston, MA (*Abstract Co-Author*) Nothing to Disclose
Jo-Anne O. Shepard, MD, Boston, MA (*Abstract Co-Author*) Editor with royalties, Reed Elsevier
Amita Sharma, MD,MBBS, Boston, MA (*Abstract Co-Author*) Nothing to Disclose

For information about this presentation, contact:

asharma2@mgh.harvard.edu

PURPOSE

Pre-treatment pulmonary nodule localization techniques can reduce conversion of minimally invasive surgical resection to open thoracotomy and can aid radiation planning. However, there are no outcomes reported after CT-guided fiducial localization. The purpose of this study is to assess the technical success rate of CT-guided fiducial localization of pulmonary nodules, surgical localization failure rate, and recurrence-free survival.

METHOD AND MATERIALS

A single-center, retrospective study was performed on consecutive CT-guided fiducial localization of lung nodules. Endpoints included technical success of fiducial placement, surgical localization failure rate, and 1-year and 2-year recurrence-free survival.

RESULTS

136 CT-guided fiducial localization procedures were performed on 128 patients (66% female; mean age, 64 years +/- 12) for 141 nodules (mean size, 11 mm +/- 5; mean distance to pleura, 10 mm +/- 8). The technical success rate was 98% (133/136). 134 nodules were resected during 126 operations performed 6 days +/- 16 after fiducial placement (range, 0-123). Surgical localization failure occurred in one case. Seventy-four of 133 resected nodules were invasive primary lung cancers, 16 were minimally invasive carcinoma, 7 were adenocarcinoma in-situ. Seventeen nodules were metastases, 1 was a carcinoid and 18 were benign. Among 46 patients who underwent a wedge resection of a primary lung cancer with at least 1 year of CT surveillance, and 34 patients with at least 2 years of CT surveillance, there was no evidence of local recurrence or intra- or extra-thoracic metastasis.

CONCLUSION

CT-guided fiducial localization of pulmonary nodules is safe, effective and results in a low surgical localization failure rate. One and two-year recurrence rate after wedge resection for lung cancer is low.

CLINICAL RELEVANCE/APPLICATION

Minimally invasive techniques for resection of small nodules has resulted in the need for image guided techniques to aid localization; CT-guided fiducial localization is a safe and reliable method

VSPD11

Pediatric Neuroradiology

NR PD

AMA PRA Category 1 Credit ™: .75

Sub-Events

VSPD11-A Corpus Callosum Agenesis: Prenatal MRI and Postnatal Outcome

Participants
Daniela Prayer, MD, Vienna, Austria (*Presenter*) Nothing to Disclose

For information about this presentation, contact:

daniela.prayer@meduniwien.ac.at

LEARNING OBJECTIVES

1) participants will be able to distinguish isolated from non- isolated Corpus callosum agenesis on Fetal MRI. 2) Recognize morphological brain abnormalities associated with Corpus callosum agenesis detect fetal brain abnormailites that may have an impact on the clinical outcome of fetuses with c Corpus callosum agenesis.

ABSTRACT

Anomalies of the Corpus callosum may be associated with with favorable or unfavorable neuropsychological outcome. An important role for fetal MRI has become to predict the prognosis in these cases as accurate as possible. There, the most important information is to decide whether the complete or partial agenesis of the Corpus callosum is combined with other brain anomalies, such as, for instance, disorders of cortical development or pontocerebellar malformations. Patterns that are possibly based on a chromosomal defect may be recognozed. In addition, even in isolated Callosal agenesis morphological landmarks have been defined that may indiate a more or less favorable prognosis in a respective case. This was done by a correlation of these landmarks with postnatal neuropsychological tests. Thus MRI has become an important prenatal imaging tool, improving the management of pregnancies complicated by fetal brain malformations.

VSPD11-B Imaging of Posterior Fossa Anomalies

Participants
Jason N. Wright, MD, Seattle, WA (*Presenter*) Nothing to Disclose