Genitourinary Radiology
Participants
Julian Ramirez Arango, MD, Mexico City, Mexico (Presenter) Nothing to Disclose
Mary C. Herrera-Zarza, MD, Mexico City, Mexico (Abstract Co-Author) Nothing to Disclose
Luis A. Ruiz Elizondo, MD, Mexico City, Mexico (Abstract Co-Author) Nothing to Disclose
Alin Marissa Becerril Ayala, MD, Mexico City, Mexico (Abstract Co-Author) Nothing to Disclose
Jose L. Criales, MD, Mexico City, Mexico (Abstract Co-Author) Nothing to Disclose
Kenji Kimura, MD, Mexico City, Mexico (Abstract Co-Author) Nothing to Disclose
Accurate Diagnosis of Lipid Rich and Lipid Poor Angiomyolipomas

Participants
Philip K. Taylor, DO, Tucson, AZ (Presenter) Nothing to Disclose
Bobby T. Kalb, MD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose
Hina Anif, Vancouver, BC (Abstract Co-Author) Nothing to Disclose
Ferenc Czeeyda-Pommersheim, MD, Pittsburgh, PA (Abstract Co-Author) Nothing to Disclose
Iva Petkovska, MD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose
Diego R. Martin, MD, PhD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose
James R. Costello, MD, PhD, Tucson, AZ (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Angiomyolipomas (AMLs) are renal masses composed of fat, vascular stroma, and smooth muscle tissue. When AMLs contain a significant fat content, imaging diagnosis is well documented with distinct imaging features. Diagnosis becomes challenging when AMLs present with a small percentage of fat content. Given the difficulty in distinguishing lipid poor AMLs from such malignant masses as renal cell carcinoma, this diagnostic dilemma assumes even greater clinical importance. MRI provides a non-invasive means to distinguish between a lipid poor AML and a malignant renal mass. An accurate diagnosis of an AML can potentially spare a patient such invasive procedures as a nephrectomy or ablation with profound impact on overall patient morbidity and clinical outcome.

TABLE OF CONTENTS/OUTLINE
- Detail imaging features of lipid rich AMLs using ultrasound and CT.
- Discuss advanced MRI techniques including non-contrast, dynamic contrast enhanced and functional imaging.
- Highlight the imaging features of AMLs using advanced MRI techniques. Within the discussion, fat saturation techniques will be described and differentiated from echo phase imaging.
- Illustrate the diagnosis of a lipid poor angiomyolipoma using MRI techniques. Emphasize the features that distinguish a lipid poor AML from a malignant mass such as a clear cell renal cell carcinoma.
- Summary
Update On Multiparametric Prostate MRI Utilizing PI-RADS Version 2: How To Do It Like The Pros

All Day Room: GU/UR Community, Learning Center

Participants
Michael Nguyentat, BA, Orange, CA (Presenter) Nothing to Disclose
Alexander Ushinsky, MD, Orange, CA (Abstract Co-Author) Nothing to Disclose
Shane Knipping, Long Beach, CA (Abstract Co-Author) Nothing to Disclose
Alessandra Miranda-Aguirre, MD, Orange, CA (Abstract Co-Author) Nothing to Disclose
Fergus V. Coakley, MD, Portland, OR (Abstract Co-Author) Nothing to Disclose
Christopher S. Green, MD, MBA, Corona, CA (Abstract Co-Author) Nothing to Disclose
Sara Fardin, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Chandana G. Lall, MD, Orange, CA (Abstract Co-Author) Nothing to Disclose
Roozbeh Houshyar, MD, Sturbridge, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Review of prostate Multiparametric Prostate MRI (mpMRI) protocols per recommendations from Reporting and Data System Version 2 (PI-RADSv2) with an emphasis on 3T imaging without use of endorectal coil
2. Short review of normal prostate anatomy
3. Review of the PI-RADSv2 scoring system, with emphasis on the difference between transitional and peripheral zone lesions.
4. Review of sample cases with pathologic correlation to reinforce the principles of PI-RADSv2.

TABLE OF CONTENTS/OUTLINE
1. Technical requirements: what’s needed to perform mpMRI per PI-RADSv2
2. Advanced mpMRI imaging techniques: MR spectroscopy, dynamic contrast enhancement and use of endorectal coil
3. Sequences: standard mpMRI sequences as recommended by PI-RADSv2
4. Normal prostate anatomy and benign findings on MRI: benign prostate hyperplasia, hemorrhage, and prostatitis
5. Abnormal prostate findings: a review of PI-RADSv2 scoring
6. The next step with mpMRI: prostate cancer staging by imaging
7. Practice makes perfect: a review of sample cases with pathologic correlation

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Chandana G. Lall, MD - 2013 Honored Educator
Bilateral Testicular Masses: A Mixed Bag

All Day Room: GU/UR Community, Learning Center

Participants
Dominic L. Scola, MD, Troy, MI (Presenter) Nothing to Disclose
Naveen Selvam, BS, MD, royal oak, MI (Abstract Co-Author) Nothing to Disclose
Hanh V. Nghiem, MD, Royal Oak, MI (Abstract Co-Author) Nothing to Disclose
Syed Zafar H. Jafri, MD, Royal Oak, MI (Abstract Co-Author) Nothing to Disclose
Mutual B. Amin, MD, Royal Oak, MI (Abstract Co-Author) Nothing to Disclose
Sheila Sheth, MD, Cockeysville, MD (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Understand the wide differential of etiologies with bilateral testicular masses. Provide a comprehensive list for reference. Discuss certain imaging and clinical factors used to differentiate. Review neoplastic (benign vs malignant) and non-neoplastic (infectious vs inflammatory vs developmental)

TABLE OF CONTENTS/OUTLINE
Bilateral Testicular Masses: A Mixed Bag
- Introduction
  - Bilateral testicular masses a diagnostic dilemma
- Materials and Methods
  - No known comprehensive review of the various etiologies of bilateral testicular masses (retrospective review and literature review).
  - Detailed Literature review (141 articles)
  - Universal Health Consortium (UHC)/Electronic medical record (EMR)/Tumor Bank (TB)
  - Separated by etiology, clinical factors, imaging appearance
- Results
  - 20 unique case reports
  - N=57 (UHC/EMR)
  - N=451 (TB), 11 bilateral
  - 8 neoplastic (1 metachronous)
  - 3 non-neoplastic (2 syndromic, 1 infectious)
- Discussion
  - Combine literature review and retrospective review
  - Comprehensive list of etiologies
  - Mimics
- Conclusion
  - Helpful imaging characteristics
  - Histologic dependence
  - Importance of knowledge of wide differential
Imaging Features and Complications of Female Urethral Diverticulum, What the Urologist Needs to Know

All Day Room: GU/UR Community, Learning Center

Participants
Philip C. Louden, MD, Charlottesville, VA (Presenter) Nothing to Disclose
Afshan Orman, MD, Charlottesville, VA (Abstract Co-Author) Nothing to Disclose
Arun Krishnaraj, MD, MPH, Charlottesville, VA (Abstract Co-Author) Nothing to Disclose
Stephen H. Culp, MD, Charlottesville, VA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
After reviewing this exhibit the learner will be able to:
1. Describe the imaging features of urethral diverticula across multiple modalities
2. Recognize imaging findings which indicate complications of urethral diverticula
3. Identify and highlight findings that are important to communicate to urologists
4. Discuss the management of urethral diverticula

TABLE OF CONTENTS/OUTLINE

Outline
1. Brief overview of the clinical presentation of urethral diverticula
2. Multimodality imaging illustrations of urethral diverticula
3. Imaging examples of complications of urethral diverticula
   a. Stones
   b. Infection
   c. Malignancy
4. Management of urethral diverticula
   a. The Urologist’s perspective

Conclusions
Urethral diverticula classically present with symptoms of dysuria, dribbling (post-void), and dyspareunia. Complications of urethral diverticula include stones, infection, and malignancy. Multiple imaging modalities allow for the confident diagnosis and evaluation of urethral diverticula. Communicating key imaging features to the Urologist is a critical part of effective management.
Top Ten Things Radiologists Need to Know about Renal Angiomyolipoma without Visible Fat (AML.wovf)

All Day Room: GU/UR Community, Learning Center

Participants
Nicola Schieda, MD, Ottawa, ON (Presenter) Nothing to Disclose
Robert Lim, MD, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Matthew D. McInnes, MD, FRCPC, Ottawa, ON (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
AML.wovf are the most commonly resected benign renal neoplasms. AML.wovf are small (<4cm) incidental lesions occurring mainly in females. AML.wovf can be associated with classic AML and may be sporadic or seen in Tuberous Sclerosis. AML.wovf are typically hyperattenuating at unenhanced CT. AML.wovf are homogeneous and do not calcify. AML.wovf are typically hyperenhancing on enhanced CT/MRI with washout kinetics. AML.wovf are characteristically hypointense on T2W-MRI with marked diffusion restriction. AML.wovf may demonstrate signal drop on opposed phase (OP) compared to in phase (IP) chemical shift MRI. AML.wovf do not demonstrate hemorrhage on T1W (including chemical shift) MRI. The use of a multi-variate approach to MR findings can diagnose AML.wovf with high degrees of accuracy.

TABLE OF CONTENTS/OUTLINE
1. Brief review of histopathology and demographics of AML.wovf.
2. Present CT findings of AML.wovf with review of literature.
3. Present MR findings of AML.wovf with review of literature.
4. Discuss diagnostic accuracy of CT and MRI for AML.wovf.
5. Review diagnostic accuracy of percutaneous biopsy in suspected AML.wovf.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Evan S. Siegelman, MD - 2013 Honored Educator
Penile Cancer: A Road Map for Initial Staging, Surgical Planning and Follow-up

All Day Room: GU/UR Community, Learning Center

Participants
Paulo H. De Castro, MD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Regis Otaviano Bezerra, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Claudio Bovolenta B. Murta, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Giuliano B. Guglielmetti, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
William Nahas, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Marcio Ricardo T. Garcia, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: - To review the role of MRI for initial staging; - To discuss the importance of lymph nodes assessment; - To describe the main techniques of lymphadenectomy; - To describe treatment response patterns after neoadjuvant chemotherapy; - To evaluate postoperative changes, complications and recurrence.

TABLE OF CONTENTS/OUTLINE
- Anatomy; - Review of imaging findings on conventional MRI; - Staging; - Neoadjuvant chemotherapy response; - Treatment (surgical); - Postoperative assessment; - Sample cases.
Spectrum of Radiological Findings of Hereditary Renal Cell Cancer Syndromes

All Day Room: GU/UR Community, Learning Center

Participants
Jana Lovell, BS, Lutherville, MD (Presenter) Nothing to Disclose
Elizabeth C. Jones, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Andrew J. Dwyer, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Nikeith Shah, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Ramaprasad Srinivasan, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Adam Metwali, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Ashkan A. Malayeri, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) To discuss genomics and pathophysiology of hereditoary renal cell cancer syndromes
1) To review and compare conventional radiological findings of hereditary renal cell cancer syndromes, including von Hippel Lindau syndrome, Birt-Hogg-Dube syndrome, and hereditary leiomyomatosis and renal cell cancer

TABLE OF CONTENTS/OUTLINE
Pathophysiology and genetics of hereditary renal cell cancer syndromes including: von Hippel Lindau Hereditary leiomyomatosis and renal cell cancer Birt-Hogg-Dube syndrome Tuberous Sclerosis Comprehensive review of findings of renal lesions of each syndrome Conventional CT Conventional MR Diffusion weighted imaging Discuss sample cases Summary of radiological characteristics
UR009-EC-X

Uroradiology Cases Challenge! Lessons Learnt Interactive Quiz! (Interesting Cases with Focus on Lessons Learned; Test Your Radiology Skills versus Peers)

All Day Room: GU/UR Community, Learning Center

Participants
Marawan R. El Farargy, MBChB, Manchester, United Kingdom (Presenter) Nothing to Disclose
Shyamsunder R. Koteyar, MBBS, FRCR, Manchester, United Kingdom (Abstract Co-Author) Nothing to Disclose
Mathew Crouch, Manchester, United Kingdom (Abstract Co-Author) Nothing to Disclose
Srujana Ganti, MBChB, Manchester, United Kingdom (Abstract Co-Author) Nothing to Disclose
Carolyn M. Allen, MBChB, FRCR, Manchester, United Kingdom (Abstract Co-Author) Nothing to Disclose
Catherine Swainson, Stockport, United Kingdom (Abstract Co-Author) Nothing to Disclose
Charlotte Ford, Oldham, United Kingdom (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
A collection of top case-scenarios which posed dilemmas to reach the diagnoses. This is presented via an interactive standalone computer-based quiz aiming to deliver crucial take-home messages, such as: Missed history is missed diagnosis A humble plain film makes a big difference Using radiology modalities to their fullest may alter your diagnosis Tips on pathognomnic lesions on scans On the spot assessment of the quiz-taker radiological judgement and comparison with peers Results will be emailed to the quiz-taker including links of references to consolidate their knowledge about these topics

TABLE OF CONTENTS/OUTLINE
The quiz-taker will be able to review scans, select answers and view learning points. Examples of contents: How easy it is to find chondrosarcoma on plain films compared to advanced scans Germ cell tumour of testicle mimicking infarct on imaging and histology Missed history leading to delayed diagnosis & treatment of endometrial TB Mucinous cyst adenoma scans could be misleading How nephrographic phase is the best phase to notice subtle renal masses The onion peel appearance of testicular epidermoid Transitional cell carcinoma of bladder diverticula Adenomatoid tumour of the epididymis seen on ultrasound versus histology Missed testicular torsion of undescended testis mimics Hemia & inguinal abscess
Confidence Building Measures to Enhance Acceptance of Low Radiation Dose CT for Renal Colic: An Anthology of Real-life Cases

Participants
Alexi Otrakji, MD, Boston, MA (Presenter) Nothing to Disclose
Mannudeep K. Kalra, MD, Boston, MA (Abstract Co-Author) Technical support, Siemens AG; Technical support, Medical Vision
Melissa M. Shaw, BS, New Haven, CT (Abstract Co-Author) Nothing to Disclose
Swati Goyal, Boston, MA (Abstract Co-Author) Nothing to Disclose
Garry Choy, MD, MS, Boston, MA (Abstract Co-Author) Nothing to Disclose
Christopher Moore, MD, New Haven, CT (Abstract Co-Author) Consultant, Koninklijke Philips NV

TEACHING POINTS
Implementation of low radiation dose CT protocols for kidney stones requires "buy-in" from the radiologists who should feel confident that low radiation dose images will not affect their ability to assess renal calculi. An interactive platform will be used to present several clinical examples of renal calculi imaged with low radiation dose CT protocols. The exhibit will enlist the radiation doses and scan protocols for each clinical case so that radiologists can comprehend the link between image quality, abnormality detection, scan protocols and radiation doses for different CT scanners and methods of image reconstruction. The purpose is to highlight: Detection of renal and acute extra-renal abnormalities on low radiation dose renal colic CT examinations Understand CT scanner protocols and radiation doses with different low radiation dose CT protocols for evaluation of renal calculi.

TABLE OF CONTENTS/OUTLINE
This exhibit will give a case-based interactive tour to the participants. We will use interactive online software (RadIQ) to take a look on the following clinical scenarios: Different anatomical locations of renal calculi Image findings of renal calculi complication: Hydronephrosis, hydroureter, and cystitis Incidental renal findings: cysts, tumors, and nephrocalcinosis Incidental non-renal findings: appendicitis, diverticulosis
Participants
Chenglong Wang, Nagoya, Japan (Abstract Co-Author) Nothing to Disclose
Yoshihiko Nakamura, PhD, Tomakomai, Japan (Abstract Co-Author) Nothing to Disclose
Masahiro Oda, PhD, Nagoya, Japan (Presenter) Nothing to Disclose
Yasushi Yoshino, Nagoya, Japan (Abstract Co-Author) Nothing to Disclose
Tokunori Yamamoto, Nagoya, Japan (Abstract Co-Author) Nothing to Disclose
Kensaku Mori, PhD, Nagoya, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To learn how dominant regions of renal arteries can be computed To understand dominant regions can be computed by Voronoi diagram (VD) To learn how dominant region analysis can contribute partial nephrectomy procedure

TABLE OF CONTENTS/OUTLINE
Renal anatomy Blood supply from several arteries Dominant regions defined each renal artery Partial nephrectomy performing selective clamping of renal artery Quantitative analysis of renal CT images for pre-operative diagnosis Important to understand dominant regions for selective clamping Image-based estimation of renal function loss caused by artery clamping of partial nephrectomy Pre-operative diagnostic report showing dominant regions and volume ratio Renal dominant region computation and quantitative image reporting Precise segmentation of renal arteries by blood vessel model fitting Dominant region computation based on VD using renal artery branches as seed Computation of volume ratio for each dominant region over entire region Quantitative analysis report generation showing dominant region volume rate with showing 3D rendering of dominant regions Demonstration of renal artery and its dominant region extraction process Interactive demonstration of extraction results using 3D display and 3D printed model
**Participants**
David S. Lin, MD, Detroit, MI (*Presenter*) Nothing to Disclose
Matthew C. Rheinboldt, MD, Detroit, MI (*Abstract Co-Author*) Nothing to Disclose
Chad Klochko, MD, Farmington Hills, MI (*Abstract Co-Author*) Nothing to Disclose

**TEACHING POINTS**

The purpose of this exhibit is to: review for the viewer the pathophysiology, demographics and clinical features of Fournier gangrene illustrate the characteristic features seen on sonographic and MDCT imaging highlight the pathways of potential anatomic spread present the limitations of both clinical and imaging evaluation and illustrate both clinical complications and surgical management.

**TABLE OF CONTENTS/OUTLINE**

Fournier gangrene: introduction pathophysiology, demographics and clinical findings pelvic floor fascial anatomy pathways of infection spread imaging findings radiography sonography MDCT clinical management post-surgical imaging appearance summary
Follow the Stream: Imaging of Augments, Reconstructions and Non-Cystectomy Urinary Diversions in Adult Patients

Awards
Certificate of Merit

Participants
Lauren Moomjian, MD, Richmond, VA (Presenter) Nothing to Disclose
Laura R. Carucci, MD, Midlothian, VA (Abstract Co-Author) Nothing to Disclose
Georgi Guruli, MD, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Adam Klausner, Midlothian, VA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
A variety of surgical techniques are utilized to augment, reconstruct or reroute the urine stream. Procedures performed for augmentation and reconstruction of the urinary tract often utilize other segments of the GU or GI tract. Findings from these procedures will be found on imaging studies during routine radiology practice. Knowledge of expected postoperative anatomy, examination techniques and potential complications is essential for accurate diagnosis. Purpose/Aim: Review methods of bladder augmentation, urinary tract reconstruction and non-cystectomy urinary diversions. Discuss the indications and exam techniques for imaging following urinary diversion. Describe the expected postoperative anatomy. Discuss imaging findings of postoperative complications.

TABLE OF CONTENTS/OUTLINE
The Role of CT Imaging after Receiving Dialysis: Basic Things to Know for Every Radiology Resident / Fellow

All Day Room: GU/UR Community, Learning Center

Participants
Akihiro Nakamata, Okinawa, Japan (Presenter) Nothing to Disclose
Masahiro Okada, MD, Nishihara-Cho, Japan (Abstract Co-Author) Nothing to Disclose
Ryo Kinoshita, MD, Okinawa, Japan (Abstract Co-Author) Nothing to Disclose
Masafumi Toguchi, MD, Osakasayama, Japan (Abstract Co-Author) Nothing to Disclose
Yuko Iraha, Nishihara-cho, Japan (Abstract Co-Author) Nothing to Disclose
Sadayuki Murayama, MD, PhD, Nishihara-Cho, Japan (Abstract Co-Author) Research Grant, Toshiba Corporation
SHOTA TAKEHARA, Okinawa, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purposes of this exhibit are: 1. To review the spectrum of imaging in dialysis patients. 2. To discuss the relationship between clinical and image findings in patients with dialysis. 3. To explain the utility of CT and MRI for the complications associated with dialysis. 4. To have discussion toward the effective therapy.

TABLE OF CONTENTS/OUTLINE
The following diseases are discussed by reviewing general issues and high-resolution images. 1. Renal atrophy/calcifications of the aorta 2. Dialysate solution in the intestine 3. Acquired cystic disease of the kidney (ACDK) a) Commonly observed in patients undergoing dialysis b) Multiple small cysts of the kidneys c) High frequency of intracystic hemorrhage 4. Renal cell carcinoma with renal failure (Dialysis associated RCC) a) Secondary to ACDK b) Over 10 years of dialysis duration c) Tumor cells with eosinophilic cytoplasm d) Sarcomatous change in patients with long-term dialysis 5. Amyloid arthropathy 6. Destructive spondyloarthropathy: Plain X-ray 7. Encapsulating peritoneal sclerosis 8. Pulmonary congestion/interstitial lung edema
Bag of Worms: Everything You Wanted to Know About Varicoce Imaging

All Day Room: GU/UR Community, Learning Center

Participants
Meir H. Scheinfeld, MD, PhD, Bronx, NY (Presenter) Nothing to Disclose
Mordecai Koenigsberg, MD, Flushing, NY (Abstract Co-Author) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To identify extra-testicular, intra-testicular and mixed scrotal varicoceles on ultrasound, CT and MR imaging To learn gray scale and Doppler ultrasound criteria for a varicocele To understand the clinical findings in a patient with a varicocele To appreciate the image guided and surgical treatment options of a varicocele

TABLE OF CONTENTS/OUTLINE
Varicocele definition and cause Clinical presentation of varicocele Ultrasound imaging Left sided varicocele Bilateral varicocele Isolated right sided varicocele and its significance Intra-testicular varicocele Intra-testicular and extra-testicular varicocele Venous measurements on gray scale imaging Doppler imaging appearance of varicocele Varicocele (intra-testicular) mimics Testicular PSA Dilated rete testes CT imaging MR imaging Treatment of varicocele Coiling and/or sclerosing Surgical ligation
Urothelial Carcinomas of the Upper Urinary Tracts: Patterns of Imaging on the Urothelial and Excretory Phase in CT Urography

All Day Room: GU/UR Community, Learning Center

Participants
Hiroshi Juri, Takatsuki, Japan (Presenter) Nothing to Disclose
Yoshikazu Tanaka, MD, Takatsuki, Japan (Abstract Co-Author) Nothing to Disclose
Atsushi Nakamoto, Takatsuki, Japan (Abstract Co-Author) Nothing to Disclose
Mitsuhiro Koyama, MD, Suita, Japan (Abstract Co-Author) Nothing to Disclose
Go Nakai, MD, Takatsuki, Japan (Abstract Co-Author) Nothing to Disclose
Yoshifumi Narumi, MD, Suita, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
This exhibit will show images of urothelial carcinomas (UC) of the upper urinary tracts in CT urography. UC often appear as a mass enhanced with contrast media on the urothelial phase (UP), and appear as filling defects on the excretory phase (EP). Lesions are clearly delineated on the EP compared to the UP in some cases. However, UC sometimes appear as wall thickening of the upper urinary tract on the UP, and it is difficult to detect lesions as filling defects on the EP. Thus, evaluation of both of the UP and EP would be important.

TABLE OF CONTENTS/OUTLINE
First, we will present the protocol of CT urography in our institution. Second, we will show Urothelial carcinomas (UC) of the renal pelvis and ureter on the unenhanced, urothelial, and excretory phase in CT urography. -Renal pelvis: normal pattern, UC appeared as a mass, UC appeared as wall thickening, UC with renal invasion. -Ureter: normal pattern, UC appeared as a mass, UC appeared as wall thickening, UC with no abnormal finding. -We will also show a case with UCs in both renal pelvis and ureter.
The Unusual Suspects: Radiologic and Pathologic Images of Atypical Bladder Neoplasms

All Day Room: GU/UR Community, Learning Center

Participants
Eric Royston, DO, MPH, Tripler Army Med Ctr, HI (Presenter) Nothing to Disclose
Rastislav Osadsky, MD, Honolulu, HI (Abstract Co-Author) Nothing to Disclose
Charles F. Gould, MD, Kailua, HI (Abstract Co-Author) Nothing to Disclose
Jonathan R. Wood, MD, Honolulu, HI (Abstract Co-Author) Nothing to Disclose
Darcy J. Wolfman, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Understand the basic pathology and etiology of bladder neoplasms. Enhance knowledge and broaden differential for bladder neoplasms outside of urothelial cell carcinoma. Better understand imaging characteristics of non-urothelial cell carcinoma neoplasms.

TABLE OF CONTENTS/OUTLINE
Review of bladder cancer basic information Anatomy - layers of bladder wall Clinical presentation The role of imaging in bladder neoplasms US, CT, MRI, Cystoscopy Radiologic imaging, gross specimen, and microscopy of atypical (non-urothelial cell carcinoma) neoplasms Adenoma Papilloma Solitary fibrous tumor Leiomyoma Neurofibroma Paraganglioma Squamous cell carcinoma Adenocarcinoma Small cell carcinoma Leiomyosarcoma Lymphoma Sarcomatoid carcinoma Metastasis Review of specific radiologic imaging characteristics Summary / Conclusion
Awards
Magna Cum Laude

Participants
Takashi Tanaka, MD, Okayama, Japan (Presenter) Nothing to Disclose
Ryota Inai, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Yohei Marukawa, MD, Okayama, Japan (Abstract Co-Author) Nothing to Disclose
Akihiro Tada, Okayama, Japan (Abstract Co-Author) Nothing to Disclose
Hideo Gobara, MD, Okayama, Japan (Abstract Co-Author) Nothing to Disclose
Shinji Hashimura, MD, Okayama-Shi, Japan (Abstract Co-Author) Nothing to Disclose
Shuhei Sato, MD, PhD, Okayama, Japan (Abstract Co-Author) Nothing to Disclose
Akira Kawashima, MD, PhD, Phoenix, AZ (Abstract Co-Author) Nothing to Disclose
Susumu Kanazawa, MD, Okayama, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
After reviewing this exhibit, the learner will be able to:
1. List differential diagnoses of kidney lesions in systemic diseases.
2. Know about the characteristic imaging findings and clinical courses to suggest specific systemic diseases related to the kidney and understand how the appropriate review of past imaging and medical records influence the precise differential diagnosis.

TABLE OF CONTENTS/OUTLINE
Introduction
Differential diagnosis of kidney lesions in systemic diseases
Cases will include but will not be limited to: Metastasis, Renal cell carcinoma or Angiomyolipoma in Genetic disorders (Von Hippel-Lindau disease, Tuberous sclerosis, Birt-Hogg-Dubé syndrome), Leukemia, Lymphoma, Methotrexate-associated lymphoproliferative disorder, Post-transplant lymphoproliferative disorder, Immunoglobulin G4-related disease, Multicentric Cattleman's disease, Sarcoidosis, Systemic lupus erythematosus, Sjögren's syndrome, Rosai-Dorfman disease, Bacillus Calmette-Guérin granulomatosis, Bancroft filariasis, Mucormycosis, Neurogenic bladder
Multiparametric Prostate MRI Made Simple: An Algorithmic Approach

All Day Room: GU/UR Community, Learning Center

**Participants**
Corinne C. Liu, MD, Mineola, NY (*Presenter*) Nothing to Disclose

**TEACHING POINTS**

The purpose of this educational exhibit is to present an algorithmic approach in the interpretation of Multiparametric Prostate MRI. A step by step approach will be presented for both transition zone and peripheral zone tumors. Specific case examples will also be provided. Participants will understand the imaging findings on different sequences that correspond to a specific PIRADS category and how the overall PIRADS score is obtained, particularly depending on the location of the tumor and its enhancement pattern. The diffusion weighted sequence is the most important sequence in determining the PIRADS score in peripheral zone tumors while the T2 weighted sequence is the most important sequence in determining the PIRADS score in transition zone tumors. Dynamic contrast enhanced images also play an important role in peripheral zone tumors with a score of 3 on diffusion weighted images while diffusion weighted imaging plays an important role in transition zone tumors with a score of 3 on T2 weighted imaging.

**TABLE OF CONTENTS/OUTLINE**

List of cases:
- Peripheral zone tumors, ranging from PIRADS 1 to 5, with algorithmic approach in each case
- Transition zone tumors, ranging from PIRADS 1 to 5, with algorithmic approach in each case
Treatments of Prostate Cancer and Their Imaging Appearance on 3T Multiparametric Prostate MRI

All Day Room: GU/UR Community, Learning Center

Participants
Alexander E. Dao, BA, Mineola, NY (Presenter) Nothing to Disclose
David Habibian, Mineola, NY (Abstract Co-Author) Nothing to Disclose
Seth Blacksburg, MD, MBA, Mineola, NY (Abstract Co-Author) Nothing to Disclose
Anthony Corcoran, Mineola, NY (Abstract Co-Author) Nothing to Disclose
Aaron E. Katz, MD, Garden City, NY (Abstract Co-Author) Nothing to Disclose
Corinne C. Liu, MD, Mineola, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The prostate has a predictable appearance on Multiparametric Prostate MRI after treatment. Anatomy of the pelvis is distorted after radical prostatectomy. Radiation and cryoablation distorts the zonal anatomy. Distortion of the prostate from cryoablation depends on the site of treatment. Susceptibility artifacts from radiation seeds in brachytherapy or fiducial markers placed for Cyberknife radiotherapy have a typical appearance on MRI. The different treatments of prostate cancer will be described from a urologist or radiation oncologist's perspective. Their associated imaging findings on MRI will be presented with each treatment.

TABLE OF CONTENTS/OUTLINE
Specific cases after radical prostatectomy, radiation and cryoablation will be presented to individuals viewing the exhibit. Each procedure will be described from a urologist's or radiation oncologist's perspective. The imaging findings on MRI will be presented with each procedure.

List of cases:
Description of radical prostatectomy procedure and the expected changes on MRI following prostatectomy
Description of Cyberknife radiotherapy and the expected post-treatment changes on MRI
Description of focal cryoablation and the expected post-treatment changes on MRI
Description of brachytherapy and the expected post-treatment changes on MRI
Infiltrating the Kidney: Infiltrative-Appearing Pathologic Renal Processes, A Pattern-Based Approach to Differential Diagnosis

All Day Room: GU/UR Community, Learning Center

Participants
Edwina Chang, MD, Chicago, IL (Presenter) Nothing to Disclose
Anup J. Alexander, MD, Elmhurst, IL (Abstract Co-Author) Nothing to Disclose
Pritesh Patel, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Melvy S. Mathew, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To understand the normal nephrogram and variant patterns constituting abnormal nephograms 2. To present a pattern-based approach to interpreting the abnormal nephrogram and constructing a differential diagnosis based on imaging and clinical findings 3. To review the differential considerations and imaging findings characteristic of various diffuse or infiltrative processes involving the kidney

TABLE OF CONTENTS/OUTLINE
Normal nephrogram
Abnormal nephrogram patterns
- Absent
- Delayed
- Hyperdense
- Rim and reverse-rim
- Striated
- Spotted
Pattern-based approach to differential diagnosis
- Borders (e.g. Linear - infarct, Round/convex - lymphoma)
- Locoregional findings (e.g. Perinephric stranding - pyleonephritis)
- Ancillary findings (e.g. Biliary findings in IgG4-related disease)
Differential considerations for the infiltrative kidney (including sample cases and mimics)
Inflammatory and others
- Pyelonephritis
- Xanthogranulomatous pyelonephritis
- Acute kidney injury
- IgG4-related disease
- Renal infarcts
Neoplasm
- Epithelial tumors of the renal parenchyma
- Epithelial tumors of the renal pelvis
- Renal sarcoma
- Lymphoma/leukemia
- Metastatic disease
- Pediatric renal tumors
Future directions and summary
Relationships and Communications between the Different Retroperitoneals Compartments

All Day Room: GU/UR Community, Learning Center

Participants
Daniel D. Padron, MD, Burgos, Spain (Presenter) Nothing to Disclose

TEACHING POINTS
Teaching point 1: Radiologists should understand the anatomy of the retroperitoneal space and localize the lesions in these compartments. Teaching point 2: Predict the spread of collections from its initial location in some of these compartments.

TABLE OF CONTENTS/OUTLINE
Both parietal peritoneum and transversalis fasciae contain the retroperitoneal space and all of its compartments, between which there is communications with pelvic recess through the interfascial spread. The anterior pararenal space (APRS) has communications with the retropancreatic space through the kneeland space and through the interfascial space between the superficial and deepest layers of the pararenal posterior fasciae. The posterior pararenal space (PPRS) has communication into the preperitoneal space through the interfascial way along the virtual space between the parietal peritoneum and tasversalis fasciae and has continuity through the pelvic spaces through the perirenal adipose tissue.
TEACHING POINTS

Prostate Specific Antigen (PSA) levels have a historical importance in diagnosis of prostate cancer. In the past, elevated levels of PSA were a prompt indication for prostate biopsy. With the advent of imaging studies, especially multiparametric MRI, this paradigm has shifted. Many other benign and malignant conditions may also present with elevated PSA levels, and most of them can be readily identified in mpMRI. The purpose of this exhibition is: - To review common benign conditions that present with elevated PSA levels. - Describe and illustrate their main imaging findings. - Discuss the MRI protocol to help in the differential diagnosis.

TABLE OF CONTENTS/OUTLINE

1. Importance and controversies of PSA in prostate cancer screening. 2. Not always prostate cancer: - Benign Prostatic Hypertrophy; - Prostatitis; - Prostatic abscess; - Prostatic manipulations (rectal examination; prostatic massage; needle biopsy) - Other malignancies - Recent ejaculation; - Natural aging; - Bicycle riding. 3. The best imaging tools to differentiate causes of high PSA from prostate cancer. 4. Summary.
Differential Diagnosis of Solid Renal Masses: A Pictorial Review with Radiologic-Pathologic Correlation

All Day Room: GU/UR Community, Learning Center

Participants
Javier Miguez Gonzalez, MD, Barcelona, Spain (Presenter) Nothing to Disclose
Vicente Valles Noguero, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Alona Thomas Martinez, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Pilar Lozano Arranz, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Francesc Tresserra Casas, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Emilio Inarejos Clemente, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Jordi Catala Forteza, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: 1. To explain the main radiologic features of benign and malignant solid renal tumors in adults on multidetector CT and MRI, with emphasis on patterns of contrast enhancement. 2. To describe the macroscopic and microscopic pathologic features of solid renal masses, establishing a nice correlation with radiographic findings. 3. To review basic concepts in staging and follow-up of renal cell carcinoma.

TABLE OF CONTENTS/OUTLINE
1. Introduction  2. Imaging techniques and study protocol 3. Imaging findings of renal masses with radiologic-pathologic correlation
   A) Benign Renal Tumors: Angiomyolipoma, Oncocytoma, Others (adenoma, leiomyoma, solitary fibrous tumor) B) Malignant Renal Tumors: Clear Renal Cell Carcinoma, Papillary Renal Cell Carcinoma, Chromophobe Renal Cell Carcinoma, Multilocular Cystic Renal Cell Carcinoma, Carcinoma of the Collecting Ducts of Bellini, Renal Medullary Carcinoma, Transitional Cell Carcinoma of the Upper Urinary Tract, Lymphoma, Metastases
4. Staging and follow-up of Renal Cell Carcinoma  5. Summary and conclusions
A New Indicator for the Estimation of Renal Function by Using the Anteroposterior Diameter of the Renal Sinus in Abdominal MDCT

All Day Room: GU/UR Community, Learning Center

Participants
Yasuhiro Inokuchi, RT, Tokyo, Japan (Presenter) Nothing to Disclose
Saki Kouya I, RT, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose
Masahiro Uematsu, RT, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose
Tsuneyuki Takashina, MD, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The anteroposterior diameter of the renal sinus (APDRS) at axial images in abdominal multi detector-row computed tomography (MDCT) can be used as a simple new indicator for estimation of renal function.

TABLE OF CONTENTS/OUTLINE
To prevent progression to end-stage kidney disease, it is necessary to manage patients at early chronic kidney disease (CKD). CKD is currently classified based on a patient’s eGFR and AER. Therefore, in order to discover early CKD patients, it is important to observe eGFR. The present study proposes that the APDRS at axial images in MDCT is useful for estimation of eGFRcreat. Firstly, correlation between the APDRS and eGFRcreat were investigated in 94 patients who underwent MDCT, and it has been shown a significant negative correlation ($r = -0.600$, $P < .0001$). In addition, between each APDRS corresponding to eGFRcreat based on the stage classification of CKD observed significant differences respectively ($P < .001$). Secondly, inter-reader reproducibility of the APDRS was assessed using intra-class correlation coefficients (ICC), and the inter-reader ICC was 0.855. To summarize study, Even if eGFRcreat is not measured, the approximate eGFRcreat can be estimated by the measurement of the APDRS at axial images in MDCT. Therefore, it is suggested that this method can be used as a simple new indicator for estimating CKD stages.
**Review of Contrast Enhanced Ultrasound in Characterizing Renal Neoplasms**

All Day Room: GU/UR Community, Learning Center

**Participants**
Tal D. Cohen, BS, Rootstown, OH (*Presenter*) Nothing to Disclose
Cynthia L. Peterson, MPH, Salem, OH (*Abstract Co-Author*) Nothing to Disclose
Richard G. Barr, MD, PhD, Youngstown, OH (*Abstract Co-Author*) Consultant, Siemens AG; Consultant, Koninklijke Philips NV; Research Grant, Siemens AG; Research Grant, SuperSonic Imagine; Speakers Bureau, Koninklijke Philips NV; Research Grant, Bracco Group; Speakers Bureau, Siemens AG; Consultant, Toshiba Corporation; Research Grant, Esaote SpA; Research Grant, B and K Ultrasound; Research Grant, Hitachi Aloka Ultrasound

**TEACHING POINTS**

The purpose of this exhibit is:
1. Review the CEUS findings in both benign and malignant renal neoplasms
2. Briefly review the sensitivity and specificity of CEUS in characterizing renal neoplasms as benign or malignant
3. Discuss the use of CEUS in characterizing complex cystic renal masses

**TABLE OF CONTENTS/OUTLINE**

Review CEUS off-label use
Discuss the technical factors in performing a CEUS examination of the kidney
Review Imaging Findings
Benign Lesions
Benign Cysts (Bosziak 1 lesions)
Bosziak 2 cystic lesions
Bosniak 3 cystic lesions
Benign solid lesions (hematoma)
Oncocytomas
Malignant Lesions
Renal Cell Carcinoma
Transitional Cell Carcinoma
Lymphoma
**TEACHING POINTS**

MDCT for evaluation of renal cell carcinoma (RCC) is the only body CT protocol where 4 acquisitions are supported by the literature. However, use of 4 phases can deliver radiation doses as high as 56 mSv. This exhibit focuses on tailoring protocol design for specific subtypes and time points in the patient’s clinical course from diagnosis to postcurative surveillance to metastatic disease. The educational goals are: understanding how each phase contributes to diagnostic efficacy, balancing diagnostic efficacy with radiation dose modulation, devising an algorithm for reduction in acquisitions during follow up based on disease status.

**TABLE OF CONTENTS/OUTLINE**

Introduction MDCT phases for renal imaging (precontrast, corticomedullary, nephrographic, delayed) Optimal phases for each clinical scenario renal mass detection (maximizing conspicuity of small masses in cortex or medulla) renal mass characterization (distinguishing clear cell vs papillary vs chromophobe) preoperative staging and treatment planning surveillance s/p partial nephrectomy surveillance s/p total nephrectomy for clear cell RCC in remission surveillance s/p total nephrectomy for papillary or chromophobe RCC in remission metastatic clear cell RCC metastatic papillary RCC patients receiving antiangiogenesis agents Proposal for tailored protocols

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

- Pamela T. Johnson, MD - 2016 Honored Educator
- Elliot K. Fishman, MD - 2016 Honored Educator
Prostate Carcinoma: Multiparametric Magnetic Resonance (MR) Imaging Pitfalls

All Day Room: GU/UR Community, Learning Center

Participants
Gianpiero Cardone, MD, Milano, Italy (Presenter) Nothing to Disclose
Maurizio Papa, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Filippo Russo, MD, Candiolo, Italy (Abstract Co-Author) Nothing to Disclose
Tommaso Maga, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Andrea Losa, MD, Milano, Italy (Abstract Co-Author) Nothing to Disclose
Paola Mangili, PhD, Milano, Italy (Abstract Co-Author) Nothing to Disclose
Fraco Gaboardi, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Giuseppe Balconi, Ornago, Italy (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To illustrate the most frequent Multiparametric MR imaging pitfalls in the evaluation of prostate carcinoma To describe benign processes that may mimic prostate carcinomas. To illustrate the most effective prostate MR imaging examination techniques.

TABLE OF CONTENTS/OUTLINE
1) Morphologic and pathologic characteristics of prostate cancer
2) Multiparametric MR imaging techniques
3) MR imaging pitfalls in the evaluation of prostate carcinoma:
   a) Stromal BPH nodules
   b) Peripheric BPH nodules
   c) Acute and chronic prostatitis
   d) Granulomatous prostatitis
   e) Thickening of surgical capsule
   f) "Moustache sign"
   g) Central zone
   h) Artifacts on diffusion-weighted images
A Troubled Stream: Fluoroscopic Evaluation of the Adult Male Urethra

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Jennifer Flanagan, Dallas, TX (Presenter) Nothing to Disclose
Shaun M. Nordeck, MS, RRA, Dallas, TX (Abstract Co-Author) Nothing to Disclose
Richard C. Batz Jr, MD, Dallas, TX (Abstract Co-Author) Nothing to Disclose
Cecelia Brewington, MD, Dallas, TX (Abstract Co-Author) Research Grant, Toshiba Corporation

TEACHING POINTS
Brief review of normal adult male urethral anatomy and identify common areas for disease. Overview of adult male urethral abnormalities and surgical interventions. Discuss retrograde urethrogram and voiding cystourethrogram techniques for pre and postoperative assessment.

TABLE OF CONTENTS/OUTLINE
Introduction Review of Normal Anatomy (adult male) Posterior and anterior urethra Glands Common disease sites Retrograde Urethrogram Procedure technique Image review Voiding Cystourethrogram Procedure technique Image review Male Urethral Abnormalities Adult congenital Infectious Trauma Neoplasm Vascular Functional Surgical Intervention Objectives and techniques Fluoroscopic pre and post-operative evaluation Complications Conclusion
Imaging of the Penis
All Day Room: GU/UR Community, Learning Center

Participants
Jun Isogai, MD, Asahi, Japan (Presenter) Nothing to Disclose
Naoki Harata, Asahi, Japan (Abstract Co-Author) Nothing to Disclose
Jun Kaneko, Hasuda, Japan (Abstract Co-Author) Nothing to Disclose
Hayahiko Fujii, Asahi City, Japan (Abstract Co-Author) Nothing to Disclose
Katsuya Yoshida, MD, Asahi, Japan (Abstract Co-Author) Nothing to Disclose
Tassei Nakagawa, MD, PhD, Asahi, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To demonstrate normal variants of penile vasculature and a wide variety of penile disorders.

TABLE OF CONTENTS/OUTLINE
A. Normal variants of penile vasculature
1) Dilated penile dorsal artery
2) Pooling of contrast material in the corpus cavernosum and spongiosum
B. CT or MRI findings of a wide spectrum of penile disorders
1) Traumatic penile hematoma
2) Traumatic penile emphysema
3) Penile fracture
4) Fournier gangrene and corpus spongiosum abscess
5) Penile cancer
6) Urethral dissemination of urogenital cancer
7) Penile spread of recurrent rectal cancer
8) Penile metastasis
9) Peyronie disease (Induratio penis plastica)
Don't Stress: How to Differentiate Adrenal Lesions

All Day Room: GU/UR Community, Learning Center

Participants
Angela Tong, MD, MS, Valhalla, NY (Presenter) Nothing to Disclose
Zeenia Irani, MD, MS, Valhalla, NY (Abstract Co-Author) Nothing to Disclose
Ross A. Myers, MD, Valhalla, NY (Abstract Co-Author) Nothing to Disclose
Jennifer M. Thomas, MD, Valhalla, NY (Abstract Co-Author) Nothing to Disclose
Perry S. Gerard, MD, Valhalla, NY (Abstract Co-Author) Nothing to Disclose
Anthony G. Gilet, MD, New York, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

Embryology of the adrenal gland The radiologic appearance of benign and malignant lesions with pathologic correlation Avoiding imaging pitfalls Management of adrenal lesions

TABLE OF CONTENTS/OUTLINE

In this educational presentation, we will present illustration of the embryology and anatomy of the adrenal gland. We will also review the CT and MRI imaging characteristics of various adrenal lesions including the following: Congenital abnormalities: Adrenal hyperplasia The 'lying-down' adrenal Testicular adrenal rest tumors Benign lesions: Adrenal cysts Adrenal adenoma Adrenal myelolipoma Adrenal hematoma Granulomatous disease in the adrenal gland. Malignant lesions Adrenal cortical carcinoma Pheochromocytoma (10% malignancy rate) Neuroblastoma Adrenal metastasis Challenging cases and pitfalls Adrenal hemorrhage mimicking neoplasm
Transition Zone Prostate Cancer: Pearls, Pitfalls and Dilemmas in the Diagnosis and Interpretation on Prostate MRI

Awards
Certificate of Merit

Participants
Varaha Tammisetty, MD, Houston, TX (Presenter) Nothing to Disclose
Rosa P. Castillo, MD, Coral Gables, FL (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1. Illustrate the typical and atypical imaging appearances, pearls and patterns of Transition zone prostate cancer on prostate MRI.  
2. Review and discuss the pitfalls and confounding Transition zone pathology in the interpretation of prostate MRI.  
3. Discuss and review the literature on the dilemmas and limitations of prostate MRI in the interpretation and diagnosis of TZ cancer on prostate MRI.

TABLE OF CONTENTS/OUTLINE

1. Approach to PIRADS categorization in Transition zone and pearls in interpretation with case based examples of typical and atypical TZ cancer.  
2. Illustrated examples of patterns of MR appearances and intraprostatic spread of TZ cancers.  
3. Richly illustrated examples of pitfalls of MR interpretation in TZ including: Stromal hyperplasia vs TZ cancer Occult TZ cancer in stromal nodule/BPH Periurethral cancer Prominent AFM Thickened surgical capsule Atypical TZ stromal neoplasms such as Stromal tumor of uncertain malignant potential Technical factors-Windowing of ADC, DWI and rectal motion  
4. Discussion and review of literature on the dilemmas and limitations of prostate MRI in the interpretation and diagnosis of TZ cancer on prostate MRI including the role of high b value DWI.  
5. Review the role of genomics, molecular pathology of prostate cancer and differences in Transition Zone cancer.  
6. Future directions and summary
Imaging of the Seminal Vesicles: A Review

All Day Room: GU/UR Community, Learning Center

Participants
Ahmed S. Soliman, MBBS, Doha, Qatar (Presenter) Nothing to Disclose
Pardeep K. Mittal, MD, Atlanta, GA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

- To understand the anatomical relationships of the seminal vesicles, including relevant pathological aspects (staging of pelvic cancers, disseminated male genital infection).
- To know the embryological sequence that leads to congenital anomalies of the seminal vesicles and reason for their association with other GU anomalies.
- To have a quick review on the spectrum of pathologies that can be seen in the seminal vesicles: seminal vesicle cysts, seminal vesicles stones, acute and chronic infection and inflammation, malignancy with or due to invasion by a pelvic neoplasm.

TABLE OF CONTENTS/OUTLINE

- Anatomy of the male pelvis and the location of the seminal vesicles, vas deferens and ejaculatory ducts.
- The embryological story of seminal vesicles and other genitourinary structures and its relevant clinical presentations.
- Assessment of the seminal vesicles and ejaculatory ducts: MRI vs TRUS, which modality to choose?
- Pathological spectrum involving the seminal vesicles: Absent and hypoplastic seminal vesicles. Hemorrhagic seminal vesicles: causes. Seminal vesicle cysts, types and association.
- Seminal vesicle abscess and Male Accessory Gland infection (MAGI). Chronic inflammation of seminal vesicles including schistosomiasis and TB. Involvement of seminal vesicles in different types of malignancy.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at:
https://www.rsna.org/Honored-Educator-Award/

Pardeep K. Mittal, MD - 2016 Honored Educator
Advanced DWI Analysis for Kidney Evaluation Using IVIM and Kurtosis: Physical Basis and Clinical Applications

All Day Room: GU/UR Community, Learning Center

Awards
Certificate of Merit

Participants
Teodoro Martin, MD, Jaen, Spain (Presenter) Nothing to Disclose
Antonio Luna SR, MD, Jaen, Spain (Abstract Co-Author) Nothing to Disclose
Jordi Broncano, MD, Cordoba, Spain (Abstract Co-Author) Nothing to Disclose
Lidia Alcala Mata, MD, Jaen, Spain (Abstract Co-Author) Nothing to Disclose
Inmaculada Valero, BMedSc, Cordoba, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Resume the technical adjustments of DWI acquisition for kidney evaluation.
2. Describe from an educational point of view, the main signal intensity analysis models: Monocompartmental and Bicompartmental (Intravoxel incoherent motion-IVIM and Kurtosis).
3. Review the potential role of advanced DWI analysis models in different clinical scenarios compared with conventional monocompartmental analysis.

TABLE OF CONTENTS/OUTLINE
1. Introduction
2. Technical basis and adjustments of DWI for kidney evaluation
   a. Monocompartmental analysis
   b. Bicompartmental analysis
      - IVIM model
      - Kurtosis model
3. Role of different DWI analysis models in clinical practice
   a. Obstructive disease (chronic and acute renal damage)
   b. Nephropathies (chronic kidney disease, diabetes and renal allograft)
   c. Benign and malignant lesions
   e. Renal ischemia
Venous Thrombosis and Renal Cell Carcinoma: What Urologist Needs to Know

All Day Room: GU/UR Community, Learning Center

Participants
Abhijit Sunnapwar, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose
Hardik U. Shah, MBBS, MD, SAN ANTONIO, TX (Presenter) Nothing to Disclose
Dharam Kaushik, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose
Bhagya Sannanarja, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to: Enumerate the pertinent CT findings to be mentioned for pre-operative evaluation of a patient with renal cell carcinoma (RCC) and concomitant venous thrombosis. Review how the CT findings determine the surgical approach in cases of radical nephrectomy and venous thrombectomy. Discuss common pitfalls in predicting venous involvement in renal cell carcinoma.

TABLE OF CONTENTS/OUTLINE
MDCT protocol in patients with RCC and suspected renal vein/IVC thrombosis. Classification scheme of venous thrombosis in renal cell carcinoma. Illustrations with CT reconstructions showing: Vascular anatomy of the involved kidney including relationship of renal arteries & veins as well as variants Size and level of confluence of gonadal and lumbar veins Presence of accessory hepatic veins Levels of venous extension of thrombus with grading Predictors of invasion of wall of IVC by tumor thrombus Extension of thrombus into gonadal, lumbar and hepatic veins Extent of venous collaterals Relation of the venous structures to the surrounding structures with surgical implications Common pitfalls in evaluation of venous involvement such as differentiation between thrombus and contrast mixing; bland thrombus versus tumor thrombus Impact on surgical approach.
Spectrum of Testicular and Extra-testicular Pathologies at MRI: A Review

All Day Room: GU/UR Community, Learning Center

Awards
Identified for Radiographics

Participants
Pardeep K. Mittal, MD, Atlanta, GA (Presenter) Nothing to Disclose
Ahmed S. Soliman, MBBS, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
Argha Chatterjee, MBBS, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (Abstract Co-Author) Research Grant, Siemens AG
Adham Darweesh, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
Maneesh Khanna, MBBS, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
Jay Patel, MD, Morristown, NJ (Abstract Co-Author) Nothing to Disclose
Courtney A. Coursey Moreno, MD, Suwanee, GA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
- Discuss scrotal anatomy at MRI and imaging protocols
- Describe spectrum of benign and malignant conditions of extra testicular and testicular pathologies at MRI and mimics
- Review pathological conditions where MRI plays a crucial problem-solving role

TABLE OF CONTENTS/OUTLINE
US has been the primary imaging modality of testes due to its low cost and readily availability but is limited due to operator dependency and soft tissue characterization. These days MRI has become readily available and also widely accepted by the urologists, used as problem solving tool due to its superior soft tissue contrast resolution and no radiation involved. In the review we will present:

- Pathophysiology of testicular tumors and risk factors
- Examples of testicular tumors: Seminoma and Non seminomatous germ cell tumors (teratoma, embryonal cell and mixed germ cell tumor) and NGC stromal tumors leydig and sertoli cell and granulosa cell tumor, lymphoma and metastases
- Non-malignant conditions: Testicular hematoma, infarction, abscess, TB, microlithiasis, cryptorchidism, testicular hemangioma, rete testis etc.
- Extra testicular conditions: Adenomatoid tumor, spermatic cord sarcoma, hydrocele, etc.

For management it is important for the radiologist and urologist to understand the characteristic of benign and malignant conditions of the testis and role of MRI

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Pardeep K. Mittal, MD - 2016 Honored Educator
Courtney A. Coursey Moreno, MD - 2016 Honored Educator
Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator
Post-operative Complications Evaluation after Percutaneous and Laparoscopic Cryoablation of Small Renal Masses: CT and MR Imaging

All Day Room: GU/UR Community, Learning Center

Participants
Gianpiero Cardone, MD, Milano, Italy (Presenter) Nothing to Disclose
Maurizio Papa, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Andrea Losa, MD, Milano, Italy (Abstract Co-Author) Nothing to Disclose
Paola Mangili, PhD, Milano, Italy (Abstract Co-Author) Nothing to Disclose
Fracco Gaboardi, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Giuseppe Balconi, Ornago, Italy (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) To illustrate the most frequent CT and MR imaging appearance of the kidney treated with percutaneous and laparoscopic cryoablation. 2) To report the spectrum of post-operative complications in patients treated with percutaneous and laparoscopic cryoablation. 3) To illustrate the MR and CT findings for post-operative complications in patients treated with percutaneous and laparoscopic cryoablation.

TABLE OF CONTENTS/OUTLINE
1) Normal MR and CT patterns of renal Cryoablation2) MR and CT patterns of postoperative complications:a) Early post-procedural incomplete ischemia of cryolesionsb) Intralesional haematomasc) Perilesional haematomasd) Retroperitoneal and pleural effusionf) Incomplete treatment of the lesionf) Fistulasg) Ureteral stenosisMost important imaging parameters after renal percutaneous and laparoscopic cryoablation were the complete treatment of the lesion in the early evaluation after treatment and the progressive decrease in size and induced ischemia of the lesion during the follow-up. Most frequent post-operative complications in patients treated with renal cryoablation were incomplete ischemia of cryolesion 24 hrs after surgery, resolved in the subsequent controls, and intralesional and perilesional haematomas. Higher contrast resolution of MR allowed better evaluation of treated areas compared to CT.
Percutaneous and Laparoscopic Renal Cryoablation Imaging Follow-up: Comparison between MR and CT Imaging Patterns

Awards
Certificate of Merit

Participants
Gianpiero Cardone, MD, Milano, Italy (Presenter) Nothing to Disclose
Maurizio Papa, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Paola Mangili, PhD, Milano, Italy (Abstract Co-Author) Nothing to Disclose
Giuseppe Balconi, Ornago, Italy (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) To evaluate the most effective CT and MR technique in the follow-up of patients treated with percutaneous or laparoscopic renal cryoablation.
2) To illustrate the differences between MR and CT patterns in patients treated with percutaneous or laparoscopic renal cryoablation for small renal tumors.
3) To show the advantages of MR imaging in the follow-up of patients treated with percutaneous or laparoscopic renal cryoablation.

TABLE OF CONTENTS/OUTLINE
1) Mechanism of cryoablation action
2) Percutaneous and laparoscopic cryoablation procedures
3) MR and CT imaging technique
4) MR and CT patterns of renal cryoablation
   a) Morphologic characteristics of renal cryolesions
   b) Size of renal cryolesions after treatment
   c) Characteristics of renal cryolesions vascularization
5) Comparison between CT and MR findings
6) MR and CT patterns of post-operative complications
7) MR and CT patterns of recurrence after percutaneous or laparoscopic renal cryoablation

MR is an effective tool in the imaging follow-up of renal lesions treated with CA. CT can be used as an alternative choice to MR, but lower contrast resolution compared to MR imaging make difficult to differentiate cryolesion from the surrounding perilesional collections. MR can also be useful in patients with renal insufficiency using the DWI sequences.
The Radiologist's Role in the Diagnosis and Treatment of Priapism

All Day Room: GU/UR Community, Learning Center

Participants
Paul-Michel Dossous, MD, MPH, New Hyde Park, NY (Presenter) Nothing to Disclose
Kunal Kothari, Manhasset, NY (Abstract Co-Author) Nothing to Disclose
John J. Hines JR, MD, New Hyde Park, NY (Abstract Co-Author) Nothing to Disclose
Barak Friedman, MD, New York, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To understand the clinical presentation and pathophysiology of priapism. To review the vascular anatomy of the penis. To understand the radiologist's role in diagnosing priapism. To review the grey scale and doppler ultrasound findings in ischemic priapism and nonischemic priapism. To understand the role of magnetic resonance imaging in the diagnosis of priapism. To understand the radiologist's role in treating priapism. Review indications for angiography and embolization. Review clinical outcomes of priapism after interventional radiology procedures.

TABLE OF CONTENTS/OUTLINE
Background
Definition of Priapism
Epidemiology of Priapism
Clinical Sequela of Priapism
Penile Anatomy
Physiology of Penile Erection
Types of Priapism
Imaging priapism
Color Doppler Ultrasound of the Penis
Role of MRI in Diagnosing Priapism
Role of Interventional Radiology in Treating Priapism
Conclusions
The Many Faces of Angiomyolipoma (AML)

All Day Room: GU/UR Community, Learning Center

Participants
Akram M. Shaaban, MBBCh, Salt Lake City, UT (Presenter) Nothing to Disclose
Benjamin Romney, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Khaled M. Elsayes, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Ayman H. Gaballah, MD, FRCR, Columbia, MO (Abstract Co-Author) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Maryam Rezvani, MD, Salt Lake City, UT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Describe classic findings of AML on different imaging modalities
Describe unusual presentations of AML and how imaging can help in reaching the diagnosis

TABLE OF CONTENTS/OUTLINE
Introduction Pathological features Imaging findings of classic renal AML and how to differentiate from other fat-containing retroperitoneal lesions Unusual presentations of AML Absent or minimal fat renal AML and how to differentiate from renal cell carcinoma AML in the setting of tuberous sclerosis AML with intravascular extension Hemorrhagic AML Epithelioid AML Treated AML Extrarenal AML

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Akram M. Shaaban, MBBCh - 2015 Honored Educator
Akram M. Shaaban, MBBCh - 2016 Honored Educator
Maryam Rezvani, MD - 2015 Honored Educator
Khaled M. Elsayes, MD - 2014 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Adrenal Adenoma: Imaging Workup, Typical/atypical Features, Pitfalls and Mimics. Does WEISS Score Correlate with Imaging Features?

All Day Room: GU/UR Community, Learning Center

Participants
Mohamed G. Elbanan, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Mohammed Amr Habra, Houston, TX (Abstract Co-Author) Nothing to Disclose
Brinda Rao, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Sanaz Javadi, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Miao Zhang, Houston, TX (Abstract Co-Author) Nothing to Disclose
Khaled M. Elsayes, MD, Ann Arbor, MI (Presenter) Nothing to Disclose

TEACHING POINTS
- Describe the imaging workup of adrenal masses - Review the spectrum of typical and atypical imaging features of adrenal adenoma - Illustrate most commonly encountered imaging pitfalls and mimics of adrenal adenoma - Discuss Weiss Scoring system for pathological diagnosis of adrenal adenomas and correlate imaging features with pathological findings

TABLE OF CONTENTS/OUTLINE
- Pathology of adrenal adenomas - Imaging workup and utility of various imaging modalities - Typical Imaging features of adrenal adenoma - Atypical Imaging features of adrenal adenomas; cystic changes, hemorrhage, calcification, myelolipomatous degeneration, mixed lipid poor/lipid rich - Technical pitfalls, for example; Improper scan timing on CT - Limitation of MR in diagnosing some lipid poor adenoma - Overlap of FDG uptake for some adenomas and metastases - Overlap of ADC values for some adenomas and metastases - Mimics of adrenal adenomas, for example: Simple cyst mimicking adenoma on non-enhanced CT - Metastases containing lipid (such as clear cell RCC and HCC) - Small Adrenocortical carcinoma - Weiss Score; correlation with imaging features and impact on management

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Khaled M. Elsayes, MD - 2014 Honored Educator
Multiparametric MR Imaging of the Prostate before and after Interventions

All Day Room: GU/UR Community, Learning Center

Awards
Identified for RadioGraphics

Participants
Pritesh Patel, MD, Chicago, IL (Presenter) Nothing to Disclose
Melvy S. Mathew, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Igor Trilisky, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Aytekin Oto, MD, Chicago, IL (Abstract Co-Author) Research Grant, Koninklijke Philips NV

TEACHING POINTS
Adding to the mainstays of surgery and radiation therapy for prostate cancer, a wide variety of focal therapies are increasingly being utilized. Imaging of prostate cancer, treatment response and monitoring is increasingly performed with MRI. Currently, no single source exists that reviews all the available therapies and their imaging appearance.

This presentation reviews the rationale for MRI in prostate cancer, and its use in cancer detection and following all existing treatment methods. Upon completion of this exhibit, readers should:

1. Understand basic identification of prostate cancer on MRI to help with post-intervention imaging.
2. Be aware of the numerous therapeutic options for prostate cancer, and understand how each therapy works and differs from another.
3. Understand associated imaging findings with each specific therapy.

TABLE OF CONTENTS/OUTLINE

MR Detection of Cancer
Intervention and Post-Intervention Imaging

Surgery
--Pretreatment Imaging
Radiation
--Pretreatment Imaging
--Posttreatment Imaging
Hormone Therapy
--Posttreatment Imaging
Focal Therapy
1. High-intensity Focused Ultrasonic Ablation (HIFU)
   --Posttreatment Imaging
2. Photodynamic Therapy
   --Posttreatment Imaging
3. Cryoablation
   --Posttreatment Imaging
4. Laser Ablation
   --Posttreatment Imaging
5. Electroproportion
   --Posttreatment Imaging

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Aytekin Oto, MD - 2013 Honored Educator
Launching a Prostate MRI-TRUS Fusion Biopsy Service: Lessons Learned from a Single Institution Experience

All Day Room: GU/UR Community, Learning Center

Participants
Juan J. Ibarra-Rovira, MD, Houston, TX (Presenter) Nothing to Disclose
Rony Kampalath, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Guilherme Godoy, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Dov Kadmon, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose

PURPOSE
To share the early experiences at our institution associated with the launch of a Prostate MRI-Transrectal Ultrasound (TRUS) fusion biopsy service. This service is a collaborative effort between the Radiology and Urology departments.

METHOD AND MATERIALS
Between January 2015 and March 2016, 40 MRI guided prostate biopsies were performed at our institution using the Artemis mechanical TRUS biopsy arm. Biopsy procedures were performed by urologists, targeting lesions identified beforehand by radiologists using the ACR Prostate Imaging-Reporting and Data System (PI-RADS) version 2. The urology service made a consensus decision to target lesions graded as PI-RADS 3 or higher. MRI-TRUS fusion biopsy was used in addition to standard 12 core biopsy for each patient. This paper describes early experiences with the system, including early technical challenges, logistical issues, and diagnostic accuracy. Institutional Review Board approval was obtained and the requirement for informed consent was waived for this retrospective chart review.

RESULTS
Early challenges in the implementation of the program included radiologist inexperience with the PI-RADS version 2 system, resulting in significant inter-observer variability in the grading of prostate lesions. Initial biopsies often suffered from inadequate sampling. There were also significant logistical challenges in digitally fusing MRI and real-time TRUS images, as this involved the transfer of imaging studies between three different software platforms. Patients ranged in age between 53 and 84 years. Of the 40 biopsies, 34 had previously undergone prior standard TRUS guided biopsy. Highest PI-RADS score on pre-procedural MRI correlated with the likelihood of positive biopsy for prostate carcinoma.

CONCLUSION
Despite initial challenges, MRI-TRUS fusion biopsy is an effective and accurate method of targeting suspicious prostate lesions. Implementation of a prostate MRI-TRUS fusion biopsy service is made easier by open collaboration between the Radiology, Urology, and Pathology departments as well as educating a small core group of radiologists in the use of objective criteria such as the PI-RADS scoring system.

CLINICAL RELEVANCE/APPLICATION
Initial challenges with the launch of a Prostate MRI-TRUS Fusion Biopsy Service can be overcome, as we have shown with our own experience. Concerns about these challenges should not prevent more widespread adoption of this technology.

FIGURE
http://abstract.rsna.org/uploads/2016/16011128/16011128_vj3m.jpg
PI-RADS Version 2 - Test Your Knowledge: Case Presentations in a Question and Answer Format with Rad-Path Correlation

All Day Room: GU/UR Community, Learning Center

Participants
Syed A. Ali, MBBSCh, FRCR, Birmingham, United Kingdom (Abstract Co-Author) Nothing to Disclose
Shaza AlSharif, MD, Jeddah, Saudi Arabia (Presenter) Nothing to Disclose
Hatim Maghraby, Jeddah, Saudi Arabia (Abstract Co-Author) Nothing to Disclose
Basim Alsaywid, Jeddah, Saudi Arabia (Abstract Co-Author) Nothing to Disclose
Giovanni P. Artho, MD, Boucherville, QC (Abstract Co-Author) Nothing to Disclose
Abdulkader Al-Kenawi, MD, Jeddah, Saudi Arabia (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) To review the epidemiology, clinical presentation and disease course of prostate cancer
2) To review the Prostate Imaging-Reporting and Data System, version 2 (PI-RADS v2) in the assessment of prostate carcinoma particularly with regards to localizing and scoring lesions, which can stratify patients and help tailor their management.
3) To present cases as unknowns followed by review of imaging findings with Rad-Path correlation.

TABLE OF CONTENTS/OUTLINE
Multiparametric prostate MRI plays a major role in the pre-treatment setting for assessment, staging and evaluation of recurrence of prostate cancer and for active surveillance. This exhibit will review the importance of PI-RADS v2 categorization, zonal and sector anatomy map localization, the scoring system and 'tie-breaker' rules. The exhibit will be presented in an interactive quiz format of a number of cases, presented as follows: a) Images from mpMRI at 3T. b) Discussion of imaging findings according to the PI-RADS lexicon. c) Final PI-RADS score. d) Pathology correlation according to Gleason score. Lastly, limitations encountered in the current PI-RADS and pitfalls will be discussed.
Pelvicaliceal and Ureteral Diseases—Not Always Upper Urinary Tract Urothelial Cell Carcinoma

All Day Room: GU/UR Community, Learning Center

Participants
Manuel J. Moreno Rojas, MD, Barcelona, Spain (Presenter) Nothing to Disclose
Carmen Sebastia Cerqueda, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Blanca Pano Brufau, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Rafael Salvador Izquierdo, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Carme Mallofre, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Carlos Nicolau, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is: To review benign and malignant ureteral diseases that can mimic upper urinary tract urothelial cell carcinoma. To show radiological and urological keys for differential diagnosis. To depict potential urological treatments in each case, and how radiologist can provide help.

TABLE OF CONTENTS/OUTLINE
Although an urothelial carcinoma must be suspected when a mass or a thickening is seen in the upper urinary tract, there are multiple benign and malignant diseases from other origins that can mimic the former mentioned. The aim of this abstract is to review the main differential diagnosis of urothelial carcinoma including: arteriovenous malformations, inflammatory diseases (pielitis cystica, acute tuberculosis, schistosomiasis, malakoplakia, vasculitis, inflammatory pseudotumor, amyloidosis, candidiasis, etc); ureteral thickenings after obstruction, surgery or radioteraphy; benign tumors like papilloma, inverted papilloma, fibroepithelial polyps, villous adenoma, benign and malignant mesenchymal tumors, and malignant tumors such as prostatic and gastric metastases, ureteral lymphoma among others.
Post-operative and Post-treatment Appearance of the Prostate and their Complications

All Day Room: GU/UR Community, Learning Center

Participants
Nicholas L. Fulton, MD, Cleveland, OH (Presenter) Nothing to Disclose
Kevin R. Kalisz, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To review common methods of treatment in prostate pathology, including prostatectomy, prostate artery embolization, external beam radiation, brachytherapy and drainage.
2. To discuss the imaging appearance of the post-treatment prostate.
3. To discuss common post-treatment complications of the prostate and adjacent organs.

TABLE OF CONTENTS/OUTLINE

Common Surgeries and Treatments for prostate pathology - Prostatectomy, Open vs. Robot-assisted laparoscopic radical prostatectomy - Prostate artery embolization - Transurethral resection of the prostate - Radiation (external beam, brachytherapy) - Percutaneous abscess drainage - Overview of indications and technique for prostate treatments - Complications - Anastamotic strictures and leaks (extraperitoneal and intraperitoneal) - Malpositioned brachytherapy seeds - Abscess, seroma and lymphocele formation - Fistula after radiation therapy - Injury to adjacent structures (rectum) - Non-radiologic complications (bladder outlet obstruction, incontinence, impotence) - Clinical outcomes - Recurrence and mortality rates by treatment - TURP versus PAE for BPH.
Pitfalls in Multiparametric MR Imaging of the Prostate

All Day Room: GU/UR Community, Learning Center

Participants
Nicholas L. Fulton, MD, Cleveland, OH (Presenter) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To review potential pitfalls in MRI of the prostate, including those resulting in false positive and false negative examinations.
2. To discuss normal prostate anatomy and anatomic variants which may be mistaken for pathology on prostate MRI.
3. To explain pitfalls inherent to MRI which may hinder diagnostic ability.
4. To review non-malignant findings of the prostate which may limit diagnostic accuracy, including benign prostatic hyperplasia, post-biopsy hemorrhage and prostatitis.

TABLE OF CONTENTS/OUTLINE
Overview of findings of prostate cancer on multiparametric MRIMRI findings of the normal prostate- Anterior fibromuscular stroma- Central gland- Periprostatic vein- Non-malignant pathologies of the prostate at MRI that may mimic malignancy- Benign prostatic hyperplasia- Prostatitis, Granulomatous prostatitis- Hemorrhage- Scarring Prostate Cancer that may be missed at MRI- Mucinous adenocarcinoma- Central gland tumors- Artifacts inherent to multiparametric MRI and how to correct them- Motion artifact- Limitations to diffusion-weighted imaging (low signal-to-noise ratio, susceptibility artifacts)- 1.5 vs. 3T- Presence or absence of endorectal coil
MRI Evaluation of the Central Gland of the Prostate: Normal and Pathologic Findings

All Day Room: GU/UR Community, Learning Center

Participants
Teodora N. Bochnakova, MD, Cleveland, OH (Presenter) Nothing to Disclose
Nicholas L. Fulton, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To review the normal appearance of the central gland of the prostate on multiparametric MR imaging
2. To discuss the appearance of prostate adenocarcinoma involving the central gland of the prostate
3. To describe other non-malignant etiologies of abnormal central glands, including benign prostatic hyperplasia
4. To review potential pitfalls in the evaluation of the central gland, including false positive and false negative findings of prostate cancer

TABLE OF CONTENTS/OUTLINE
Central gland: Normal anatomy and MRI appearance - Central zone and transitional zone
Age related changes - Long TE sequences to distinguish from peripheral zone
Incidence of central gland prostate cancer - Clinical presentation - Demographics
Natural history of central gland prostate cancer - T2-weighted imaging - Diffusion-weighted imaging - Dynamic contrast-enhanced imaging - Other techniques including spectroscopy, diffusion tensor imaging
Potential pitfalls in MRI of central gland - Benign prostatic hyperplasia - Post-biopsy hemorrhage - Normal age-related findings affecting accuracy
PI-RADS 2 for Central Gland Carcinoma - Emphasis on T2 over DWI
Urinary reconstruction techniques refer to reimplantation of the ureter into the bladder. There are a variety of surgical techniques available for reconstruction of the distal ureter, including modifications of ureteroneocystostomy, such as the psoas hitch and the Boari flap procedures, which allow for correction of longer ureteral defects. Multiple factors influence the choice of surgical procedure, including the length and location of the ureteral stricture or injury, the etiology of the ureteral abnormality, the timing of the operation relative to injury or treatment, and the status of the urinary bladder. Knowledge of normal postoperative imaging anatomy and of the imaging findings of known complications is imperative for appropriate interpretation. Failure of accurate image interpretation may lead to inappropriate intervention and/or delayed diagnosis, ultimately leading to unfavorable patient outcomes.

**TABLE OF CONTENTS/OUTLINE**

Basic description of the common surgical techniques available for reconstruction of the distal ureter. Illustration and explanation of the normal post-operative fluoroscopic and CT imaging findings. Description of postoperative complications and their fluoroscopic and CT imaging appearance. Emphasis will be placed on the psoas hitch and the Boari flap reconstruction techniques.
Multiparametric MRI Evaluation of Tumor Recurrence in the Post-Treatment Prostate

All Day Room: GU/UR Community, Learning Center

Participants
Kevin R. Kalisz, MD, Cleveland, OH (Presenter) Nothing to Disclose
Nicholas L. Fulton, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Rodney J. Ellis, MD, Pepper Pike, OH (Abstract Co-Author) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
The purpose of this exhibit is to: Review the MRI techniques used in the assessment of prostate cancer with emphasis on sequences most useful in the post-treatment prostate Understand the most common treatment modalities available for the treatment of prostate cancer and their indications Understand the expected post-treatment MRI appearance of the prostate Recognize the findings of recurrence of prostate cancer post-treatment as well as pitfalls that may mimic recurrence

TABLE OF CONTENTS/OUTLINE
1. Introduction
2. Review of prostate MRI sequences and their role in assessing the post-treatment prostate
3. Overview of common prostate cancer therapies and indications Radical prostatectomy External beam radiation Anti-androgen therapy Combination radiation and anti-androgen therapy
4. Normal and expected post-treatment changes for each therapy
5. Findings of prostate cancer recurrence for each therapy
6. Pitfalls and mimics of recurrence and ways to differentiate them true recurrence
Scrotum Calcifications: What You Should Think about?

All Day Room: GU/UR Community, Learning Center

Participants
Osman C. Saito, MD, PhD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Alexandre F. Kanas, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Sandra M. Tochetto, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Maria Cristina Chammas, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Andrea C. Gomes, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Giancarlo G. Cerri, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Guilherme O. Rego, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Rafael Macedo, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Laura M. Coura, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Arthur M. Correa, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
(1) The purpose of this educational exhibit is describe the main sort of scrotum calcifications; (2) To review the most common diseases that can cause scrotum calcifications; (3) To point out which radiological means should be used in order to make the right diagnosis; (4) To establish a concision description of what is relevant for the radiologist and physician; (5) Try to make make an algorithm for detecting the risk for malignancy.

TABLE OF CONTENTS/OUTLINE
Scrotum calcifications are commonly encountered in the clinical practice at ultrasound, and may be occasionally found at CT and X-ray examination. Intra- or extra-testicular calcifications have different clinical relevance. Extra-testicular calcifications are more frequent than intratesticular calcifications and they are usually benign, they include scrotal pearls, epididymal calcifications, and calcifications involving the tunicae and the scrotum wall. On the other hand intratesticular calcifications may be benign, if related to trauma, infarction, and inflammation, but they may also be found in tumors. Testicular microlithiasis may be found in healthy men, despite there is no evidence that it is either a premalignant condition or a causative agent for neoplasia. However there is a clear association exists between those testicular calcifications, and an increased risk of malignancy.
TEACHING POINTS

Due to increased application of the pelvic MRI, we have become more aware of cystic lesions in the genitourinary tract (GU). In order to understand cystic lesions in the lower GU tract, it is vital to understand normal and abnormal development of GU tract. Knowledge of normal anatomies in this complex region helps appropriate evaluation of the lesions. The purpose of this exhibit is:
1. To review normal development and anatomy of lower GU tract.
2. To discuss abnormal development in lower GU tract, which may cause cystic lesions.
3. To demonstrate the imaging, mainly MRI, appearance of cystic lesions of the lower GU tract.
4. To summarize differential diagnosis of cystic lesions of the lower GU tract.

TABLE OF CONTENTS/OUTLINE

Embryology & Anatomy
Male
- Intra-prostatic cysts
  - Median cysts: Prostatic utricle cysts, Müllerian duct cysts
  - Paramedian cysts: Ejaculatory duct cysts
- Lateral cysts: Prostatic retention cysts, Cystic degeneration of BPH, Cysts associated with tumor, Prostatic abscess
Extra-prostatic cyst
- Seminal vesicle cysts; in association with Zinner syndrome
- Cysts of the vas deferens
- Skene's duct cysts, urethral diverticulum

Cysts of the canal of Nuck
Problems not Mentioned during the Application of PI-RADS v2

All Day Room: GU/UR Community, Learning Center

Participants
Huihui Wang, MD, Beijing, China (Presenter) Nothing to Disclose
Xiaoying Wang, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
PI-RADS v2 is proved to be useful in evaluating prostate cancer. But there may be in delilma in the process of application that not mentioned. The purpose of this exhibit is to bring forward few questions we meet in our single institution and corresponding possible improvement.

TABLE OF CONTENTS/OUTLINE
The cases will be presented in a quiz format. Questions will be raised in the discussion of each case. The list of cases includes:
• whether DCE is no value for predicting tumors in the transition zone (TZ)?
• whether DCE is only useful in lesion score of 3 in the peripheral zone (PZ)?
• why T2WI is not used in scoring for the lesion in the peripheral zone if ADC and DWI are of diagnostic quality?
• How to do with the lesion scored 3 on T2WI images in the TZ, if it is scored 4 on ADC maps?
• When primary score 3 is upgraded, how to determine the final score if the greatest dimension is more than 1.5cm or prostatic capsule extension is suspected?
• If there is a less extent and focal enhancement on the basis of diffuse mild hypointensity on ADC and T2WI in the PZ, is it positive pattern?
Upper Urinary Tract Urothelial Cell Carcinoma: Urologists and Radiologists Working Together

All Day: GU/UR Community, Learning Center

Awards
Certificate of Merit
Identified for RadioGraphics

Participants
Lidia Fortuny, MD, Barcelona, Spain (Presenter) Nothing to Disclose
Carmen Sebastian Cerqueda, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Jordi Huguet, MD, Sabadell, Spain (Abstract Co-Author) Nothing to Disclose
Meritxell Costa-Grau, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Laura Bunesch Villaiba, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Carlos Nicolau, MD, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
- To show radiology findings that can help to differentiate benign from malignant pelvicaliceal or ureteral masses and thickenings, and how to help manage them.
- To assist in correct staging of upper urinary tract urothelial cell carcinoma (UTUCC).
- To depict urological medical advances and types of surgery that can be used in the treatment of these patients and how the radiologist can help in deciding their therapeutic management strategy.

TABLE OF CONTENTS/OUTLINE
Recent advances in diagnosis (ureterorenoscopy, cytology, radiological functional imaging like PET or MR-diffusion) and new treatments of upper UTUCC such as:
- transuretral resection by ureterorenoscopy in T1 UTUCC,
- neoadjuvant chemotherapy previous to surgery in T3 UTUCC,
- the possibility of open or endoscopic ureteral desinsertion depending on UTUCC location,
- renal conservative surgeries like Boari flap and reimplantation, Psoas hitch, uretero-ureterostomy, percutaneous nephroscopic surgery and transuretero-ureterostomy,
- autotransplantation. Emphasize the importance of a precise radiological report in helping urologists to provide the most adequate treatment in each patient.
TEACHING POINTS

Discuss clinical findings and pathophysiology of pheochromocytoma and paraganglioma
Review MRI appearance of pheochromocytoma and paraganglioma in common and uncommon locations with focus on abdominal imaging

TABLE OF CONTENTS/OUTLINE

Outline:- Review pathophysiology of pheochromocytoma and paraganglioma- Discuss clinical symptoms, laboratory findings, and hereditary syndromes- Illustrate MRI features of pheochromocytoma with review of differential diagnosis of adrenal masses- Illustrate MRI features of sympathetic and parasympathetic paraganglioma
Summary: Improving understanding of the pathophysiology and recognizing the common and uncommon MRI features of pheochromocytoma and paraganglioma will help the radiologist narrow differential diagnosis and improve recognition of uncommon tumors.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Pardeep K. Mittal, MD - 2016 Honored Educator
Courtney A. Coursey Moreno, MD - 2016 Honored Educator
Good News, It’s Not Cancer: Non-neoplastic Mimics of Renal and Urothelial Neoplasms

All Day Room: GU/UR Community, Learning Center

Participants
Monisha Shetty, MD, Royal Oak, MI (Presenter) Nothing to Disclose
Lejla Aganovic, MD, La Jolla, CA (Abstract Co-Author) Nothing to Disclose
Lawrence J. Bahoura, MD, Royal Oak, MI (Abstract Co-Author) Nothing to Disclose
Mitual B. Amin, MD, Royal Oak, MI (Abstract Co-Author) Nothing to Disclose
S. Z. Jafri, MD, Royal Oak, MI (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1.) There is a spectrum of non-neoplastic conditions of the kidney and urothelium that can mimic neoplasm.
2.) These non-neoplastic mimics include infectious, inflammatory, vascular and post-operative entities.
3.) Knowledge of these processes and their relevant imaging and histopathologic features can help to appropriately guide management.

TABLE OF CONTENTS/OUTLINE
The imaging and relevant histopathologic features of non-neoplastic mimics of renal and urothelial neoplasms will be reviewed, including the following entities: Sarcoidosis Amyloidosis Splenorenal fusion Parenchymal renal artery aneurysm Arteriovenous malformation Column of Bertin Tumefactive xanthogranulomatous pyelonephritis Mucormycosis Abscess Tuberculosis Hydatid cyst Focal pyelonephritis IgG4-related kidney disease Extramedullary hematopoiesis Erdheim-Chester disease Ureteral endometriosis Subepithelial hemorrhage Pyeloureteritis cystica Ablation cavity Post-operative fat-packing
Complications Following Renal Transplantation—Imaging in the Early Post-operative Period

All Day Room: GU/UR Community, Learning Center

Participants
James Tanner, MA, FRCR, Cambridge, United Kingdom (Presenter) Nothing to Disclose
Ines Harper, MBBCh, PhD, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Edmund M. Godfrey, MBBCh, FRCR, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Irum Amin, MBBCh, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Simon Harper, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Sara S. Upponi, MBBS, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

After viewing the exhibit the reader will:
Appreciate the normal immediate post-operative imaging appearances following renal transplantation.
Have a clear understanding of the early complications and be familiar with the imaging findings.
Understand key findings that require urgent intervention and the clinical and interventional radiological therapeutic options available.

TABLE OF CONTENTS/OUTLINE

Introduction
Imaging modalities utilized in the acute phase following renal transplant.
Normal imaging appearances following renal transplantation.
Pictorial review of early complications and relevant differential diagnosis illustrated with an imaging algorithm.
Summary and teaching points.
Complications Following Renal Transplantation-Imaging in the Late Post-operative Period

All Day Room: GU/UR Community, Learning Center

Participants
Ines Harper, MBBS, PhD, Cambridge, United Kingdom (Presenter) Nothing to Disclose
James Tanner, MA, FRCP, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Edmund M. Godfrey, MBBS, FRCP, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Irum Amin, MBBS, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Simon Harper, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Sara S. Upponi, MBBS, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
After viewing the exhibit the reader will: Have a better understanding of the range of pathologies occurring late after renal transplantation. Be familiar with the breadth of imaging findings, which will be illustrated using a case review approach highlighting the role of different imaging modalities. Be aware of the main differential diagnosis and management options in this clinical setting.

TABLE OF CONTENTS/OUTLINE
Introduction
Review of pathophysiology of late complications following renal transplantation. Pictorial review of common and important late complications including relevant pitfalls and mimics. Management options. Summary and teaching points.
Differentiation of Renal Tumors with Multiparametric MRI Approach

All Day Room: GU/UR Community, Learning Center

Awards
Cum Laude
Identified for RadioGraphics

Participants
Camila L. Vendrami, Santo Andre, Brazil (Abstract Co-Author) Nothing to Disclose
Carolina Parada Villavicencio, MD, Chicago, IL (Presenter) Nothing to Disclose
Argha Chatterjee, MBBS, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Paul Nikolaidis, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Vanessa Lewis, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
David C. Casalino, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Jeanne M. Horowitz, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Cecil G. Wood III, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Carla B. Harmath, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Vahid Yaghmai, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (Abstract Co-Author) Research Grant, Siemens AG

TEACHING POINTS
Discuss multiparametric MRI approach to diagnose RCC Illustrate the classic MR imaging features of RCC subtypes: clear cell, papillary and chromophobe and limitations in distinguishing them from other lesions such as oncocytoma and AML. Distinguish MR features for clear cell RCCs from papillary RCCs on chemical shift imaging features of fat and hemosiderin, T2 signal intensity and differences in enhancement. Distinguish MR features for a confident diagnosis of AML when there is macroscopic fat with India Ink artifact and signal loss on T1FS images and hypervascular enhancement and the limitations encounter for the diagnosis of lipid poor AMLs.

TABLE OF CONTENTS/OUTLINE
Introduction-importance of distinguishing renal masses RCC including the distinguishing MR features of their subtypes Assessment of imaging features including: size, T1 and T2WI signal intensity, chemical shift techniques for to assess for macroscopic and microscopic fat and India Ink artifact, enhancement characteristics, necrosis, DWI and ADC values. Ability to distinguish low from high grade clear cell RCCs Ability to distinguish clear cell from papillary RCCs and limitations. Ability to distinguish AML from clear cell RCC and limitations. Ability to distinguish papillary RCC from lipid poor AML and limitations. Ability to distinguish oncocytoma from RCC and limitations.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Jeanne M. Horowitz, MD - 2016 Honored Educator
Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator
Vahid Yaghmai, MD - 2012 Honored Educator
Vahid Yaghmai, MD - 2015 Honored Educator
Spectrum of Inflammatory Renal Disease
All Day Room: GU/UR Community, Learning Center

Participants
Katherine C. Longo, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Vincenzo K. Wong, Houston, TX (Abstract Co-Author) Nothing to Disclose
Cary L. Siegel, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (Abstract Co-Author) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Thomas M. Dykes, MD, Hershey, PA (Abstract Co-Author) Researcher, Bayer AG
Lori Mankowski Gettle, MD, Hummelstown, PA (Presenter) Nothing to Disclose

TEACHING POINTS
Review the differential diagnosis of inflammatory renal disease
Discuss imaging characteristics of inflammatory renal disease
Demonstrate how imaging influences diagnosis and treatment of inflammatory renal disease

TABLE OF CONTENTS/OUTLINE
Acute Inflammatory Renal Disease
Pyelonephritis
Pyonephrosis
Septic Emboli
Infected Renal Cyst
Chronic Inflammatory Renal Disease
Xanthogranulomatous Pyelonephritis
Renal Tuberculosis
Malakoplakia
Renal Replacement Lipomatosis
Systemic Inflammatory Diseases
Special Considerations
Tropical Infections
Immunocompromised Patients
Abnormal Anatomy

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at:
https://www.rsna.org/Honored-Educator-Award/

Perry J. Pickhardt, MD - 2014 Honored Educator
Multiparametric Ultrasonographic Assessment of Scrotal Masses Including Contrast-enhanced Ultrasound and Tissue Elastography: A Case Series Pictorial Review

All Day Room: GU/UR Community, Learning Center

Participants
Carla S. Goncalves, MBBS, Southend-on-Sea, United Kingdom (Presenter) Nothing to Disclose
Mohammad Aslam, MBBS, Southend On Sea, United Kingdom (Abstract Co-Author) Nothing to Disclose
Alan Tan, MBChB, London, United Kingdom (Abstract Co-Author) Nothing to Disclose
Shaifali V. Jain, FRCS, Westcliff on Sea, United Kingdom (Abstract Co-Author) Nothing to Disclose
Fatima Dambha, MBBS, London, United Kingdom (Abstract Co-Author) Nothing to Disclose
Andrew B. Tanqueray, FRCS, Essex, United Kingdom (Abstract Co-Author) Nothing to Disclose
Sidath Liyanage, MBBS, London, United Kingdom (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Describe the imaging features of common scrotal masses on traditional Gray-scale (GSUS) and Colour Doppler Ultrasound (CDUS), and on the emerging techniques of contrast-enhanced ultrasound (CEUS) and tissue elastography (TE) based on current literature.
2. Identify benign vs malignant features on multiparametric US in a case series from our institution.
3. Relate the imaging findings to management, intra-operative & histological findings.
4. Discuss the potential of CEUS and TE in the evaluation of scrotal lesions.
5. Be aware of the diagnostic pitfalls in scrotal multiparametric US.

TABLE OF CONTENTS/OUTLINE
1. Introduction:
   1a. diagrammatic summary of imaging features of common scrotal masses on traditional GSUS and CDUS
   1b. discussion of current literature on the emerging, added and adjuvant role of CEUS and TE in scrotal US and their imaging features
2. Pictorial review of a 14 case series from local cancer multi-disciplinary team meetings:
   2a. Illustration of the discriminating imaging features with GSUS, CDUS, CEUS and TE. Benign & malignant entities include: seminoma, teratoma, germ cell mixed form, lymphoma, segmental testicular infarction, simple cyst, TB orchitis
   2b. Case correlation of radiological findings with management, and intra-operative & histological findings
3. Pearls and pitfalls of scrotal multiparametric ultrasonographic assessment
4. Summary
Renal Angiomyolipomas: Typical and Atypical Presentations and Uncommon Complications

All Day Room: GU/UR Community, Learning Center

Participants
Pablo Soffia, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Andres Labra, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Giancarlo Schiappacasse, MD, Vitacura, Chile (Abstract Co-Author) Nothing to Disclose
Ema V. Leal, MD, Santiago, Chile (Presenter) Nothing to Disclose
Stefan Guiloff, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Fabian O. Villacres, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1.- Describe typical and atypical presentations of angiomyolipomas.
2.- Review the spectrum of imaging findings of angiomyolipomas on US, CT and MRI.
3.- Describe the association with tuberous sclerosis and lymphangioleiomyomatosis and its radiological features.

TABLE OF CONTENTS/OUTLINE
1.- Angiomyolipomas: epidemiology.
2.- Imaging characteristics of typical and atypical renal angiomyolipomas on US, CT and MRI.
3.- Complication of the angiomyolipomas: spontaneous rupture/bleeding, aggressive growth patterns.
4.- Image guided percutaneous treatment of complications
All in the Family: Current Update on Genetics and Imaging of Hereditary Renal Cell Carcinomas

All Day Room: GU/UR Community, Learning Center

Awards
Certificate of Merit

Participants
Hardik U. Shah, MBBS, MD, SAN ANTONIO, TX (Presenter) Nothing to Disclose
Bhagya Sannanajja, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose
Raghunandan Vikram, MBBS, FRCP, Houston, TX (Abstract Co-Author) Nothing to Disclose
Priya Rao, Houston, TX (Abstract Co-Author) Nothing to Disclose
Srinivasa R. Prasad, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Venkata S. Katabathina, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Discuss pathology & genetics of the various syndromes associated with hereditary renal cell carcinomas (RCC). Review the renal & extra-renal imaging findings of syndromic RCCs. Discuss screening & management guidelines of hereditary RCC syndromes.

TABLE OF CONTENTS/OUTLINE

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Venkata S. Katabathina, MD - 2012 Honored Educator
Raghunandan Vikram, MBBS, FRCR - 2012 Honored Educator
Srinivasa R. Prasad, MD - 2012 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Participants
Joshua Shur, MBBS, London, United Kingdom (Presenter) Nothing to Disclose
Shahrooz Mohammadi, MBBS, London, United Kingdom (Abstract Co-Author) Nothing to Disclose
Philip Touska, MBBS, London, United Kingdom (Abstract Co-Author) Nothing to Disclose
Faraan Khan, BSc, MRCP, London, United Kingdom (Abstract Co-Author) Nothing to Disclose
Michael Gonsalves, MBBS, London, United Kingdom (Abstract Co-Author) Nothing to Disclose
Graham J. Munneke, MBBS, London, United Kingdom (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
- To review the published imaging and pathological classification systems of renal masses.
- To understand the imaging pathway, indications and technique for the use of contrast enhanced ultrasound in the assessment of renal masses.
- To demonstrate the contrast-enhanced sonographic appearances of renal masses including benign and malignant lesions, with cross-sectional and pathological correlation.
- To understand how contrast-enhanced ultrasound can be used as a problem solving tool in difficult cases.

TABLE OF CONTENTS/OUTLINE
- Overview and learning objectives.
- Introduction and basic physics of contrast enhanced ultrasound.
- Bosniak classification system of renal masses and the WHO histological classification of renal tumours.
- How contrast-enhanced ultrasound is used in the imaging pathway for investigation of renal masses.
- Pictorial review of indeterminate renal masses with cross-sectional and pathological correlation.
- Conclusion and summary.
Ending the Voodoo of Prostate MRI: Application of PI-RADS 2.0 in the Diagnosis, Classification, and Reporting of Prostate Carcinoma

All Day Room: GU/UR Community, Learning Center

Participants
Samuel J. Galgano, MD, Birmingham, AL (Presenter) Nothing to Disclose
Jason A. Pietryga, MD, Riverside, RI (Abstract Co-Author) Nothing to Disclose
Jessica G. Zarzour, MD, Birmingham, AL (Abstract Co-Author) Nothing to Disclose
Rupan Sanyal, MD, Birmingham, AL (Abstract Co-Author) Nothing to Disclose
Mark D. Little, MD, Birmingham, AL (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Multi-parametric MRI is useful at identifying clinically significant prostate carcinoma and, if applied systematically, may decrease over-diagnosis and aid targeted MR/TRUS fusion guided biopsy. Teaching points: 1. Review ACR PI-RADS 2.0 guidelines for technical specifications for prostate carcinoma imaging. 2. Demonstrate, with specific imaging examples, new PI-RADS classification system for prostate lesions and its implications on diagnosis, staging, and reporting.

TABLE OF CONTENTS/OUTLINE
1. Introduction. Rational for new PI-RADS imaging classification and reporting to address patients with both biopsy-proven and suspecting prostate carcinoma to establish disease burden and staging. 2. Briefly review recommended ACR technical and dynamic imaging specifications for multi-parametric prostate MRI. 3. Using quiz based format, apply new PI-RADS 2.0 classification for unknown prostate lesions. Each case will be followed by pertinent findings and appropriate PI-RAD v.2 category. Cases will include normal pelvic and new sector map prostate anatomy, example of each PI-RAD category and rational for diagnosis, extra-capsular extension, neurovascular bundle and seminal vesicle invasion, as well as common imaging pitfalls secondary to benign findings and technical factors.
Up and Down of Peyronie’s Disease: When It Is Time to Worry?

All Day Room: GU/UR Community, Learning Center

Participants
Osmar C. Saito, MD,PhD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Marco Bianchi, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Rodrigo O. Pina, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Miguel J. Francisco Neto, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Maria Cristina Chammas, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Giovanni G. Cerri, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Adriano S. Seabra, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Pedro H. Moraes, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Arthur M. Correa, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Maria Cristina Chammas, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Sandra M. Tochetto, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Alexandre F. Kanas, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
(1) To describe the main clinical aspects of Peyronie disease; (2) To point out the main findings in X ray, ultrasound (US) and magnetic ressonance (MR); (3) Which examination should be performed first, ultrasound or MRI? (4) Which complications can occur lately?

TABLE OF CONTENTS/OUTLINE
Peyronie’s disease is an uncommon disorder that develops a fibrous plaque in the sheaths covering the penis corpora cavernosa. During the erection the penis usually bend towards the inelastic fibrous plaque. Erectile dysfunction may be related to pain, veno-occlusive dysfunction, or bending of the penis. After a time the plaque can calcifies. Soft tissue radiography of the penis can detect calcified plaques. Penile sonography is the first choice for identification of small lesions. US detects the number of plaques, their size, and the exact position of the lesions in the penis. MR imaging may be very usefull for detecting and staging penile tumors, evaluate arteriogenic dysfunction, depict penile fractures, visualize penile prostheses, and identify plaques of Peyronie disease. MR imaging of Peyronie disease shows a focal thickening of the tunica albuginea and is best seen on T2-weighted images. An inflamed Peyronie plaque enhances after an intravenous administration of gadolinium.
Renal Transplant Complications: Imaging Diagnosis and Interventions

All Day Room: GU/UR Community, Learning Center

Participants
Ilya Livshits, Buffalo, NY (Presenter) Nothing to Disclose
Sharon Steinberger, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Rebecca Chang, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Amir Noor, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Javin Schefflein, MD, New York, NY (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Discuss the various surgical techniques of renal transplantation
Identify the normal appearances of the transplanted kidney on
grayscale and Doppler ultrasound
Recognize a wide range of complications of renal transplantation and their appearance on
ultrasound, CT, and fluoroscopy
Understand imaging guided treatment options

TABLE OF CONTENTS/OUTLINE
1. Introduction     A. Discuss the history of renal transplantation dating back to 1954
     B. Explain the organ procurement and transplant network
2. Surgical technique     A. Review the anastomotic techniques in living donor and cadaveric renal transplants
     B. Overview of normal velocities and resistive indices (RI)
3. Imaging basics     A. Illustrate normal post transplant ultrasound appearance using grayscale and Doppler techniques
     B. Overview of normal velocities and resistive indices (RI)
4. Demonstrate a range of commonly encountered post transplant complications     A. Renal artery stenosis
     • Doppler waveform abnormalities
     • Fluoroscopic diagnosis
     B. Hydronephrosis
     C. Perinephric collections
5. Review treatment options for these complications     A. Renal artery stenting
     B. Fluoroscopic placement of ureteral stents
     C. CT guided drainage
6. Survival     A. Overall survival
     • Living donor
     • Cadaveric donor
     B. Quality of life
State-of-the-art High-resolution Ultrasonography of Acute Scrotum

All Day Room: GU/UR Community, Learning Center

Awards
Certificate of Merit

Participants
Nagaaki Marugami, Kashihara, Japan (Presenter) Nothing to Disclose
Aki Takahashi, MD, Kashihara, Japan (Abstract Co-Author) Nothing to Disclose
Toshiko Hirai, MD, Kashihara, Japan (Abstract Co-Author) Nothing to Disclose
Kimihiko Kichikawa, MD, Kashihara, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To introduce high-resolution scrotal ultrasonography by using transducer (11-15MHz) at B mode, color Doppler, and contrast enhanced mode.
2. To demonstrate the appearance of high-resolution ultrasonography in patients with acute scrotum.

TABLE OF CONTENTS/OUTLINE
1. Method and technique of scrotal ultrasound imaging (Grey-scale, color Doppler and contrast-enhanced US) by using high-frequency transducer
2. Etiology of acute scrotum
3. Case presentation of acute scrotum; testicular torsion from complete to intermittent torsion, segmental testicular infarction, testicular appendage, epididymitis from acute to chronic phase, orchitis, testicular trauma, testicular tumors and inguinal disorders.

Summary
Grey-scale, color Doppler and contrast-enhanced US by using high-resolution ultrasonography demonstrate high accuracy in the diagnosis of acute scrotum.
Pitfalls to Avoid in Acquiring and Interpreting Prostate MRI: Seven Preconceptions

All Day Room: GU/UR Community, Learning Center

Participants
Satoru Takahashi, MD, Suita, Japan (Presenter) Nothing to Disclose
Yoshiko Ueno, MD, PhD, Montreal, QC (Abstract Co-Author) Nothing to Disclose
Kazuhiro Kitajima, MD, Nishinomiya, Japan (Abstract Co-Author) Nothing to Disclose
Yu Ueda, PhD, Kobe, Japan (Abstract Co-Author) Employee, Koninklijke Philips NV
Yuko Suenaga, Kobe, Japan (Abstract Co-Author) Nothing to Disclose
Kazuro Sugimura, MD, PhD, Kobe, Japan (Abstract Co-Author) Research Grant, Toshiba Corporation Research Grant, Koninklijke Philips NV Research Grant, Bayer AG Research Grant, Eisai Co, Ltd Research Grant, DAIICHI SANKYO Group
Utaro Tanaka, Kobe, Japan (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Since the introduction of Prostate Imaging Reporting and Data System (PI-RADS), multi-parametric MRI (mpMRI) is now widely accepted as a modality to improve detection, localization, characterization, and risk stratification in patients with suspected prostate cancer. As PI-RADS v2 aims to establish minimum acceptable technical parameters, and to simplify and standardize image interpretation, there still are rooms to be caught up in our own preconceptions. The purpose of this exhibit is: 1. To review minimum technical requirement in mp-MRI by PI-RADS v2 2. To show technical considerations in each scanner to fulfill the requirement of PI-RADS vs and potential options 3. To demonstrate potential preconceptions in the interpretation of prostate MRI using PI-RADS v2

TABLE OF CONTENTS/OUTLINE
Scanning parameter/technique-Minimum requirement in PI-RADS v2-Image example of required sequences and their pitfall-Potential options to overcome pitfalls-T2w: "The thinner, the better"-DWI: "The bigger, the better"-DCE-MRI: "The sooner, the better"-Image interpretation-Review of PI-RADS v2 scoring-T2w: "Dark focuses are always evil"-DWI: "Its not my fault"-DCE-MRI: "the glory that blushed and bloomed"-FDG-PET: "Are you sure?"
Penile Prosthetic Implants in MRI: What Every Radiologist Must Know

All Day Room: GU/UR Community, Learning Center

Awards
Certificate of Merit

Participants
Marcelo Castro, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Paulina Sepulveda Pinto, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Eric Gana Sr, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Andrea I. Fuentealba Cargill, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Natalia Rossel, MD, Santiago, Chile (Presenter) Nothing to Disclose
Juan P. Duran Sr, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Sebastian Aguirre Vicente, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
Miguel Seminario, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose
David Herquinigo, MD, Santiago, Chile (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To realize a pictographic review of the most frequent penile implants (PI) currently used. To describe the types, components and the use mechanism of the different penile implants. To review the importance of the MR imaging technique in the evaluation of PI. To describe the most common features related to the typical radiological imaging findings in dysfunctional PI. To correlate clinical manifestations with the anatomical localization of dysfunctional PI described in MR imaging studies.

TABLE OF CONTENTS/OUTLINE
We realize a pictographic review of the imaging findings in normal and dysfunctional PI in MRI based on retrieved cases describing: Types and components of the most frequent PI. Relationship of penile prosthetic implants with pelvis anatomy. Functional complications of a penile prosthetic implants. We create and propose an organized systematic protocol that describes the radiological assessment in the RMI, with the basics elements in a “check list” form that each radiologist should know and consider in the evaluation of patients with PI. Debate about the future directions and summary of PI.
Multiparametric MRI Computer-aided Diagnosis: Which Role is it Play in Clinical Workflow of Prostate Cancer Detection?

All Day Room: GU/UR Community, Learning Center

Participants
Ge Gao, MD, Beijing, China (Presenter) Nothing to Disclose
Chengyan Wang, PhD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Xiaoying Wang, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Jue Zhang, Beijing, China (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To review the feasible workflow of PCa mpMRI-CAD in routine clinical application.
2. To discuss the advantage and pitfall of different clinical roles of PCa mpMRI-CAD.

TABLE OF CONTENTS/OUTLINE
Update the advanced PCa mpMRI-CAD
Clinical application of PCa mpMRI-CAD
Feasible workflow
Performance of different workflow (first/second/concurrent reader)
Advantage and pitfall of each role
Prospect of PCa mpMRI-CAD clinical application
Clinical process of PCa detection that integrate the dedicated PCa mpMRI-CAD
**UR166-ED-X**

Cancer Re-occurrence Detection in the Post Radiation Treated Prostate Gland Using Multiparametric Magnetic Imaging Resonance

All Day Room: GU/UR Community, Learning Center

**Participants**
Robert Villani, MD, Manhasset, NY (Presenter) Nothing to Disclose
Eran Ben-Levi, MD, Roslyn, NY (Abstract Co-Author) Nothing to Disclose
Ardeshir R. Rastinehad, DO, New York, NY (Abstract Co-Author) Consultant, Koninklijke Philips NV
Yonah B. Esterson, MD, Manhasset, NY (Abstract Co-Author) Nothing to Disclose

**TEACHING POINTS**
This exhibit will describe the appearance of the prostate gland post radiation treatment for malignancy using multiparametric magnetic resonance imaging (mpMRI). We will describe the appearance of re-occurrence of disease in the post radiation treated prostate gland. Following viewing this exhibit readers of mpMRI of the prostate should be comfortable with the typical appearance of a post treatment prostate gland, and the characteristics associated with neoplasm re-occurrence.

**TABLE OF CONTENTS/OUTLINE**
1. Prostate anatomy on mpMRI
2. Normal gland vs. post treatment gland appearance on mpMRI
3. Types of radiation treatment (i.e. Brachytherapy, Cyberknife etc.), and their mpMRI appearance
4. Other post cancer treatment appearance (i.e. Microwave ablation, Cryotherapy etc.)
5. mpMRI characteristics of post treatment re-occurrence
6. Gallery of sample cases
7. Review and conclusions
Genitourinary Oncologic Complications-Resident Primer
All Day Room: GU/UR Community, Learning Center

Participants
Lina El Bejjani, MD, Beirut, Lebanon (Presenter) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Meghan G. Lubner, MD, Madison, WI (Abstract Co-Author) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Perry J. Pickhardt, MD, Madison, WI (Abstract Co-Author) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc;
Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Venkata S. Katabathina, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Review the different types of genitourinary tumors.
Discuss the main acute complications associated to these tumors.
Review imaging findings related to these complications.

TABLE OF CONTENTS/OUTLINE
A. Epidemiology of GU cancers
B. Epidemiology of acute complications in GU neoplasms and the expected management
C. Case based review: GU tumors and associated complications
   1. Pericardial tamponade from metastasis
   2. Acute subscapular or intraabdominal hemorrhage
   3. Venous tumor invasion presenting with PE or DVT
   4. Acute venous tumor thrombus
   5. Cisplatin related arteriothromboembolic events in germ cell tumors
   6. Malignant bowel obstruction
   7. Bevacizumab or radiotherapy induced GI perforation
   8. Growing teratoma syndrome in germ cell tumors
   9. Spinal cord compression from metastasis
   10. Urinary tract obstruction with subsequent uremia or pyonephrosis:
       a. Bladder outlet obstruction
       b. Bilateral ureteral obstruction

With emerging different protocols aiming at prolonging survival rates, it is expected to encounter more urgent and life threatening complications in GU cancer patients whether treatment or non-treatment related. The purpose of this presentation is to highlight to radiology residents the acute complications in patients with GU tumors and to illustrate for them the radiologic findings to look for in emergency settings.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator
Venkata S. Katabathina, MD - 2012 Honored Educator
Adrenal or Extra-adrenal: That is the Question
All Day Room: GU/UR Community, Learning Center

Participants
Hugo C. Carneiro, MD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Brunna Oliveira, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Pedro J. Pereira, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Camila C. Tavares, MD, Sao Paulo Sp, Brazil (Abstract Co-Author) Nothing to Disclose
Aley Talans, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Tiago O. Morita, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Natally d. Horvat, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
To review adrenal glands and retroperitoneal anatomy; To demonstrate key imaging findings that may help the radiologist differentiate adrenal from extra-adrenal lesions; To discuss the main differential diagnosis.

TABLE OF CONTENTS/OUTLINE
- Adrenal gland and retroperitoneal anatomy;
- The potential "intruders";
- Illustrated cases from our department (abdominal US, CT and MR), depicting adrenal pseudolesions, such as: Gastric diverticulum; Hepatic cyst; Hepatic adenoma; Renal carcinoma; Retroperitoneal neoplasms; Ganglioneuroma; Leiomyosarcoma of inferior vena cava; Lymphoma; Neurovascular structures; Vein thrombosis with collaterals; Celiac ganglia; Accessory spleen; Pancreatic tail diseases.
Focal Treatment of Prostate Carcinoma: What the Radiologist Need to Know

All Day Room: GU/UR Community, Learning Center

Participants
Mariano Volpacchio, MD, Buenos Aires, Argentina (Presenter) Nothing to Disclose
Sadhna Verma, MD, Cincinnati, OH (Abstract Co-Author) Nothing to Disclose
Marcelo Borghi, Buenos Aires, Argentina (Abstract Co-Author) Nothing to Disclose
Joaquina Paz Lopez Moras, MD, Buenos Aires, Argentina (Abstract Co-Author) Nothing to Disclose
Teodoro Martin, MD, Jaen, Spain (Abstract Co-Author) Nothing to Disclose
Antonio Luna, MD, Jaen, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
In recent years, traditional approach to treat localized prostate cancer has been challenged by the development of various focal techniques. Although, there is controversy in the urological community as to strict indications and limitations as well as concerns about long term effectiveness, this focal approach with a curative intent represents an attractive alternative to radical treatment. The purpose of this exhibit is to: Review traditional treatment modalities for prostate carcinoma Discuss the rationale basis for focal treatment, technical aspects, patient and lesion selection Describe focal treatment approaches with emphasis of merits, potential complications and limitations Illustrate with a case-based approach pre and post-treatment expected findings and pitfalls

TABLE OF CONTENTS/OUTLINE
Introduction Traditional treatment of prostate carcinoma Focal treatment modalities: Radiation Therapy Cryoablation High-Intensity Focal Ultrasound (HIFU) Photodynamic therapy

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Sadhna Verma, MD - 2013 Honored Educator
Doppler Ultrasound Vascular Evaluation of the Penis and Testicles: A Quizzical Case Series

All Day Room: GU/UR Community, Learning Center

Participants
David C. Gimarc, MD, Denver, CO (Presenter) Nothing to Disclose

TEACHING POINTS

Groin pain in males is a frequent chief complaint encountered in the Emergency Department and Urgent Care settings. Commonly, initial radiology evaluation of the penis, scrotum, and testicles is accomplished with grayscale, color, and spectral Doppler sonographic imaging. Through this presentation, readers will become more familiar with the ultrasound (specifically spectral Doppler) evaluation of the most common conditions. In addition, readers will learn about the vascular anatomy of these organs, and how their physiology relates to the various conditions. This will be presented through a case series of quiz questions.

TABLE OF CONTENTS/OUTLINE

Case Examples will include: Testicular Torsion Epididymitis/Orchitis Complicated by abscess Post-traumatic hyperemia Priapism (before and after treatment) Low-flow (ischemic) High-flow (non-ischemic) Varicocele Testicular fracture and hematoma Scrotal Cellulitis Additionally, the presentation will review: Basic Penis, scrotal, and testicular vascular anatomy Testicular/Penile Vascular Physiology - related to Spectral Doppler findings
Genitourinary Tuberculosis - Understanding Pathophysiology Hallmarks through Imaging Findings

All Day Room: GU/UR Community, Learning Center

Participants
Guilherme O. Rego, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Yuri C. Neves, MD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Camila C. Tavares, MD, Sao Paulo Sp, Brazil (Abstract Co-Author) Nothing to Disclose
Dannuza M. Fernandes, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Jose R. Rimoli, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Alexandre F. Kanas, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Bruno A. Rocha, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Fernando I. Yamauchi, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Publio C. Viana, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

1. Review the pathophysiology hallmarks of the genitourinary tract tuberculosis and explain its spread and evolutive changes as seen in different imaging methods;
2. Describe the main imaging findings at multiamaging modalities of the disease.
3. Recognize the advantages and limitations of each imaging modality in depicting the disease.

TABLE OF CONTENTS/OUTLINE

Background Definition of urinary tract tuberculosis Epidemiology Clinical aspectsPathophysiology urinary tract tuberculosis and disease progressionReview of imaging findings Fluoroscopic findings Ultrasoundography aspects Computed tomography featuresAdvantages and limitations of different techniques.
Utility of PET/CT Imaging in Prostate Cancer: Novel Tracers

All Day Room: GU/UR Community, Learning Center

Participants
Mehdi Taghipour, MD, BOSTON, MA (Presenter) Nothing to Disclose
Esther Mena, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Sara Sheikhhabaei, MD, MPH, Baltimore, MD (Abstract Co-Author) Nothing to Disclose
Lilja B. Solnes, MD, MBA, Baltimore, MD (Abstract Co-Author) Nothing to Disclose
Rathan M. Subramaniam, MD, PhD, Dallas, TX (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Value of PET/CT imaging in the diagnosis, therapy assessment and post treatment setting of prostate cancer Value of PET/CT imaging in the management of patients with high risk prostate cancer Novel PET agents beyond FDG: 11C-Acetate, 11C- and 18F-Choline, 18F-FACBC, 18F-NaF, 18F- and 68Ga-PSMA-labelled compounds for biochemical recurrence prostate cancer Case illustration of PET/CT imaging in detecting loco-regional and distant metastatic disease in prostate cancer

TABLE OF CONTENTS/OUTLINE
Brief summary of prostate cancer epidemiology, diagnosis, treatment and patients’ prognosis. Role of PET/CT imaging in staging, therapy assessment and management of patients with prostate cancer Value of F18-FDG-PET/CT imaging in prostate cancer Value of C11-Acetate-PET/CT imaging in prostate cancer Value of C11 and F18-Choline-PET/CT imaging in prostate cancer Value of F18-FACBC-PET/CT imaging in prostate cancer Value of F18 NaF-PET/CT imaging in prostate cancer Value of F18- and Ga68-PSMA-based PET/CT imaging in prostate cancer
A Multimodality Exploration of Renal Sinus Disorders Utilizing the Latest Imaging Techniques

All Day Room: GU/UR Community, Learning Center

Participants
Saad Hussain, MD, New Haven, CT (Presenter) Nothing to Disclose
Vivek Patel, MD, New Haven, CT (Abstract Co-Author) Nothing to Disclose
Mahan Mathur, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Gary M. Israel, MD, Madison, CT (Abstract Co-Author) Nothing to Disclose
Margarita V. Revzin, MD, Wilton, CT (Abstract Co-Author) Nothing to Disclose
Mike Spektor, MD, New Haven, CT (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. Discuss the basic anatomy of the renal sinus.
2. Discuss the traumatic, benign, and neoplastic disorders of the renal sinus.
3. Present the ultrasound, CT, MRI, and angiographic imaging findings of these renal sinus disorders.

TABLE OF CONTENTS/OUTLINE
1. Renal sinus anatomy
2. Review the imaging modalities and protocols used to diagnose renal sinus pathology
3. Traumatic renal sinus disorders
   - Renal laceration involving the renal sinus
   - Post traumatic pseudoaneurysms
4. Non-neoplastic renal sinus disorders
   - Renal sinus (parapelvic) cysts
   - Renal sinus lipomatosis
   - Retroperitoneal fibrosis
   - Renal vascular lesions
5. Neoplastic renal sinus disorders
   - Transitional cell carcinoma arising from the renal pelvis
   - Metastatic/locally invasive tumors: lymphoma, renal cell carcinoma
6. Summary
TEACHING POINTS

Learning the significance of pyelorenal backflow (PRB). Improve the diagnosis of PRB through discussing its mechanisms. Perform a picture-based quiz to help radiologist learn about the CT appearances of the different forms of PRB.

TABLE OF CONTENTS/OUTLINE

The resorption of urine, as a compensatory mechanism in the setting of acute obstruction, is termed "pyelorenal backflow". This phenomenon occurs via one of five pathway: pyelovenous, pyelolymphatic, pyelotubular, pyelointerstitial and pyelosinusual. Based on a quiz format, we will emphasize key differential diagnostic points of each form through a pictorial review: Pyelotubular: considered normal phenomenon, produces a wedge-shaped striated area of blush extending from a calyx. Pyelointerstitial: Similar to pyelotubular although it reaches out to the edge of the renal cortex. Pyelosinus: most common form. Contrast enters the renal sinus and tracks along infundibulae, pelvis and proximal ureter. Pyelolymphatic: Contrast enters peripelvic lymphatics. Multiple small channels in the hilium of kidney directed towards the para-aortic lymph node chain are visualized. Pyelovenous: rare. Thrombus in the renal vein and inferior vena cava sufficiently slowed the flow to allow visualization on CT.
The purpose of this educational exhibit is to review the expected radiologic appearance and complications of devices and treatments used to treat urinary incontinence and erectile dysfunction.

**TABLE OF CONTENTS/OUTLINE**

Outline: Brief overview of urinary incontinence and erectile dysfunction including etiology, prevalence and indications for treatment. Overview of expected radiologic appearance of devices and treatments for urinary incontinence including urinary sphincters, peri-urethral bulking agents and male sling. Overview of expected radiologic appearance of devices used to treat erectile dysfunction including inflatable and semi-rigid penile prostheses. Image rich review of complications related to artificial urinary sphincters and penile prostheses. Complications such as device component malposition, malfunctioning tubing, urethral leak, infection, aneurysmal dilation of corporal cylinder, floppy glans SST deformity, pump erosion, collapsed reservoirs, post-surgical fibrosis will be illustrated.

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Evan S. Siegelman, MD - 2013 Honored Educator
MRgFUS and Prostate Cancer: Focal Therapy for a Healthy Life of Better Quality

All Day Room: GU/UR Community, Learning Center

FDA Discussions may include off-label uses.

Participants
Hans Peter Erasmus, Rome, Italy (Presenter) Nothing to Disclose
Susan Dababou, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Cristina Marrocchio, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Roberto Scipione, Terracina, Italy (Abstract Co-Author) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Carlo Catalano, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Acquire basic knowledge about prostate cancer, focal therapy and the technique called MRgFUS Understand the importance of MR guidance and its major advantages Understand patient inclusion criteria Learn about different approaches used with this technique Correlate the theory with results found in-vivo and appreciate the positive impact MRgFUS has had on life quality after focal therapy. Get a perspective on where focal therapy using MRgFUS is headed towards

TABLE OF CONTENTS/OUTLINE
Introduction ("What's the problem and how can we solve it?") Prostate Cancer Epidemiology Basic physiopathology Impact Value of focal treatments MRgFUS Basic concepts Advantages compared to conventional treatment Patient Inclusion Criteria Transurethral and Transrectal Approach Cases ("Does it work?") Global Experience Personal Experience Discussion ("What's in the future?") Current hurdles to overcome What should be further investigated? MRgFUS as primary care treatment? References
Diagnosis of Prostate Cancer at Multiparametric Prostate MRI: Mistakes in Interpretation

All Day Room: GU/UR Community, Learning Center

Awards
Certificate of Merit

Participants
Jinxing Yu, MD, Richmond, VA (Presenter) Nothing to Disclose
Ann S. Fulcher, MD, Midlothian, VA (Abstract Co-Author) Nothing to Disclose
Sarah G. Winks, MD, Richmond, VA (Abstract Co-Author) Nothing to Disclose
William C. Behl, MS, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Anna L. Ware, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Michael Brooks, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Mary A. Turner, MD, Richmond, VA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

To discuss the common and uncommon mistakes in the diagnosis of prostate cancer (PCa) at multiparametric MRI (mp-MRI) and to emphasize strategies and MR imaging clues to avoid these mistakes and make a correct diagnosis.

TABLE OF CONTENTS/OUTLINE

Mp-MRI of the prostate has become a very important tool in the diagnosis of PCa. However, there are many diagnostic challenges we encounter in our daily practice that may lead to mistakes in interpretation, compromising the accuracy of the diagnosis. Our radiology department is one of the few in the country in a large academic center performing US/MRI fusion-guided prostate biopsies. Our extensive experience has helped us recognize mistakes in the diagnosis of PCa at mp-MRI. These mistakes include but are not limited to misinterpretation of normal anatomic structures and benign processes as suspicious lesions and misinterpretation of atypical imaging presentations of PCa as benign processes. Technical issues related to acquisition and interpretation of functional imaging (DWI and DCE) of the prostate can also lead to mistakes in diagnosis. MR imaging clues and strategies for avoiding these mistakes in the diagnosis of PCa will be emphasized in the poster through many targeted biopsy proven examples.
Dynamic US and MR of Pelvic Floor Dysfunction: New Concepts to Improve Diagnosis

Awards
Certificate of Merit

Participants
Nicole Kurzbard-Roach, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Karoly Viragh, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Rinat Masamed, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Michael L. Douek, MD, MBA, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Daniel J. Margolis, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
Pelvic floor dysfunction, including both pelvic floor relaxation and pelvic organ prolapse, can lead to any combination of urinary or defecatory dysfunction, organ prolapse, and/or pelvic pain. Unfortunately, treatment failure is common - over 50% of patients presenting with pelvic floor dysfunction may have already undergone a failed intervention. Surgical intervention usually involves the placement of a pelvic sling, a procedure with a complication rate (pain and/or perforation) of approximately 10%. US and MR provide both anatomic and functional information for pre-procedural planning and post-operative problem solving, especially in the evaluation of mesh fragments. These dynamic imaging techniques provide reproducible and quantifiable means of diagnosis to triage patients to surgical intervention, follow patients after surgery, and evaluate failed interventions. Through multimodality imaging review and clinico-pathologic correlation, this exhibit will help radiologists understand surgically relevant pelvic floor anatomy, pelvic floor disorders, and the appearance of common implant and surgical techniques to improve performance and interpretation of dynamic pelvic floor imaging.

TABLE OF CONTENTS/OUTLINE
Female pelvic floor anatomy: compartments and relevant disorders Dynamic imaging protocols and guidelines Post-operative imaging evaluation
Participants
Djamel Ait Ali Yahia, Angers, France (Abstract Co-Author) Nothing to Disclose
Sultan H. Yahya, MBBS, Angers, France (Presenter) Nothing to Disclose
Cosmina R. Nedelcu, MD, Angers, France (Abstract Co-Author) Nothing to Disclose
Catherine Ridereau-Zins, MD, Angers, France (Abstract Co-Author) Nothing to Disclose
Christophe Aube, MD, PhD, Angers, France (Abstract Co-Author) Speaker, Bayer AG Support, General Electric Company

TEACHING POINTS
The purpose of this educational exhibit is to:
- convey the different clinical situations necessitating a penile MR exam
- clarification of clinical indications necessitating a penile MR exam
- highlight the typical imaging aspects of various penile diseases and their clinical significance. Such pathologies include Pyronie’s disease, penile carcinoma, penile trauma, and prosthetic implants.

TABLE OF CONTENTS/OUTLINE
- Anatomy- Imaging techniques and adaptations- Normal MR penile semiology- Pathologies and MRI features
  Pyronie disease  Penile carcinoma  Traumatic penile injuries  Penile implants- Conclusion
A practical guide to prostate magnetic resonance analysis: A step-by-step to detecting lesions

All Day Room: GU/UR Community, Learning Center

Awards
Magna Cum Laude

Participants
Valter R. Dos Santos Junior, MD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Anthony R. Souza, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Davi d. Romao, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Thais C. Lima, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Tassia R. Yamanari, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Natally d. Horvat, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Claudia D. Leite, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Research Grant, General Electric Company
Giovanni G. Cerri, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Pedro Panizza, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Publio C. Viana, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Luciana C. Zattar-Ramos, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Renata V. Leao, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

Teaching Points
To review prostate anatomy on Magnetic Resonance Imaging (MRI) To propose and explain a systematic approach based on a mnemonic "PROSTATE MRI" which will aid to remember each step of prostate MRI analysis To explain in details each step and discussing its relevance Before searching for lesions: purpose of exam, PSA, physical exam information, protocol and pitfalls Searching for lesions Malignancy risk of lesions (will be discussed on Part II) Searching extraprostatic involvement and metastasis

Table of Contents/Outline

Brief Introduction to the subject Prostate MRI Anatomy Systematic Approach to analysis prostate MRI Training Session presents a practical case in a interactive way to reinforce the concepts learned in previous sections Conclusions
ED006-SU

Genitourinary Sunday Case of the Day
Sunday, Nov. 27 7:00AM - 11:59PM Room: Case of Day, Learning Center

GU

AMA PRA Category 1 Credit™: .50

Participants
Theodora A. Potretzke, MD, Madison, WI (Presenter) Nothing to Disclose
Adam Froemming, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Naoki Takahashi, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (Abstract Co-Author) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Meghan G. Lubner, MD, Madison, WI (Abstract Co-Author) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Anup S. Shetty, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Richard Tsai, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Monica R. Drylewicz, MD, PhD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Matthew S. Davenport, MD, Cincinnati, OH (Abstract Co-Author) Royalties, Wolters Kluwer nv;
Benjamin Mervak, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Brian T. Welch, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Veena R. Iyer, MD, Minneapolis, MN (Abstract Co-Author) Nothing to Disclose
Seema Mukerjee, MD, White Plains, NY (Abstract Co-Author) Nothing to Disclose
Shannon P. Sheedy, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) Recognize imaging findings seen in disorders of the genitourinary systems. 2) Develop differential diagnosis based on the clinical information and imaging findings. 3) Recognize the clinical importance of diagnosis.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Naoki Takahashi, MD - 2012 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
PURPOSE
To determine the percentage of small (<3cm) complex cystic renal lesions that regress based on follow-up studies and to investigate predictive clinical factors.

METHOD AND MATERIALS
A hospital database was searched from 1/1/10, to 9/2/15, for Bosniak category (BC) 2F, 3 and 4 cysts studied with C+ CT or MRI and with follow up. Two readers independently assigned a BC to the initial and last studies. Demographics and clinical outcome of patients with lesions that regressed from BC 2F, 3 or 4 (or remained stable as BC 2F), were compared with those that progressed. The relationship of progression with age, sex and history of renal cell carcinoma (RCC) was assessed using Fisher's exact test. A subgroup analysis was performed on patients with lesions that were assigned a BC of 2F by both readers. Inter-observer agreement was assessed using Kappa statistics.

RESULTS
106 patients (71:35 M:F, avg. age 61) were identified with a dominant complex cystic renal lesion. 81 of 106 lesions (76.4%) regressed from BC 2F, 3 or 4 (60), or remained stable as a 2F lesion (21) (Kappa = 0.57). Two regressed lesions were resected; one of these regressed from BC 4 to 2F, was resected and was a low grade papillary RCC (this was in a 52 year old female with a history of RCC); the other was benign (renal dysplasia) in a patient without a history of RCC. 8 of the 25 progressed or stable BC 3 or 4 lesions were resected, of which 7 were RCC (87.5%) and 1 benign (cystic nephroma). To date, no patients recurred or had metastatic disease. Progression was associated with a history of RCC (P = .04). Kappa between the 2 readers for assigning a BC 2F was 0.41. 50 lesions (47.1%) were assigned a BC 2F by both readers. Kappa between the 2 readers for progression of these lesions was 0.43. 6 lesions (12%) progressed on follow up imaging. 3 of these were resected and were malignant. All 3 of these occurred in patients with a history of RCC. Progression was associated with history of RCC (p=0.007).

CONCLUSION
Based on this study, 76.4% of small (<3cm) BC 2F, 3 and 4 cystic renal lesions regress. Therefore, small size should be a consideration for conservative management. In the absence of a history of RCC these lesions may be amenable to imaging follow up rather than resection.

CLINICAL RELEVANCE/APPLICATION
In the absence of a history of RCC, small BC 2F, 3 and 4 lesions may be amenable to imaging follow up rather than immediate resection.
PURPOSE
To evaluate the relative cost-effectiveness of active surveillance (AS) vs. nephron-sparing surgery (NSS) in patients with Bosniak III renal cysts.

METHOD AND MATERIALS
A decision-analytic Markov model was developed to estimate life expectancy and lifetime costs for 60-year-old male patients with a Bosniak III renal cyst treated with AS or NSS. The model incorporated the yearly probability of metastatic disease and local recurrence (extrapolated from small solid renal neoplasms and adjusted for the 53% prevalence of malignancy in Bosniak III renal cysts), AS with multiphasic renal CT imaging at 6 months and annually for 5 years, and complications from CT imaging or NSS. Reclassification to Bosniak IV renal cysts on AS (1.1% per year) was treated by NSS. An incremental cost-effectiveness analysis (ICER) was performed under an assumed $50,000 per quality-adjusted life year (QALY) societal willingness-to-pay threshold level.

RESULTS
Active surveillance yielded an average QALY expectancy of 19.37 years, longer than 19.00 years for NSS (QALY difference of 4.5 months). The lifetime cost for AS of Bosniak III renal cysts was $19,387, substantially less expensive than $44,684 for NSS. Given that AS is more effective and substantially less expensive than NSS, the ICER is a negative value, indicating that AS dominates NSS. Results were robust to changes in most model parameters, with metastatic disease contributing substantial average lifetime costs for AS ($17,142) and NSS ($22,021).

CONCLUSION
Active surveillance for Bosniak III renal cysts was more effective and substantially less expensive than NSS, suggesting that a change in current recommendations is needed.

CLINICAL RELEVANCE/APPLICATION
Current management of Bosniak III renal cysts is based on the malignancy rate at surgical resection rather than on a survival advantage, and the results of a cost-effective analysis study can inform management recommendations.

SSA10-03  Can Quantitative CT Texture Analysis be used to Differentiate Subtypes of Renal Cell Carcinoma on Multiphasic Multidetector CT Images?

Sunday, Nov. 27 11:05AM - 11:15AM Room: E351

Awards
Student Travel Stipend Award

Participants
Gu Mu Yang, Zhang, MD, Beijing, China (Presenter) Nothing to Disclose
Hao Sun, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Bing Shi, Beijing, China (Abstract Co-Author) Nothing to Disclose
Huadan Xue, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Zhenhui Jin, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Balaji Ganesan, PhD, London, United Kingdom (Abstract Co-Author) CEO, TexRAD Ltd; Director, Feedback plc; Director, Stone Checker Software Ltd; Director, Prostate Checker Ltd

PURPOSE
To investigate whether CT texture analysis (CTTA) can be used to differentiate non clear-cell renal cell carcinoma (non-ccRCC) from clear-cell renal cell carcinoma (ccRCC) and differentiate non-ccRCC subtypes of papillary RCC (pRCC) and chromophobe RCC (chRCC).

METHOD AND MATERIALS
A total of 100 ccRCC and 27 non-ccRCC (12 pRCC and 15 chRCC) lesions were analyzed. CTTA was performed on multiphasic CT images by using TexRAD software. Receiver operating characteristic (ROC) analysis was performed and the area under the ROC curve (AUC) was calculated for texture parameters that were significantly different for the objectives. Sensitivity (Se), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV) and accuracy were calculated by using the cut-off value of texture parameter with the highest AUC.

RESULTS
Compared to ccRCC, non-ccRCC had significantly lower MPP, higher kurtosis at medium texture scales on unenhanced CT images (P=0.032) and lower mean, SD, entropy, MPP and higher kurtosis at all texture scales on enhanced CT images (P=0.000). A MPP < 66.26 at coarse texture scale on corticomedullary images identified non-ccRCC from ccRCC (AUC=0.92±0.04, Se=85.0%, Sp=92.6%, PPV=97.7%, NPV=62.5%, accuracy=86.6%, P=0.000). Compared to chRCC, pRCC had significantly lower mean and MPP at fine texture scale (P=0.002). A MPP < 56.06 at fine texture scale on corticomedullary images identified pRCC from chRCC (AUC=0.85±0.08, Se=86.7%, Sp=75.0%, PPV=81.3%, NPV=81.8%, accuracy=81.5%, P=0.002).

CONCLUSION
CTTA on multiphasic multidetector CT images could be used to accurately differentiate non-ccRCC from ccRCC, and further differentiate between pRCC and chRCC.

CLINICAL RELEVANCE/APPLICATION
CTTA could be used as a non-invasive tool to classify histological subtypes of RCC and potentially assist in patient management owing to their prognostic significance and guide in treatment selection.

SSA10-04  Differentiation of Papillary Type 1 and Type 2 RCC on CT Textural Analysis

Sunday, Nov. 27 11:15AM - 11:25AM Room: E351

Participants

Awards
Student Travel Stipend Award
To investigate the role of CT texture analysis (CTTA) in distinguishing Papillary Type I and Type II RCC.

METHOD AND MATERIALS

Multi phase contrast enhanced CT (CECT) including Non contrast (NC), Corticomedullary (CM), nephographic (N) and excretory (E) of 93 patients with pathologically proven pRCC (49 Type I and 44 Type II) underwent filtration-histogram based CTTA using a commercially available research software (TexRAD Ltd, www.texrad.com, part of Feedback Plc, Cambridge, UK). Using the DICOM images, filtration step extracted texture features using different spatial scale filters corresponding to fine, medium and coarse texture scales followed by histogram quantification: Mean gray-level pixel intensity, Entropy, Standard-Deviation (SD), Mean of positive pixels (MPP), Kurtosis and Skewness. Non-parametric Mann Whitney test was used to test for significant difference in CTTA between Type I and Type II pRCC using SPSS (IBM) software.

RESULTS

There were statistically significant differences in textural features between Type 1 and 2 in all phases of CECT. This was consistently seen across the phases in entropy with a mean of 13.19 for type 1 and 30.2 for type 2 (p<0.001), N phase. Significant differences were seen in SD of type 1 (mean 16.19) and type 2(mean 28.20) (p=0.003), MPP of type 1 (mean 14.67) and type 2(mean 29.18) (p<0.001) in N phase; kurtosis of type 1 (mean 26.31) and type 2(mean 38.22) (p=0.01) in NC phase. Other parameters (Mean and skewness) and phases (CM and E) were also useful in differentiating between the two subtypes.

CONCLUSION

A software based CTTA can reliably stratify type 1 from type 2 RCC on CECT images.

CLINICAL RELEVANCE/APPLICATION

Our study demonstrates the possibility of CT texture analysis as an imaging biomarker for differentiating subtypes of papillary RCC reliably.

HONORED EDUCATORS

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Raghunandan Vikram, MBBS, FRCR - 2012 Honored Educator

SSA10-05 Can Computerized Tumor-Cortex Echointensity Ratio Differentiate Angiomyolipomas from Echogenic Renal Cell Carcinomas?

Sunday, Nov. 27 11:25AM - 11:35AM Room: E351

Participants

Peein Habollahi, MD, Philadelphia, PA (Presenter) Nothing to Disclose
Laith R. Sultan, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Lisa P. Jones, MD, PhD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Chandra Sehgal, PhD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Anil Chauhan, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

PURPOSE

Hyperechoic renal lesions are a common incidental finding noted on routine ultrasound exams. Even though the majority of hyperechoic renal tumors are angiomyolipomas (AML), hyperechoic renal tumors cannot be characterized as AML based on ultrasound alone because up to one third of renal cell carcinomas (RCC) can be hyperechoic relative to the renal cortex. In the current study, we have evaluated the diagnostic value of renal tumor to cortex echointensity ratio (TCER) for the characterization of hyperechoic renal tumors.

METHOD AND MATERIALS

All the patients who underwent renal ultrasound examination within our health system between 2012-2014, were screened. Patients with adequately characterized hyperechoic renal tumors were included in the study. Contrast enhanced MRI, multiphase CT, 2 year follow up for stability and/or histopathology were considered as reference standard. TCER was defined as the ratio between renal mass echointensity to adjacent renal cortex, as measured by ROI placements. Mazda software (version 4.6, Lodz, Poland) was used for lesion segmentation and echointensity measurements.

RESULTS

A total of 101 tumors in 95 patients were identified. 75 out of 101 tumors (74.3%) were characterized as AML. Mean age of the patients with AML tumors was 63.1±14.7 versus 62.9±10.8 for patients with non-AMl tumors (p>0.05). AMLs were more prevalent among females (54 females (78.3%) with AML compared to only 9 females (34.6%) with non-AML tumors)(p<0.001). Within non-AML tumors, 20 out of 26 were malignant (including 19 RCCs as well as one metastatic papillary thyroid cancer). The mean TCER for AML was significantly higher compared to the other tumors (4.14±2.73 versus 2.19±0.71, respectively, p<0.001). For AML diagnosis, TCER values greater than 2.31 were associated with sensitivity, specificity and positive likelihood ratio of 82.67%, 73.08% and 3.07, respectively; with area under the ROC curve of 0.85. Moreover, TCER values greater than 3.98 resulted in 100%
specificity for AML diagnosis with a sensitivity of 37.33%.

CONCLUSION
These results suggest that computerized echointensity ratio might be a valuable tool for the characterization of hyperechoic renal masses, providing very high specificity for diagnosing AMLs with values greater that 3.98.

CLINICAL RELEVANCE/APPLICATION
Based on these findings, computerized TCER has the potential to decrease the amount and cost of the diagnostic work up for hyperechoic renal tumors.

SSA10-06 CT Texture Analysis of Post-contrast and Non-contrast Images; Early Observations on Differences in Renal Tumor Types
Sunday, Nov. 27 11:35AM - 11:45AM Room: E351

Participants
Azadeh Tabari, Boston, MA (Presenter) Nothing to Disclose
Cinthia Cruz, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Michael S. Gee, MD, PhD, Jamaica Plain, MA (Abstract Co-Author) Nothing to Disclose
Sarahjeev Singh, MD, Boston, MA (Abstract Co-Author) Research Grant, Siemens AG; Research Grant, Toshiba Corporation; Research Grant, General Electric Company; Research Grant, Koninklijke Philips NV
Debra A. Gervais, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

PURPOSE
Determine and compare CT texture analysis features between renal masses and define whether image texture can be used to distinguish different subtypes of renal tumors.

METHOD AND MATERIALS
IRB approved retrospective study of consecutive patients from a single institution who had biopsy proven renal cell carcinoma (RCC) and concomitant CT were included. Patients were divided in 5 groups based on the tumor type. Axial contrast-enhanced and unenhanced CT images were contoured manually by an analyst using commercially available software (TexRAD, UK), with 124 ROIs placed over the clear cell RCC (n=59), papillary RCC (n=16), chromophobe RCC (n=21), angiomyolipoma (AML) (n=17) and oncocyotma (n=11). Skewness, kurtosis, entropy, and MPP (mean value of positive pixels) were assessed in all filters. Independent ANOVA tests were used to evaluate for significant differences between groups

RESULTS
28 patients (M:F 18:10, mean age 59 ± 18 years), 12 ccRCC, 4 Pap RCC, 5 AML, 4 cRCC and 3 oncocyotma were identified. 22/28 of patients had small (<4 cm) renal masses. Histogram analysis of CT values using filter number 2 (ssf2) in contrast-enhanced nephrogenic phase showed statistically significant differences in skewness (range 0.5-0.3, f-ratio=3.6, p=0.009) and kurtosis (range 0.4-1.9, f-ratio=3.09, p=0.02) among the individual subtypes. AML and chromophobe showed the highest and lowest values for skewness. Chromophobe and papillary showed the highest and lowest values for kurtosis, respectively (table 1). In unenhanced CT ssf2 mpp (range: 27.7-67.8, f-ratio=3.6, p=0.01) were also significantly different with oncocyotma and papillary presenting the highest and lowest mpp values, respectively (table 1). None of the other evaluated features demonstrated significant differences.

When comparing the small and large tumors no significant difference in the evaluated texture features was found

CONCLUSION
Renal lesions demonstrated significantly different texture quantitative parameters on CT, specifically malignant lesions showed significantly different texture skewness and kurtosis on contrast enhanced CT, as well as in texture mpp on unenhanced CT images, regardless of tumor size

CLINICAL RELEVANCE/APPLICATION
Texture analysis features show early promise distinguishing renal tumor types. Ongoing evaluation is needed to determine potential future use as imaging biomarkers

SSA10-07 Atypical Imaging Features of Central Renal Cell Carcinoma That Mimics Renal Pelvic Urothelial Carcinoma? Utility of Intravoxel Incoherent Motion MR Imaging
Sunday, Nov. 27 11:45AM - 11:55AM Room: E351

Participants
Zhaojie Li, Wuhan, China (Presenter) Nothing to Disclose
Zhen Li, MD, PhD, Wuhan, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
To evaluate the diagnostic performance of intravoxel incoherent motion (IVIM)-derived perfusion and diffusion parameters in the differentiation of central renal cell carcinoma (RCC) from renal pelvic urothelial carcinoma, with pathologic examination as the reference standard.
The institutional review board approved this retrospective study and waived the informed consent requirement. A total of 111 patients with either pathologic analysis-confirmed central renal cell carcinoma (n=83) or renal pelvic urothelial carcinoma (n=29) were assessed by using multi-b values DWI(0–1700 sec/mm²) on a 3.0T MRI. IVIM-based parameters (D, pure diffusion; f, perfusion fraction; D*, pseudodiffusion coefficient) were retrospectively compared between central renal cell carcinoma (RCC) and renal pelvic urothelial carcinoma. Receiver operating characteristic (ROC) analyses were performed to determine the optimal thresholds, the sensitivities, and specificities for differentiation.

RESULTS
Mean f was significantly lower in the renal pelvic urothelial carcinoma group (f=0.242±0.053, P <0.001) than in the central renal cell carcinoma group (f=0.408±0.074). Mean D was significantly lower in the renal pelvic urothelial carcinoma group (D=0.911±0.138×10⁻³ mm²/s, P <0.05) than in the central renal cell carcinoma group (D=1.021±0.187×10⁻³ mm²/s). Mean D* did not significantly differ between the two groups (P =0.172). The AUC, sensitivity, specificity and the cutoff value, respectively, for differentiating central renal cell carcinoma (RCC) from renal pelvic urothelial carcinoma for f, D were as follows: f, 0.972, 100.0%, 89.7%, and 0.298; D, 0.682, 37.3%, 96.6%, and 1.098×10⁻³ mm²/s.

CONCLUSION
IVIM imaging can be used as a noninvasive imaging method to differentiate central renal cell carcinoma (RCC) from renal pelvic urothelial carcinoma. Mean f value is more sensitive than D and D* values in this differentiation.

CLINICAL RELEVANCE/APPLICATION
IVIM imaging can be used as a noninvasive imaging method to differentiate central renal cell carcinoma (RCC) from renal pelvic urothelial carcinoma.

SSA10-08 "Is It Enhancing or Not?" The Effect of Pseudo-enhancement on the Accuracy of Spectral CT Iodine Quantification Measurements and Its Implications for Renal Lesion Diagnosis

Sunday, Nov. 27 11:55AM - 12:05PM Room: E351

Participants
Todd C. Soesbe, PhD, Dallas, TX (Presenter) Nothing to Disclose
Lakshmi Ananthakrishnan, MD, Dallas, TX (Abstract Co-Author) Nothing to Disclose
Or Green, Haifa, Israel (Abstract Co-Author) Employee, Koninklijke Philips NV
Khaled A. Nasr, PhD, Dallas, TX (Abstract Co-Author) Nothing to Disclose
Xinhui Duan, PhD, Dallas, TX (Abstract Co-Author) Nothing to Disclose
Matthew A. Lewis, PhD, Dallas, TX (Abstract Co-Author) Research collaboration, CMR Naviscan Corporation
Suhny Abbara, MD, Dallas, TX (Abstract Co-Author) Author, Reed Elsevier; Editor, Reed Elsevier; Institutional research agreement, Koninklijke Philips NV; Institutional research agreement, Siemens AG
Robert E. Lenkinski, PhD, Dallas, TX (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Research Consultant, Aspect Imaging;

PURPOSE
To measure the effect of pseudo-enhancement (i.e., the artificial increase in attenuation) on Spectral CT iodine quantification as a function of lesion size, lesion iodine levels, background iodine levels, helical versus axial scanning, and Spectral CT scanner type. To compare the accuracy of Spectral CT iodine quantification algorithms (Siemens image-based versus Philips projection-based) in the presence of pseudo-enhancing backgrounds.

METHOD AND MATERIALS
Pseudo-enhancement effects were studied using a custom-made phantom containing either six small vials (8 mm diameter, 2 mL) or six large vials (27 mm diameter, 50 mL) of aqueous iodine solutions (0, 0.5, 1.0, 2.0, 4.0 and 6.0 mg I/mL). The background iodine concentration was 0, 5, or 10 mg I/mL. The vials simulated renal lesions of various sizes and enhancements, while the background simulated the surrounding renal parenchyma at different phases. Both helical & axial scans were taken using three different Spectral CT scanners (Siemens dual-detector SOMATOM Flash and Force, and Philips detection-based IQon) with the scan parameters consistent between the systems. Data were analyzed using either Siemens syngo.via software or Philips Spectral Diagnostic Suite software. 108 total ROIs were used to measure the average iodine concentration (mg I/mL) of the vials.

RESULTS
Iodine quantification pseudo-enhancement effects are inversely proportional to lesion size and lesion enhancement, and are directly proportional to background attenuation level. These results agree with Conventional CT results. No significant differences between helical and axial scans were observed. The image-based algorithms (Siemens) overestimated the iodine concentrations by 25% to 100% over, while the projection-based algorithm measured the true iodine concentrations within standard deviation error.

CONCLUSION
Pseudo-enhancement artificially increases the Spectral CT iodine quantification levels, most notably for low enhancing lesions (<5.0 mg I/mL) surrounded by a high attenuating background (10 mg I/mL). The projection-based Spectral CT algorithm outperformed the image-based algorithms for all but the highest background attenuation (10 mg I/mL) with the smallest vial (8 mm diameter).

CLINICAL RELEVANCE/APPLICATION
Iodine quantification measurements, a biomarker for improved renal lesion diagnosis and renal cell carcinoma staging, are more accurate from Spectral CT systems that use projection-based algorithms.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/
PURPOSE

Determine if quantitative material density thresholds can be determined to discriminate papillary renal cell carcinomas from hyperdense cysts using rapid kV-switching dual energy CT (rsDECT)

METHOD AND MATERIALS

IRB approved HIPAA compliant retrospective study of consecutive patients with pathologic diagnosis of renal cell carcinoma who underwent rsDECT at a tertiary care hospital from 2011-2015. Control group included patients with complex cysts with >1 year stability. Calcium, water, and iodine content were recorded for each papillary renal cell carcinoma (n=27) in arterial (n=14) and nephrographic (n=13) phase, and compared to complex cysts (n=54) in the arterial (n=27) and nephrographic phase (n=25). Optimal thresholds were estimated using logistic regression and Youden's J based on maximum specificity and sensitivity.

RESULTS

Complex cysts have lower calcium, water, and iodine content when compared to papillary RCCs. Intralesional calcium content > 805.7 mg/cc can be used to discriminate a papillary RCC from a complex cyst in the nephrographic phase (sens 0.92, spec 0.72, PPV 0.63, NPV 0.95, accuracy 79.0%, p=0.012). Water content > 1010 mg/cc can be used as a threshold between a papillary RCC and a complex cyst in the nephrographic phase (sens 1.0, spec 0.64, PPV 0.59, NPV 1.0, accuracy 76.3%, p=0.012). In the arterial phase, no reliable threshold value for calcium or water content was found. The optimum iodine content threshold was 1.28 mg/cc to distinguish a papillary RCC from a complex cyst in the nephrographic phase (sens 1.0, spec 0.96, PPV 0.92, and NPV 1.0; AUC 0.997, acc 0.97, p<0.0001).

CONCLUSION

rsDECT quantitative material density analysis provides calcium and water intralesional content thresholds that have high sensitivity for discrimination of papillary RCCs from complex cysts, and this has ramifications for unenhanced renal rsDECT applications. However, quantitative iodine content has the most accurate threshold.

CLINICAL RELEVANCE/APPLICATION

Knowledge of the iodine, water, and calcium content in papillary renal cell carcinomas and complex cysts can aid in diagnosis and guide management of the patient.
FDG PET-CT Identification of Distant Metastatic Disease in Uterine Cervical and Endometrial Cancers: Analysis from ACRIN 6671/GOG0233

Sunday, Nov. 27 10:45AM - 10:55AM Room: E353B

Participants
Katherine E. Maturen, MD, Ann Arbor, MI (Moderator) Nothing to Disclose
Temel Tirkes, MD, Indianapolis, IN (Moderator) Nothing to Disclose
Douglas S. Katz, MD, Mineola, NY (Moderator) Nothing to Disclose

SUB-EVENTS

SSA11-01 FDG PET-CT Identification of Distant Metastatic Disease in Uterine Cervical and Endometrial Cancers: Analysis from ACRIN 6671/GOG0233

PURPOSE
To estimate the accuracy of staging PET-CT for detecting distant metastasis in patients with advanced cervical or high grade endometrial cancer in the ACRIN6671/GOG0233 patient cohort and to compare site and central radiologist test performance.

METHOD AND MATERIALS
In an IRB approved study, PET-CT and clinical data were retrospectively reviewed for all patients enrolled in the ACRIN 6671/GOG0233 trial. Two central readers, blinded to site read and reference standard, rated PET-CTs for distant metastasis (on 1-6 scale; with 4-6 indicating "positive"). Reference standard was pathology and follow-up radiology reports. Diagnostic accuracy of site and central review was estimated and compared using generalized estimating equation models and nonparametric bootstrap for clustered data.

RESULTS
153 cervical and 203 endometrial cancer patients were enrolled at 28 sites. Overall prevalence of distant metastasis was 13.7% (21/153) for cervical and 11.8% (24/203) for endometrial cancer, with most common locations being lung (5.2%) and peritoneum (4.6%) for cervical and peritoneum (6.4%) for endometrial cancer. Site PET-CT reads demonstrated 47.6% sensitivity, 93.9% specificity, 91.9% NPV, 55.6% PPV, and area under the ROC curve (AUC) of 0.75 for detecting cervical cancer metastasis compared with 66.7%/93.9%/95.5%/59.3%/0.84 for endometrial cancer metastasis. The specificity (97.7% and 98.6%) and AUC (0.78 and 0.89) for central readers in detecting cervical and endometrial cancer metastases, respectively, were both higher compared with site review in both cancer groups (P<0.01 for specificity and P<0.001 for AUC).

CONCLUSION
FDG PET-CT demonstrates high specificity and NPV for detecting distant metastasis and should be included in the pretreatment evaluation. Central radiology review offers potential improvement of PET-CT performance for metastatic detection.

CLINICAL RELEVANCE/APPLICATION
Use of pre-treatment FDG PET-CT to detect distant metastasis in cervical and endometrial cancer can spare patients unnecessary aggressive therapy, with a false positive rate < 5%.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Susanna I. Lee, MD, PhD - 2013 Honored Educator

SSA11-02 Prevalence of Ovarian Cancer in Adnexal Cysts Initially Identified on CT Exams

Sunday, Nov. 27 10:55AM - 11:05AM Room: E353B

Participants
Johannes Boos, MD, Boston, MA (Presenter) Nothing to Disclose
Olga R. Brook, MD, Boston, MA (Abstract Co-Author) Research Grant, Toshiba Medical Systems Corporation
Jiemicr Fang, Boston, MA (Abstract Co-Author) Nothing to Disclose
Alexander Brook, PhD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Deborah Levine, MD, Boston, MA (Abstract Co-Author) Editor with royalties, UpToDate, Inc; Editor with royalties, Reed Elsevier;
**PURPOSE**

To assess the clinical outcome of adnexal cysts initially identified on CT, to determine if incidental cysts need follow-up.

**METHOD AND MATERIALS**

In this HIPAA-compliant, IRB-approved study the institutional database was searched for abdomen and pelvis CTs with or without intravenous contrast between 06/2003 and 12/2010 for female patients that were reported to have adnexal cysts. Imaging appearance of adnexal cysts was obtained from review of CT studies. Patients with known ovarian cysts or cancer were excluded. Clinical outcome was assessed using follow-up imaging studies, medical records, and state cancer registry. Descriptive statistics and 95% confidence intervals were calculated. A power analysis was performed to determine sample size.

**RESULTS**

2763/42111 (6.6%, 95%CI: 6.3-6.8%) women undergoing abdominal and pelvic CT examinations in the study period (mean age 48.1±18.1 years, range 15-102) had new finding of ovarian cyst. Average follow-up was 5.1±3.8 years (range 0-12.8 years). Median cyst size was 3.1 cm, IQR 2.3-4.3 cm, range 0.8-20.0 cm. 18/2763 (0.7%, 95%CI: 0.4-1.0%) patients were found to have ovarian cancer. 0/1032 (95%CI: 0-0.4%) patients with simple cysts were diagnosed with ovarian cancer. 6/1697 (0.4%, 95%CI: 0.1-0.8%) patients with complex cysts on initial CT (initial cyst size 1.2, 2.3, 4.3, 4.5, 5.6, and 8.4 cm) and age 30, 37, 55, 62, 65, and 71 years, were diagnosed with ovarian cancer after 1-17 months (median 3.5 months) follow up with serous borderline, serous, and seromucinous pathology. 12/34 (35.3%, 95%CI: 19.8-53.5%) of patients with cysts highly suspicious for cancer (omentum deposits, a large amount of ascites, or prominent soft tissue nodularity on index CT) had ovarian cancer and 2/34 (5.9%, 95%CI:0.7-19.7%) patients had metastases to the ovary.

**CONCLUSION**

Prevalence of previously unknown adnexal cysts on CT is 6.6%, with cancer rate at 0.7% (95%CI 0.4-1.0%). All simple cysts were benign (95%CI 99.6-100%). In complex cysts without suspicious features for cancer on index CT the risk to develop cancer was 0.4% (95%CI 0.1-0.8%).

**CLINICAL RELEVANCE/APPLICATION**

Incidental simple cysts are very unlikely to develop into ovarian cancer, and thus likely do not need follow-up. Complex cysts without features highly suspicious for cancer in women of any age have a low risk of developing into cancer.

**SSA11-03 3D Volumetric MRI Higher Order Texture Analysis for Preoperative Risk Stratification of Endometrial Cancer**

Sunday, Nov. 27 11:05AM - 11:15AM Room: E353B

Participants
- Yoshiko Ueno, MD, PhD, Montreal, QC (Presenter) Nothing to Disclose
- Martin Vallières, Montreal, QC (Abstract Co-Author) Nothing to Disclose
- Ives R. Levesque, PhD, Montreal, QC (Abstract Co-Author) Nothing to Disclose
- Foucauld Chamming's, MD, PhD, Montreal, QC (Abstract Co-Author) Speaker, Supersonic Imagine
- Anthony Dohan, MD, Montreal, QC (Abstract Co-Author) Nothing to Disclose
- Caroline Reinhold, MD, MSC, Montreal, QC (Abstract Co-Author) Consultant, GlaxoSmithKline plc

**PURPOSE**

This study aimed to develop a multivariate model based on 3D volumetric MRI higher order texture analysis for the preoperative risk stratification of endometrial cancer.

**METHOD AND MATERIALS**

Institutional review board was obtained for this retrospective study. We retrospectively analyzed the data of 93 patients (mean age, 65.4 years) who underwent 1.5-T MRI scan before hysterectomy for endometrial cancer. Four non-texture features (volume, size, and shape features) and forty-two texture features (3 first-order, 8 second-order and 31 higher-order features) were extracted from the whole tumour region of MR images (T2WI, DWI at b=500 and 1000 s/mm2, ADC map at b=0,500 s/mm2 and b=0, 1000 s/mm2, early- and equilibrium-phase, post contrast-enhanced images). These features were incorporated into multivariate models by logistic regression for prediction of three binary endpoints: lymphovascular space invasion (LVSI), deep myometrial invasion (MI ≥ 50%), and high tumour grade (Type II histology, grade 3 Type I histology). Prediction performance of each model was estimated at 0.83, 0.84, and 0.81 for LVSI, deep MI, and high grade tumour, respectively. Sensitivity, specificity, and accuracy of each model was estimated: 74.0%, 74.0%, and 73.7% for LVSI; 78.0%, 73.0%, and 75.0% for deep MI; 69.0%, 75.0%, and 72.0% for high tumour grade.

**CONCLUSION**

Multivariate models based on 3D volumetric MRI texture analysis achieved good prediction performance for LVSI deep MI, and high grade tumour in the pre-operative assessment of patients with endometrial carcinoma.

**CLINICAL RELEVANCE/APPLICATION**

3D volumetric MRI texture analysis may be useful for the preoperative risk stratification of endometrial cancer and has the potential to improve treatment planning.

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality
Comparison of the Diagnostic Accuracy of Multiparametric MRI and Fluorine-18 Fluorodeoxyglucose (18F-FDG) Positron Emission Tomography Combined with CT (PET/CT) in the Differentiation between Uterine Sarcoma and Benign Leiomyoma

Sunday, Nov. 27 11:15AM - 11:25AM Room: E353B

Participants
Masataka Nakagawa, Kumamoto, Japan (Presenter) Nothing to Disclose
Tomohiro Namimoto, MD, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Kie Shimizu, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Fumi Sakamoto, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Shinya Shiraiishi, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Seitaro Oda, MD, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Takeshi Nakaura, MD, Kumamoto, Japan (Abstract Co-Author) Nothing to Disclose
Yasuyuki Yamashita, MD, Kumamoto, Japan (Abstract Co-Author) Consultant, DAIICHI SANKYO Group

PURPOSE
To compare the diagnostic accuracy of multiparametric magnetic resonance imaging (MRI) and Fluorine-18 fluorodeoxyglucose (18F-FDG) positron emission tomography combined with CT (PET/CT) in the differentiation between uterine sarcoma and benign leiomyoma.

METHOD AND MATERIALS
This retrospective study was approved by the institutional review board. The requirement to obtain informed consent was waived. Eighty-nine consecutive patients diagnosed with benign leiomyoma or uterine sarcoma who underwent pelvic MRI exam at 3T and 18F-FDG PET/CT before surgery were included. Of 89 patients, 11 (12.4%) patients had uterine sarcomas and 78 (87.6%) patients had benign leiomyomas. Two radiologists blinded to the diagnoses of uterine tumors independently evaluated images based on multiparametric MRI (T2-weighted images, T1-weighted images, dynamic MRI, with or without DWI) and rated likelihood of the presence of malignancy on a scale of 1 to 5 (1, definitely absent; 2, probably absent; 3, equivocal; 4, probably present; 5, definitely present). The apparent diffusion coefficients (ADC) values were calculated from b=0 and 1000 s/mm2. The mean ADC value was also evaluated. The maximum standardized uptake values (SUVmax) of lesions were also measured. Receiver-operating-characteristic (ROC) curve analysis was performed to compare the diagnostic performance among multiparametric MRI with/without DWI, mean ADC value and SUVmax.

RESULTS
The area under the curves (AUCs) of ROC for multiparametric MRI with DWI, MRI without DWI, SUVmax, and meanADC were 0.963, 0.915, 0.892, and 0.814 for differentiation uterine sarcoma from benign leiomyoma, respectively.

CONCLUSION
Multiparametric MRI with DWI had highest AUC of ROC and can provide accurate information for differentiation between uterine sarcoma and benign leiomyoma.

CLINICAL RELEVANCE/APPLICATION
Multiparametric MRI with DWI had highest AUC of ROC and can provide accurate information for differentiation between uterine sarcoma and benign leiomyoma.
RESULTS
Mean and skewness showed a strong correlation with the histological type: adenocarcinomas presented higher mean and skewness values (69.8±10.5 e 0.55±0.19) in comparison with squamous carcinomas. Using a cut-off value ≥ 29 for mean it was possible to differentiate the two histological types with a sensitivity of 100% and a specificity of 81%. Kurtosis showed a positive correlation with tumor response to NACT, resulting in a higher responder patients (v.m. 5.7±1.1) in comparison with non-responders (v.m. 2.3±0.5). The optimal Kurtosis cut-off value for the identification of non-responders tumors was ≥ 3.7 with a sensitivity of 92% and a specificity of 75%.

CONCLUSION
Texture Analysis applied to T2w images of uterine cervical cancer seems to be a promising imaging biomarker of tumor heterogeneity that might be useful to predict response to neo-adjuvant chemotherapy and that show also a potential role to differentiate histological tumor types.

CLINICAL RELEVANCE/APPLICATION
Texture Analysis applied to uterine cervical cancer seems to be a promising tool to describe tumor heterogeneity. The finding of a correlation between texture parameters and response to therapy might be useful to predict response to neo-adjuvant-chemotherapy with the future aim of obtaining a more personalize therapy protocol.

SSA11-06 The Value of Uterine Artery Hemodynamic Parameters Before Chemotherapy in Predicting Methotrexate Resistance in Low-risk Gestational Trophoblastic Neoplasia

Sunday, Nov. 27 11:35AM - 11:45AM Room: E353B

Participants
Jiale Qin, MD, PhD, Hangzhou, China (Presenter) Nothing to Disclose
Xiaodong Wu, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Jiamin Luo, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Junmei Wang, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Weiguo Lu, Hangzhou, China (Abstract Co-Author) Nothing to Disclose
Xing Xie, Hangzhou, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
MTX single regimen is commonly used as the initial chemotherapy in low-risk GTN. In practice, about 30% cases become resistant to MTX after several courses, and then switch to other agents. Switching drug after the development of MTX resistance prolongs the overall duration of chemotherapy and accumulates more side effects in normal organs. Therefore, the method to predict MTX resistance prior to treatment is desirable. The mechanism of GTN occurrence is considered trophoblastic cells invading uterine myometrial vessels, resulting in the blood flow changed. Ultrasound, especially Spectral Doppler, is one of real-time blood flow imaging methods to detect the in-vivo hemodynamics. In our study, we analyzed the hemodynamic parameters of vessels in both GTN uterine lesion and uterine artery, to explore the relationship between these sonographic parameters and MTX response in order to find sonographic predictive parameters.

METHOD AND MATERIALS
Prospective analysis was carried out in a total of 80 low-risk GTN patients treated with MTX between September 2012 and Match 2016 in our institute. Hemodynamic parameters (PS, ED, TAmax, TAmean, S/D, PI and RI) in uterine artery were assessed by ultrasound. In the case of GTN uterine lesion detected, tumor size and intratumor hemodynamic parameters in the lesion were additionally measured. The relationships between sonographic parameters and MTX response were analyzed.

RESULTS
The MTX response rate was 68.8%. Univariable logistic regression analysis identified that serum hCG level, FIGO score, the maximal PS, ED, TAmax and TAmean of uterine artery were the significant predictors for MTX response (p<0.05). Multivariable logistic regression analysis indicated that the maximal PS, TAmax and TAmean of uterine artery were independent predictors to MTX response. Among them, TAmean was most powerful to predict MTX response with 0.720 AUC. It had 75.0% sensitivity and 63.2% specificity at the cutoff value of 19.16 cm/s. Interestingly, none of intratumor hemodynamic parameters was significantly correlated with MTX response.

CONCLUSION
The hemodynamic parameters of uterine artery obtained prior to chemotherapy, such as PS, TAmax and TAmean, could be used as an independent factor for predicting MTX response in the low-risk GTN patients.

CLINICAL RELEVANCE/APPLICATION
Uterine artery hemodynamic parameters before chemotherapy could be applied to select treatment protocols for management of low-risk GTN.

SSA11-07 Preoperative DCE Perfusion-MRI Parameters Predict Aggressive Histology and Tumor Grade in Endometrial Carcinomas

Sunday, Nov. 27 11:45AM - 11:55AM Room: E353B

Participants
Kristine E. Fasmer, Bergen, Norway (Presenter) Nothing to Disclose
Atle Bjørnerud, PhD, Oslo, Norway (Abstract Co-Author) Intellectual property, Nordic NeuroLab AS Board member, Nordic NeuroLab AS
Sigmund Ytte-Hauge, MD, Bergen, Norway (Abstract Co-Author) Nothing to Disclose
Inger Johanne Magnussen, MD, Bergen, Norway (Abstract Co-Author) Nothing to Disclose
Renate Gruner, Bergen, Norway (Abstract Co-Author) Nothing to Disclose
Jone Trovik, MD, Bergen, Norway (Abstract Co-Author) Nothing to Disclose
To evaluate the association between CT imaging derived inter-site tumor heterogeneity metrics obtained via advanced computational radiomics method and BRCA mutation status in patients with FIGO stage III high grade serous ovarian cancer (HGSOC).

**METHOD AND MATERIALS**

77 women were retrospectively included in this IRB-approved study and underwent computed tomography prior to cytoreductive surgery. All tumor sites were manually segmented. Haralick texture features were computed voxelwise for each volume of interest. Patients were analyzed for differences in 4 inter-tumor heterogeneity metrics: inter-site entropy (SE), inter-site cluster variance (SCV), inter-site cluster shade (SCS) and inter-site cluster prominence (SCP). They were computed by constructing an affinity matrix (AM) that captured the extent of similarity between the textures (energy, entropy, contrast, homogeneity) computed at the different sites. The AM was then converted into the aforementioned features. Mean and standard deviation of the various features were computed for BRCA+ and BRCA– patients. Unpaired Welch T-tests were used to assess the relationship of the features between BRCA+ and BRCA– patients. Correction for multiple comparisons was applied using false discovery rate.

**RESULTS**

Tumor heterogeneity features for BRCA+ patients were: SE=2.98±0.48, SCV=1.44±0.72, SCS=594±365, and SCP=5512±3391. For BRCA– patients, the metrics were: SE=3.28±0.66, SCV=2.36±1.94, SCS=1030±940, and SCP=9518±8514. SCV, SCS and SCP proved to be significantly different between BRCA+ and BRCA– patients (p=0.0026 each). SE was not statistically significant between the groups (p=0.08). The same metrics neither correlated with total tumor load nor with complete vs. incomplete resection status.

**CONCLUSION**

Our radiomics evaluation of different tumor sites in stage III ovarian cancer patients allows for a non-invasive quantitative assessment of inter-site heterogeneity. SCV, SCS, and SCP tumor heterogeneity texture features might be useful to predict BRCA mutation status in patients with stage III HGSOC.
The assessment of tumoral heterogeneity in the era of personalized medicine is important, as increased heterogeneity has been associated with distinct genomic abnormalities and worse patient outcomes. Our radiomics approach in these standard-of-care CT scans can have a clinical impact by offering a non-invasive tool that might improve treatment effectivity or predict outcome.

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Stephanie Nougaret, MD - 2013 Honored Educator
Evis Sala, MD, PhD - 2013 Honored Educator

**SSA11-09   Can Magnetic Resonance Imaging Predict Aggressiveness of Endometrial Cancer?**

**Sunday, Nov. 27 12:05PM - 12:15PM Room: E353B**

**Awards**

**Student Travel Stipend Award**

**Participants**

Mona Ahmed, MD, Houston, TX (Presenter) Nothing to Disclose
Jaafar F. Alkhafaji, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Caleb A. Class, PhD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Wei Wei, Houston, TX (Abstract Co-Author) Nothing to Disclose
Revathy B. Iyer, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Priya R. Bhosale, MD, Bellaire, TX (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

Patients with endometrial cancer (EC) may undergo pre-operative magnetic resonance imaging (MRI) for treatment planning. The purpose of this study was to evaluate MRI characteristics of EC and correlate with pathology, genomic features and recurrence free survival.

**METHOD AND MATERIALS**

71 patients with biopsy-proven EC were retrospectively analyzed following IRB approval. 3 radiologists reviewed imaging findings on sagittal dynamic post contrast T1WI (DCE) and sagittal T2WI sequences. Depth of myometrial invasion (DMI) was recorded as <50% and > or = 50%. Qualitative signal intensity (SI) was recorded as >myometrium, =myometrium and < myometrium and

**RESULTS**

Statistically significant correlation was noted between lower delayed DCE SI and the presence of MSI (p=0.042). 3 readers showed substantial agreement (0.62) based on Kappa analysis for qualitative tumor SI on DCE images. Tumors with SI >myometrium on T2WI showed higher DMI (p=0.028). 12 patients were lost to follow-up, recurrence-free survival analysis was performed on 59 patients. The patients with delayed DCE SI ROI of >209, had better recurrence-free survival (p= 0.014). Based on multivariate analysis, patients with MSI-stable disease and increased delayed DCE SI had better recurrence-free survival (p=0.027). We found no correlation between MRI SI and tumor sub-type or grade.

**CONCLUSION**

Patients with MSI-stable EC showing high SI on delayed DCE had better recurrence-free survival. Tumors with high T2WI SI demonstrated aggressive features on pathology.

**CLINICAL RELEVANCE/APPLICATION**

MRI may be used as a prognostic indicator in evaluating recurrence free survival and can be used to determine which patients may benefit from comprehensive surgical staging.

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Priya R. Bhosale, MD - 2012 Honored Educator
SSA16
Nuclear Medicine (Genitourinary Imaging)
Sunday, Nov. 27 10:45AM - 12:15PM Room: S505AB

GU CT MR NM
AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50
FDA Discussions may include off-label uses.

Participants
Matthias J. Eiber, MD, Muenchen, Germany (Moderator) Nothing to Disclose
Phillip J. Koo, MD, Phoenix, AZ (Moderator) Advisory Board, Bayer AG; ;

Sub-Events
SSA16-01 Selective Inhibition and Enhancement of Anti-3-[18F] FACBC (Fluciclovine) Transport in Prostate Carcinoma Xenografts
Sunday, Nov. 27 10:45AM - 10:55AM Room: S505AB

Participants
Funmilayo I. Tade, MD, MPH, Atlanta, GA (Presenter) Nothing to Disclose
Walter G Wiles IV, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Guolan Lu, Atlanta, GA (Abstract Co-Author) Nothing to DISCLO
e
Birdal Bilir, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Jeong Seok Lee, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Baowei Fei, PhD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Carlos Moreno, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Weiping Yu, PhD, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Ronald Voll, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
Shuntaro Oka, Sodegaura, Japan (Abstract Co-Author) Employee, Nihon Medi-Physics Co, Ltd
Hiroyuki Okudaira, Sodegaura, Japan (Abstract Co-Author) Employee, Nihon Medi-Physics Co, Ltd
Mark M. Goodman, PhD, Atlanta, GA (Abstract Co-Author) Royalties, Nihon Medi-Physics Co, Ltd
David M. Schuster, MD, Atlanta, GA (Abstract Co-Author) Institutional Research Grant, Nihon Medi-Physics Co, Ltd; Institutional Research Grant, Blue Earth Diagnostics Ltd; Consultant, WellPoint, Inc; ;

PURPOSE
Fluciclovine is an amino acid analogue PET radiotracer believed to be transported mainly via system L (LAT1), but subsequent in-vitro studies showed that it is also transported via system ASC (ASCT2). In contradistinction to in-vitro studies, mRNA expression of amino acid transporter genes shows strong correlation of fluciclovine uptake with the proton dependent transporter PAT1. We set out to determine the effect of intratumoral injection of the system L inhibitor BCH and PAT1 inhibitor MeAIB on fluciclovine uptake in a prostate cancer xenograft model

METHOD AND MATERIALS
50:50 PC3-Luciferase cells and matrigel were injected into both flanks of 18 SCID mice. At average tumor size of 5mm, intratumoral injection of BCH, MeAIB or saline (6 mice/group) was completed in one xenograft with the contralateral as control. After 60 mins, 4.6±0.1 MBq fluciclovine was injected via tail vein for a 60-minute dynamic microPET-CT. Time activity curves were plotted from ROIs drawn on the xenografts. Tumor viability was assessed by bioluminescence. Differences in fluciclovine uptake between the injected tumors and controls were compared using T-test and analysis of variance as appropriate with significance at p<0.05

RESULTS
5 mice (1 MeAIB and 3 saline) were excluded due to loss of tumor viability. Thus 6 BCH, 5 MeAIB and 2 saline injected mice were analyzed. Compared to controls, mean fluciclovine SUVmax was 37(±5.3) % lower in BCH injected tumors and 52(±10.6) % higher in MeAIB injected tumors (p<0.0001). There was no significant difference between mean fluciclovine SUVmax in saline injected tumors and their controls (P=0.8) as well as among all controls (P=0.3).

CONCLUSION
BCH injection has only partial inhibitory effect on fluciclovine uptake, confirming that system L (LAT1) plays a lesser role in transport. Lack of inhibition with MeAIB confirms no direct role of PAT1 with fluciclovine transport. The unexpected finding of enhanced fluciclovine uptake after MeAIB injection deserves further study, and may involve the complex interplay of decreased glutamine uptake via MeAIB system A transporter inhibition and downstream interaction with intracellular leucine and the mTOR cascade.

CLINICAL RELEVANCE/APPLICATION
This study suggests mechanisms that could be explored for increasing amino acid based radiotracer uptake for PET imaging of cancer and the interaction of amino acid transport with mTOR dynamics.

SSA16-02 A Comparison of Positivity Rates of Anti-3-[18F]FACBC PET-CT (Fluciclovine) in Recurrent Prostate Cancer Patients on Androgen Deprivation Therapy (ADT) vs ADT-Naive Patients
Sunday, Nov. 27 10:55AM - 11:05AM Room: S505AB

Participants
Oladunni O. Akin-Akintayo, MD, Atlanta, GA (Presenter) Nothing to Disclose
Ashesh B. Jani, MD, Atlanta, GA (Abstract Co-Author) Nothing to Disclose
**Histopathology** classified 40/56 (71.4%) as PCa and 16/56 (28.6%) as benign. MP imaging with two parameters (T2w+DWI) achieved cancer, local and distant staging.

**RESULTS**

Fluciclovine is a fluorinated synthetic amino acid radiotracer with utility in prostate cancer imaging. As part of an ongoing randomized controlled trial involving post-prostatectomy recurrent prostate cancer patients, we explored the effect of ADT on prostate cancer detection by evaluating fluciclovine positivity rates in patients on ADT and ADT-naïve patients.

**METHOD AND MATERIALS**

Fifty-one patients underwent fluciclovine PET-CT as part of a prospective clinical trial. Fluciclovine uptake was recorded and descriptive statistics computed. Four equivocal scan interpretations were analyzed as positive for this study. Two-sample T-test and Fisher’s exact test were used to determine statistical significance of differences in means of background data and proportion of fluciclovine positive patients respectively.

**RESULTS**

Of the 51 patients who underwent fluciclovine PET-CT, 8 were on ADT at the time of the scan. 2 ADT patients were excluded from final analysis as PET-CT was within 2 days of starting ADT. Average (±SD, range) duration of ADT was 25.3 (±41.9, 5.14-110.7) weeks. Mean PSA (±SD, range) was 3.15 (±2.99, 0.02-7.75) ng/ml in the ADT group and 2.35 (±5.26, 0.05-31) ng/ml in the ADT-naïve group. PSA values were not significantly different between both groups (P=0.59). Median (range) Gleason Score was 9 (7-9) in the ADT group and 7 (6-10) in the non-ADT group. Overall fluciclovine positivity rate was lower in the ADT group (66.67%) compared to the ADT-naïve group (83.72%). This difference however was not statistically significant (P=0.30). Positivity rates increased with PSA in both groups with rates in the ADT-naïve group being 79.41%, and 100% at PSA levels <2 and ≥2 ng/ml, respectively; and in the ADT group 33.33% and 100% at PSA levels <2 and ≥2 ng/ml, respectively. Differences in positivity across PSA levels were not statistically significant (p=0.14 and P=1.00 at PSA levels <2 and ≥2 ng/ml, respectively), though sample size was small in each sub-category.

**CONCLUSION**

Fluciclovine PET-CT was able to detect prostate cancer recurrence in patients on ADT, though there seems to be a lower detection rate at PSA levels <2ng/ml. Further study is required with greater sample size.

**CLINICAL RELEVANCE/APPLICATION**

Validity of radiological imaging after commencement of ADT is often queried. Our study shows that fluciclovine may be of use in this regard though detection rate may be reduced at lower PSA levels.

**SSA16-03** Multiparametric [11C]Acetate Positron Emission Tomography/Magnetic Resonance Imaging in the Assessment of the Prostate Cancer

**Sunday, Nov. 27 11:05AM - 11:15AM Room: S505AB**

**Participants**

Stephan H. Polanec, MD, Vienna, Austria (Presenter) Nothing to Disclose
Piotr Andrzejewski, MA, Vienna, Austria (Abstract Co-Author) Nothing to Disclose
Pascal A. Baltzer, MD, Vienna, Austria (Abstract Co-Author) Nothing to Disclose
Thomas H. Helbich, MD, Vienna, Austria (Abstract Co-Author) Research Grant, Medicon, Inc Research Grant, Siemens AG Research Grant, C. R. Bard, Inc
Dietmar Georg, PhD, Vienna, Austria (Abstract Co-Author) Nothing to Disclose
Georgios Karanikas, MD, Vienna, Austria (Abstract Co-Author) Nothing to Disclose
Gero Kramer, MD, Vienna, Austria (Abstract Co-Author) Nothing to Disclose
Wolfgang Wadsak, Vienna, Austria (Abstract Co-Author) Speaker, General Electric Company; Consultant, THP Medical Products
Vertriebs-GmbH; Research Grant, ABX GmbH; Research Grant, Rotem GmbH
Markus Mitterhauser, Vienna, Austria (Abstract Co-Author) Speaker, General Electric Company
Martin Susani, Vienna, Austria (Abstract Co-Author) Nothing to Disclose
Peter Brader, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Katja Pinker, MD, New York, NY (Abstract Co-Author) Nothing to Disclose

**METHOD AND MATERIALS**

To demonstrate the feasibility of fused multiparametric [11C]Acetate ([11C]Ace) positron emission tomography/magnetic resonance imaging (MP [11C]Ace PET/MRI) for insight into tumor biology and to investigate the value of MRI and PET parameters for primary prostate cancer (PCa) detection, local and distant staging.

**RESULTS**

Histopathology classified 40/56 (71.4%) as PCa and 16/56 (28.6%) as benign. MP imaging with two parameters (T2w+DWI) achieved
the highest sensitivity, specificity and diagnostic accuracy of 95%, 68.8% and 88%, with an AUC of 0.82 for primary PCa. Neither assessments with a single parameter (AUC, 0.54-0.79), nor different combinations with two parameters (AUC, 0.67-0.76), three parameters (AUC, 0.69-0.79), four parameters (AUC, 0.73-0.76) nor five parameters (AUC, 0.731) achieved equally good results. MP[11C]Ace PET/MRI improved local staging with a sensitivity, specificity and diagnostic accuracy of 100%, 96% and 97% compared to MRI alone with 72.2%, 100% and 95.5. MP [11C]Ace PET/MRI correctly detected osseous and liver metastases in five patients.

CONCLUSION
MP[11C]AcePET/MRI is feasible, merges morphologic with functional information and allows insights in molecular and metabolic processes involved in cancer development. MP[11C]AcePET/MRI with two MRI derived parameters (T2 +DWI) yields the highest diagnostic accuracy. The addition of more parameters doesn’t improve diagnostic accuracy of primary PCa detection. MP[11C]Ace PET/MRI facilitates an improved local and distant staging.

CLINICAL RELEVANCE/APPLICATION
MP [11C]Ace PET/MRI provides a “one-stop” staging in patients with primary PCa and thus has the potential to improve [M1] therapy.

SSA16-04 Comparison of MRI and 18F-FDG PET/MRI for Pretherapeutic Tumor Staging of Patients with Primary Cancer of the Uterine Cervix

Sunday, Nov. 27 11:15AM - 11:25AM Room: S505AB

Participants
Johannes Grueneisen, Essen, Germany (Presenter) Nothing to Disclose
Lino Sawicki, MD, Dusseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Benedikt M. Schaarschmidt, MD, Dusseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Martin Heubner, Essen, Germany (Abstract Co-Author) Nothing to Disclose
Michael Forsting, MD, Essen, Germany (Abstract Co-Author) Nothing to Disclose
Lale Umutlu, MD, Essen, Germany (Abstract Co-Author) Consultant, Bayer AG

PURPOSE
The aim of this study was to assess and compare the diagnostic potential of MRI and integrated 18F-FDG PET/MRI for the evaluation of the primary tumors as well as whole-body tumor staging of patients with cervical cancer.

METHOD AND MATERIALS
A total of 44 consecutive patients with histopathologically confirmed cervical cancer were prospectively enrolled for a whole-body 18F-FDG PET/ MR examination prior to therapy. After written informed consent was obtained, all patients underwent an integrated whole-body PET/MRI examination, which comprised a diagnostic, contrast-enhanced whole-body MR protocol including dedicated imaging of the female pelvis. Two radiologists separately evaluated the MRI data, followed by readings of the PET/MRI datasets, regarding the determination of the local tumor spread of primary tumors of the uterine cervix as well as detection of nodal and distant metastases.

RESULTS
MRI and PET/MRI enabled the correct detection of 43 of the 44 primary cervical tumors, while in one patient with FIGO stage Ia, the tumor could not be identified based on either imaging technique. Furthermore, both, MRI and PET/MRI allowed for a correct determination of the T-stage in 38 (86%) out of the 44 patients. In 19 of the 44 patients lymph node metastases were present. PET/MRI revealed higher values for sensitivity (84% vs. 68%), specificity (92% vs. 87%) and diagnostic accuracy (89% vs. 80%) in comparison to MRI for the identification of nodal positive patients. In 3 patients distant metastases were present and could be detected in both imaging modalities.

CONCLUSION
The present study demonstrates the usefulness of 18F-FDG PET data as a valuable additive to MR imaging for more accurate nodal staging of patients with cervical cancer. For the determination of the local tumor spread 18F-FDG PET data does not provide an additional benefit to MRI.

CLINICAL RELEVANCE/APPLICATION
Combining high-quality MR and simultaneous PET-imaging, integrated PET/MRI enables an accurate TNM staging of tumors of the uterine cervix and may serve as a valuable alternative/adjunct for the clinical work-up in a pretreatment setting.

SSA16-05 Diffusion-weighted Whole-body Imaging with Background Body Signal Suppression (DWIBS) Co-registered with Digital FDG PET for Lymph Node Staging of Bladder Cancer

Sunday, Nov. 27 11:25AM - 11:35AM Room: S505AB

Participants
Michael V. Knopp, MD, PhD, Columbus, OH (Presenter) Nothing to Disclose
Huyen T. Nguyen, PhD, Columbus, OH (Abstract Co-Author) Nothing to Disclose
Katherine Binzel, PhD, Columbus, OH (Abstract Co-Author) Nothing to Disclose
Kamal S. Pohar, MD, Columbus, OH (Abstract Co-Author) Nothing to Disclose
Debra Zynger, MD, Columbus, OH (Abstract Co-Author) Nothing to Disclose
Amir Mortazavi, MD, Columbus, OH (Abstract Co-Author) Nothing to Disclose

PURPOSE
To develop and assess the diagnostic value of a combined PET MRI protocol that uses diffusion-weighted whole-body imaging with background body signal supression (DWIBS) and low-dose digital PET for lymph node staging in bladder cancer.

METHOD AND MATERIALS
In this prospective study we have currently 60 patients enrolled with muscle-invasive bladder cancer to undergo neoadjuvant
Robert Yoshiko Participants

SSA16-07 Substantially different information in similar disease. CT can not be used for assessment of the extent of active metastatic skeletal disease in PCa. Different PET modalities give bone regions from PET activity. FCH give different information about the skeletal disease. Active sites on NaF or FCH differed less from each other than sclerotic bone. There was a significant correlation between TCA and S-PSA (p<0.02), indicating that FCH could be best to evaluate active skeletal disease.

CONCLUSION
Our results suggests that CT can not be used for assessment of the extent of active metastatic skeletal disease in PCa. NaF and FCH appear to leap n-staging forward based on a new level of precision.

METHOD AND MATERIALS

12 patients with advanced skeletal PCa (>5 lesions) who had had routinely PET/CT both with FCH and NaF on consecutive days were analyzed. Bone regions in CT were used to co-register the two PET/CT scans. Whole skeleton VOI was defined on CT of PET with HU<150, and sclerotic/dense bone as HU>600. Additional VOIs were defined for FCH and NaF PET uptakes. PET based FCH and NaF VOIs that overlapped with the CT based skeletal and sclerotic VOIs were separately generated and analyzed. Pathologic bone volumes (CT, HU>600), NaF (SUV>10) and FCH (SUV >3.5) were created. For comparison we had 5 patients diagnosed with PCa with no skeletal disease.

RESULTS
There was no statistical between the sclerosis on CT in patients with metastases and in patients with no metastases. In analogue to TLG (total lesion glycolysis), we also analyzed total choline kinase activity for FCH (TCA) and total bone demineralization activity for NaF (TBA). The TCA varied from 0.57 to 4.85 [kg] in patients with metastases, i.e. up to 16.1% of skeletal volume and this was <0.3% of skeletal volume in a PCa control patients with no metastases. The TBA varied from 0.94 to 13.6 [kg] in patients with metastases, i.e. up to 17.1% of skeletal volume. The TBA was <1.5% of skeletal volume in PCa control patients. The sclerotic bone volume represented <3% of the pathologic FCH volume and <7% of the NaF volume in patients with multiple metastases. In the control PCa patients pathologic FCH was <0.5% of the sclerotic bone volume and pathologic NaF volume <1% of sclerotic bone. There was a significant correlation between TCA and S-PSA (p<0.02), indicating that FCH could be best to evaluate active skeletal disease.

CONCLUSION
Our results suggests that CT can not be used for assessment of the extent of active metastatic skeletal disease in PCa. NaF and FCH give different information about the skeletal disease. Active sites on NaF or FCH differed less from each other than sclerotic bone regions from PET activity.

CLINICAL RELEVANCE/APPLICATION
CT can not be used for assessment of the extent of active metastatic skeletal disease in PCa. Different PET modalities give substantially different information in similar disease.
and 6 under surveillance but negative at additional imaging). In 9 cases the recurrence was not identified (1 lost to follow-up, 2 treated with palliative androgen therapy). Among these 5 patients were relapsing after surgery, 8 after RT and 20 after surgery and salvage RT. The gold standard was the clinical and imaging follow-up at 41 months (median value: range 17-51), including biopsy of the suspected sites when indicated.

METHOD AND MATERIALS
The study included 21 patients diagnosed with locally advanced uterine cervical cancer who underwent pre-treatment MRI and 18F-FDG PET and were treated with concurrent CRT. 18F-FDG parameters were calculated using the standard uptake value (SUVmax, and SUVmean); metabolic tumour volume (MTV); total lesion glycolysis (TLG); ADC parameters: Maximum, mean, and minimum value (ADCmax, ADCmean, ADCmin); percentile ADC values (10th, 25th, 50th, 75th, 90th); and skewness and kurtosis of ADC were measured and compared between the responder and non-responder groups using a Tukey’s test. The Cox regression analysis was performed and Kaplan-Meier survival curves were used for EFS analysis.

RESULTS
In the non-responder group, MTV and TLG of the primary tumour were significantly higher than those of the responder group (p = 0.04 and p = 0.01, respectively). Applying Cox regression multivariate analysis, MTV (Hazard ratio [HR], 4.725; p=0.036), TLG (HR, 4.725; p=0.036), and 10th percentile ADC (HR, 5.207; p=0.048) showed a statistically significant association with EFS. When an optimal cut-off value was applied for MTV and TLG using ROC curve analysis, the EFS rates above the cut-off value were significantly lower than that below the cut-off value (p=0.002 and p=0.002, respectively).

CONCLUSION
Pre-treatment volume-based quantitative parameters of 18F-FDG PET may have better potential compared to ADC histogram for predicting treatment response and EFS in patients with locally advanced cervical cancer.

CLINICAL RELEVANCE/APPLICATION
Our study clearly showed that MTV and TLG can be used to identify patients with advanced uterine cervical cancer treated with CRT at high risk for recurrence. Our results also suggest that volume-based 18F-FDG PET/CT analysis could provide more effective information than volume-based ADC histogram analysis for predicting treatment outcome for patients with advanced uterine cervical cancer.

SSA16-08 Long Term Results of A Comparative PET/CT and PET/MRI Study of 11C-Acetate and 18F-Fluorocholine for Restaging Recurrent Prostate Cancer With Low PSA

Sunday, Nov. 27 11:55AM - 12:05PM Room: S505AB

Participants
Valentina Garibotto, MD, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Thomas Zilli, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Claire Tabouret-Viaud, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Giorgio Lamanna, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Olivier Rager, New York, NY (Abstract Co-Author) Nothing to Disclose
Sandra Jorcano, Barcelona, Spain (Abstract Co-Author) Nothing to Disclose
Hans-Joerg Vees, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Yann Seimbille, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Habib Zaidi, MSc, Switzerland (Abstract Co-Author) Nothing to Disclose
Gismon Ratib, MD, PhD, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Raymond Miralbell, MD, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Franz Buchegger, MD, Geneva, Switzerland (Abstract Co-Author) Nothing to Disclose
Karl-Olaf Lovblad, MD, Geneva, Switzerland (Presenter) Nothing to Disclose

PURPOSE
18F-fluorocholine (FCH) and 11C-acetate (ACE) are validated PET tracers for restaging of recurrent prostate cancer (PCa), targeting a common metabolic pathway (cellular membrane synthesis). Superiority in local staging is expected for ACE, given the absence of urinary excretion. Aim of this study was an intra-individual comparison of the two tracers to identify recurrent PCa at low PSA values (i.e., ≤ 3 ng/ml after surgery and ≤ 5 ng/ml after radiotherapy, RT), using clinical and imaging follow up data as gold standard.

METHOD AND MATERIALS
We included 33 subject, 29 evaluated by PET/CT and 4 by PET/MR, the same hybrid modality being used for the two tracers. Among these 5 patients were relapsing after surgery, 8 after RT and 20 after surgery and salvage RT. The gold standard was the result of the clinical and imaging follow-up at 41 months (median value: range 17-51), including biopsy of the suspected sites when indicated (6 cases). In 9 cases the recurrence was not identified (1 lost to follow-up, 2 treated with palliative androgen therapy and 6 under surveillance but negative at additional imaging).
RESULTS

The positivity rate for ACE was 66% and for FCH was 60%. The clinical and imaging follow-up confirmed that the recurrent disease was local in 11 cases, loco-regional in 4 cases, and metastatic in 9 cases (6 M1a and 3 M1b). Results were concordant in 82% of the cases (26/33) and discordant in 7/33 cases, 6 PET/CT and 1 PET/MR. All discordant cases concerned nodal localizations: in 4 cases ACE showed additional nodal uptake (3 true positive –TP- and 1 undetermined at follow-up) and in 2 cases FCH (1 TP and 1 false positive at follow-up), while in 1 case with multiple nodal localizations 2 different nodes were positive (both TP). The discordant lymph nodes were retroperitoneal (5), pararectal (1) and external iliac (2).

CONCLUSION

In patients with recurrent PCa at low PSA values, ACE and FCH showed minor discrepancies for nodal staging, mainly in the retroperitoneal area, the majority of which confirmed as TP at follow-up. Both tracers performed equally for local recurrences.

CLINICAL RELEVANCE/APPLICATION

In relapsing patients with low PSA, 11C-acetate and 18F-choline show minor discrepancies for nodal staging, while the local and distant staging provided by the two tracers is equivalent.

PURPOSE

To compare therapy management based on conventional imaging (CT/MRI/bone scan) vs. Choline/PSMA-PET/CT in patients with high-risk or recurrent prostate cancer (PC).

METHOD AND MATERIALS

In 50 patients with high-risk or recurrent PC (=biochemical relapse) 11C-Choline- or 68Ga-PSMA-PET/CT was performed before radiotherapy planning within a prospective registry study. Only patients with conventional staging (CT/MRI/bone scan) before PET/CT (n=36) were included in this subgroup analysis to compare management decisions before and after PET/CT concerning treatment intent (curative vs palliative) and target volume (TV) definition.

RESULTS

17 patients with high-risk PC, 12 patients with biochemical relapse after surgery and 7 patients with biochemical relapse after surgery and salvage radiotherapy were evaluated. PET/CT resulted in a change of management in 82% of patients with high-risk PC (TNM- and TV changes, n=12/17; treatment changes, n=14/17), in 66% of patients with recurrent PC (TNM- and TV changes, n=8/12) and in 85% of patients with recurrence after surgery and salvage radiotherapy (TNM- and treatment changes, n=6/7). In 2 patients who were stratified as M1 after conventional imaging PET/CT led to downstaging (M0) or detected oligometastatic disease, enabling curative therapy in both patients. In 12 patients, initially planned for curative treatment the detection of N1 (n=3) or M1 disease (n=9) shifted the treatment goal to palliative. Although patients with recurrence after surgery plus salvage radiotherapy were usually in a palliative situation, PET/CT enabled in 28% (2/7) of these patients disease localization and a curative approach.

In 30% (8/27) of patients, originally considered as curable, PET/CT was useful to avoid overtreatment due to early visualization of an incurable disease. Main limitation of the study is the lack of histological verification.

CONCLUSION

PET/CT had a great impact on decision making in radiotherapy planning of patients with high-risk or recurrent prostate cancer by improving staging accuracy and preventing overtreatment. Therefore we suggest that PET/CT should be included in the work-up in specific clinical situations.

CLINICAL RELEVANCE/APPLICATION

PET/CT significantly influences therapeutic management in patients with high-risk or recurrent prostate cancer.
To evaluate diagnostic accuracy of biparametric MRI (bpMRI) and expression levels of 11 genes in apparently benign tissue for detection of clinically significantly prostate cancer (SPCa).

**METHOD AND MATERIALS**

Eighty patients with an elevated PSA (2.5 - 20.0 ng/ml) and/or abnormal digital rectal examination (DRE) underwent bpMRI examination performed using surface array coils prior to a systematic 12 core biopsy (SB). bpMRI consisted of T2-weighted imaging and three separate diffusion weighted imaging acquisitions (5 b values 0-500 s/mm², 2 b values 0-1500 s/mm², 2 b values 0-2000 s/mm²). In addition to SB, two targeted biopsy cores, if a bpMRI target present, and two cores from normal-appearing prostate area, based on bpMRI, were obtained. bpMRI findings were reported using a Likert scoring system (1-5). The RNA transcript levels of ACSM1, AMACR, CACNA1D, DLX1, PCA3, PLA2G7, RHOU, SPINK1, SPON2, TMPRSS2-ERG and TDRD1 were measured with quantitative reverse-transcription PCR. Serum PSA, free PSA (fPSA) were measured and PSA density, prostate volume, age, DRE findings, TRUS findings, use of 5α-reductase inhibitors were included in the analyses as well. A regularized logistic regression classifier was used to evaluate the diagnostic accuracy of individual parameters and their combinations for detection of SPCa. The diagnostic accuracy was estimated using an area under the curve (AUC) values computed from a leave-pair-out cross validation. SPCa was defined as Gleason score 3+4 or higher.

**RESULTS**

SPCa was diagnosed in 36 (45%, 36/80) patients, respectively. Likert score and fPSA were the parameters with the highest AUC values of 0.924, 0.732, respectively. The use all 11 genes resulted in AUC value of 0.645 while the clinical variables, including fPSA, dPSA, demonstrated AUC values of 0.806. The highest AUC value were achieved by the use of Likert score and fPSA (0.930). Predicting SPCa utilizing all features (n=20) resulted in AUC value of 0.900.

**CONCLUSION**

The 11 studied genes provided limited added value to bpMRI. bpMRI demonstrated high diagnostic accuracy for detection of SPCa and addition of fPSA resulted in only minor improvement.

**CLINICAL RELEVANCE/APPLICATION**

The 11 studied genes, fPSA, PSA and clinical parameters provided limited additional value to biparametric MRI for the detection of clinically significantly prostate cancer

---

To evaluate diagnostic accuracy of biparametric MRI (bpMRI) and expression levels of 11 genes in apparently benign tissue for detection of clinically significantly prostate cancer (SPCa).

**METHOD AND MATERIALS**

Eighty patients with an elevated PSA (2.5 - 20.0 ng/ml) and/or abnormal digital rectal examination (DRE) underwent bpMRI examination performed using surface array coils prior to a systematic 12 core biopsy (SB). bpMRI consisted of T2-weighted imaging and three separate diffusion weighted imaging acquisitions (5 b values 0-500 s/mm², 2 b values 0-1500 s/mm², 2 b values 0-2000 s/mm²). In addition to SB, two targeted biopsy cores, if a bpMRI target present, and two cores from normal-appearing prostate area, based on bpMRI, were obtained. bpMRI findings were reported using a Likert scoring system (1-5). The RNA transcript levels of ACSM1, AMACR, CACNA1D, DLX1, PCA3, PLA2G7, RHOU, SPINK1, SPON2, TMPRSS2-ERG and TDRD1 were measured with quantitative reverse-transcription PCR. Serum PSA, free PSA (fPSA) were measured and PSA density, prostate volume, age, DRE findings, TRUS findings, use of 5α-reductase inhibitors were included in the analyses as well. A regularized logistic regression classifier was used to evaluate the diagnostic accuracy of individual parameters and their combinations for detection of SPCa. The diagnostic accuracy was estimated using an area under the curve (AUC) values computed from a leave-pair-out cross validation. SPCa was defined as Gleason score 3+4 or higher.

**RESULTS**

SPCa was diagnosed in 36 (45%, 36/80) patients, respectively. Likert score and fPSA were the parameters with the highest AUC values of 0.924, 0.732, respectively. The use all 11 genes resulted in AUC value of 0.645 while the clinical variables, including fPSA, dPSA, demonstrated AUC values of 0.806. The highest AUC value were achieved by the use of Likert score and fPSA (0.930). Predicting SPCa utilizing all features (n=20) resulted in AUC value of 0.900.

**CONCLUSION**

The 11 studied genes provided limited added value to bpMRI. bpMRI demonstrated high diagnostic accuracy for detection of SPCa and addition of fPSA resulted in only minor improvement.
Discrimination of Clear Cell Renal Cell Carcinoma from Oncocytoma and Fat-Poor Angiomyolipoma on MDCT Using Peak Lesion Enhancement Relative to Uninvolved Renal Parenchyma

Station #3

Participants
Heidi Coy, Los Angeles, CA (Presenter) Nothing to Disclose
Jonathan R. Young, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Michael L. Douek, MD, MBA, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Matthew S. Brown, PhD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
James Sayre, PhD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (Abstract Co-Author) Nothing to Disclose

Purpose
Although a renal mass can have imaging features of a typical clear cell renal cell carcinoma (ccRCC) on MDCT, up to 30% of these are found to be benign after surgery. Most commonly oncocytoma (Onc) and fat-poor angiomyolipoma (fpAML). Discrimination between ccRCC, and Onc or fpAML on imaging would preclude the need for biopsy, and could alter management between surgery and ablation, or active surveillance and no further evaluation. The purpose of our study is to discriminate ccRCC from Onc and fpAML on MDCT using peak lesion enhancement relative to renal cortex.

Method and Materials
With IRB approval for this HIPAA-compliant retrospective study, we queried our clinical databases to obtain a cohort of histologically proven renal masses with preoperative MDCT with four phases (unenhanced, corticomedullary (CM), nephrographic (NP), and excretory (EX)). The entire lesion was segmented in each phase. A CAD algorithm determined a 0.5cm region of interest (ROI) of peak lesion enhancement ≤300HU within the 3D lesion contour. A 0.5cm ROI was placed in enhancing renal cortex. A 0.5cm region of interest (ROI) of peak lesion enhancement ≤300HU within the 3D lesion contour. A 0.5cm ROI was placed in enhancing renal cortex.

Results
141 patients (61% men, 39% women) with 156 unique renal masses (99 (63%) ccRCC, 43 (28%) Onc, 14 (9%) fpAML) were analyzed. Mean lesion size in ccRCC = 3.1 cm (range 0.8-6.4), Onc = 3.0 cm (range 1.0-6.5), and fpAML=2.2 cm (range 0.7-3.6). In discriminating ccRCC from Onc, the model had an AUC of 0.797 (0.726-0.869 95% CI) in the CM phase, 0.598 (0.499-0.697 95% CI) analyzed. Mean lesion size in ccRCC = 3.1 cm (range 0.8-6.4), Onc = 3.0 cm (range 1.0-6.5), and fpAML=2.2 cm (range 0.7-3.6). In discriminating ccRCC from Onc, the model had an AUC of 0.797 (0.726-0.869 95% CI) in the CM phase, 0.598 (0.499-0.697 95% CI) in the CM phase.
in the NP phase, and 0.672 (0.576-.0.768 95% CI) in the EX phase. In discriminating ccRCC from fpAML, the model had an AUC of 0.858 (0.767-0.952 95% CI) in the CM phase, 0.913 (0.837-0.988 95% CI) in the NP phase, and 0.913 (0.836-.0.989 95% CI) in the EX phase.

CONCLUSION
RE in the CM phase helps discriminate Onc from ccRCC with an AUC of 0.797, while the NP and EX phases help to discriminate fpAML from ccRCC with an AUC of 0.913.

CLINICAL RELEVANCE/APPLICATION
CAD derived RE provides an objective and reproducible measure for the clinician to use when stratifying patients to specific therapeutic pathways, helping to ensure optimal patient outcomes.

PURPOSE
Lymphovascular space invasion (LVSI) and deep myometrium invasion (MI) are important prognostic factors in patients with endometrial cancer. This study aimed to evaluate the utility of 2D MRI-based texture analysis for the assessment of LVSI and deep MI of endometrial cancer, in comparison with the visual assessment of the depth of myometrial invasion.

METHOD AND MATERIALS
We retrospectively analyzed the data of 106 patients (mean age, 65.7 years) who underwent 1.5-T MRI scan before hysterectomy for endometrial cancer. Texture analysis using a filtration-histogram technique was performed using a commercial research software (TexRAD®, Somerset, England, United Kingdom) by manually delineating a region of interest (ROI) around the largest diameter of the tumor on MRI images. Texture features of ROIs (mean, standard deviation, entropy, mean of positive pixels, skewness, and kurtosis) were extracted from MR images on 5 different sequences (T2WI, DWI, ADC map, early phase of dynamic contrast-enhanced images, and post contrast-enhanced images). Random forest models using texture features were constructed for diagnosis of LVSI and deep MI. Diagnostic performance of each model was estimated as areas under the receiver-operating characteristic curve (AUC), sensitivity (Sen), specificity (Spe), and accuracy (Acc) and compared with those of independent and blinded visual assessments by two radiologists. The two radiologists included a body MRI fellow and a staff body imager with over 10 years experience with pelvic MR imaging.

RESULTS
Forty-eight patients out of 106 (45%) had deep MI and 55 patients (52%) had LVSI. The AUC, Sen, Spe, and Acc of each model were estimated at 0.84, 71.4%, 71.7%, and 71.6% for LVSI; 0.85, 79.2%, 81.0%, and 80.2% for deep MI, respectively. Sen, Spe, and Acc of visual assessment for deep MI were 68.8%, 82.8%, and 76.4% for the less-experienced radiologist, 81.2%, 82.3%, and 82.0% for the more-experienced radiologist.

CONCLUSION
2D MRI-based texture analysis showed good diagnostic performance for LVSI and deep MI. For deep MI assessment, our model using texture features demonstrated similar diagnostic accuracy to the more experienced radiologist.

CLINICAL RELEVANCE/APPLICATION
2D MRI-based texture analysis has shown promise for the assessment of lymphovascular space and deep myometrium invasion of endometrial cancer. It has the potential to help pre-treatment assessment and treatment planning.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Caroline Reinhold, MD, MSc - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2014 Honored Educator

URO05-EB-SUA
Decongesting the Renal Sinus: MR Imaging Approach to Renal Sinus Lesions with Pathologic Correlation

Hardcopy Backboard

Participants
Satheesh Krishna, MD, Ottawa, ON (Presenter) Nothing to Disclose
Nicola Schieda, MD, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Krishna Prasad Shanbhogue, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Robert Lim, MD, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Trevor A. Flood, MD, FRCP, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Subramaniyan Ramanathan, MD, MBBBS, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
TEACHING POINTS

1. Renal sinus cystic lesions include mainly parapelvic/peripelvic cysts but also less commonly: calyceal diverticula, multilocular cystic nephroma, cystic renal cell carcinoma (RCC), renal sinus urinomas, abscesses and lymphangectasia. Diagnosis can be suggested in most cases.
2. Renal sinus solid lesions include mainly upper tract urothelial cell carcinoma (UCC) and hilar RCC which may be potentially differentiated by growth and enhancement pattern and diffusion weighted imaging appearance.
3. Uncommon mesenchymal neoplasms (neurofibroma, hemangioma, leiomyoma/fibroma) and rarely ectopic cortical parenchyma should be considered when small well circumscribed non-invasive renal sinus neoplasms are identified.
4. Other miscellaneous processes may involve the renal sinus including: lipomatosis, xanthogranulomatous pyleonephritis and vascular conditions.

TABLE OF CONTENTS/OUTLINE

1. Anatomy and histology of the renal sinus.
2. MR technique for imaging the renal sinus including urography.
3. Approach to cystic renal sinus diseases.
4. Approach to solid renal sinus neoplasms including differentiation of infiltrative RCC from upper tract UCC.
5. Approach to renal sinus mesenchymal neoplasms.
6. Description of miscellaneous renal sinus pathologies.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Evan S. Siegelman, MD - 2013 Honored Educator
Krishna Prasad Shanbhogue, MD - 2012 Honored Educator
Krishna Prasad Shanbhogue, MD - 2013 Honored Educator
Genitourinary Sunday Poster Discussions
Sunday, Nov. 27 1:00PM - 1:30PM Room: GU/UR Community, Learning Center

GU

A MA PRA Category 1 Credit ™: .50

Participants
Paul Nikolaidis, MD, Chicago, IL (Moderator) Nothing to Disclose

Sub-Events

GU206-SD-SUB2 Can Quantitative Contour Analysis be a Marker for Biologic Behavior of T1 Clear Cell Renal Cell Carcinomas?

Station #2

Participants
Felix Y. Yap, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Chidubem G. Ugwueze, MS, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Megha N. Gupta, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Mike Kwon, BS, MS, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Darrel Hwang, PhD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Bino Vargese, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Steven Cen, PhD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Mihir Desai, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Inderbir Gill, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Vinay A. Duddalwar, MD, FRCR, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose

PURPOSE
Clear cell renal cell carcinomas (ccRCC) smaller than 7 cm may be upstaged to pT3 based on imaging or histopathological evidence of vascular invasion. We investigated whether these pT3 tumors demonstrated greater morphologic irregularity on imaging in retrospect that could have portended their more aggressive behavior than pT1 tumors.

METHOD AND MATERIALS
Computerized tomography (CT) images of patients with cT1 renal masses, including 21 patients with pT1 ccRCC and 11 patients with pT3 ccRCC, between 2011 and 2014 were manually segmented using Synapse 3D (Fujifilm, Stamford, CT). Tessellated 3D models of the tumor were created from the segmented voxels using custom MATLAB code. Eleven shape descriptors were then calculated per tumor: compactness, mean radial distance (RD), RD standard deviation (RDSD), RD area ratio (RDAR), zero crossings, entropy, Feret ratio (FR), convex hull area (CHA) and perimeter (CHP) ratios, elliptic compactness (EC), and sphericity (SPH). The morphometric parameters of pT3 and pT1 RCCs were compared using the Wilcoxon rank-sum test to test the hypothesis that pT3 RCC tumors demonstrate more morphologic irregularity than pT1 RCC.

RESULTS
Quantitative contour analysis was technically successful in all cases. pT3 RCCs were less spherical than pT1 RCCs (0.89 vs 0.93, p < 0.01). There were also significant differences between pT1 and pT3 RCCs in 2 parameters when analyzed in the transverse, coronal, and sagittal orientations: CHP (0.92 vs 0.95, p = 0.01; 0.89 vs 0.94, p < 0.01; 0.89 vs 0.95, p < 0.01) and EC (0.88 vs 0.92, p = 0.04; 0.84 vs 0.90, p = 0.01, 0.85 vs 0.90, p < 0.01). Some shape metrics (compactness, RDM, RDAR, RDSD, entropy) were statistically significant in the transverse orientation but showed nonsignificant differences in the coronal and sagittal orientations.

CONCLUSION
Computerized renal tumor image analysis using shape descriptors is technically feasible and efficient. 3 shape metrics may help distinguish between cT1 and cT3 ccRCCs, and may be additional quantifiable parameters that can help in differentiating between subtypes of other renal tumors.

CLINICAL RELEVANCE/APPLICATION
True objective and quantitative metrics can distinguish between cT1 and cT3 RCCs on imaging and potentially may be able to identify aggressive biologic behavior.

GU207-SD-SUB3 Bubble Over Sign on Computed Tomography Helps Differentiate Fat-poor Angiomyolipoma from Renal Cell Carcinoma: Retrospective Analysis of Consecutive 602 Subjects

Station #3

Participants
Yong Hee Kim, MD, Seoul, Korea, Republic Of (Presenter) Nothing to Disclose
Sung Yoon Park, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Young Taik Oh, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Dae Chul Jung, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Nam Hoon Cho, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Minsu Lee, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose

PURPOSE
To assess whether morphologic analysis using computed tomography (CT) can help differentiate fat-poor angiomyolipoma (AML) from renal cell carcinoma (RCC).
METHOD AND MATERIALS
Consecutive 602 patients with a histologically confirmed fat-poor AML (n=49) or renal cell carcinoma (n=553) were found between January 2006 and May 2015. Lesion size was less than 4cm on contrast-enhanced CT. For morphologic analysis, the bubble over sign and angular interface were evaluated. The bubble over sign was defined when the length of contact between bulging out portion of a mass and adjacent renal capsule is 3mm or greater. The angular interface was defined when the angle of parenchymal portion of a mass is 90° or less. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were assessed. Logistic regression was conducted to determine which variable is predictive of fat-poor AML.

RESULTS
For the diagnosis of fat-poor AML, sensitivity, specificity, PPV, NPV, accuracy, and AUC were 61.2% (30/49), 97.1% (537/553), 65.2% (30/46), 96.5% (537/556), and 94.2% (567/602) with bubble over sign, while they were 55.1% (27/49), 81.9% (453/553), 21.3% (27/127), 95.3% (453/475), and 79.7% (480/602) with angular interface, respectively. Both CT variables were predictive of fat-poor AML (bubble over sign, odds ratio=39.632, p<0.001; angular interface, odds ratio=2.703, p=0.010).

CONCLUSION
Angular interface on CT may be seen in some RCCs (18.1% in our study), resulting in low PPV for fat-poor AML. The morphologic analysis of bulging out portion may help the differentiation.

CLINICAL RELEVANCE/APPLICATION
The findings of angular interface seems to have limitation in the exclusion of RCC because some RCCs can show similar morphologic feature and the incidence rate of RCC is much higher than that of fat-poor AML. Our results (e.g. bubble over sign) may help reduce the misdiagnosis of small renal masses.

GU208-SD-SUB4  The Crenulated Rim Sign of a Collapsing Renal Cyst: Appearance of the Wall of a Cystic Renal Lesion Allows Differentiation between Malignant and Benign Renal Lesions

Participants
Sonam Jaglan, MD, New York, NY (Presenter) Nothing to Disclose
Justin M. Ream, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Nicole M. Hindman, MD, New York, NY (Abstract Co-Author) Nothing to Disclose

PURPOSE
To retrospectively determine whether benign renal cystic lesions can be differentiated from malignant on the basis of a crenulated thickened rim.

METHOD AND MATERIALS
Rad database was retrospectively searched from 1/1/05-5/1/15 for all C+ CT/MRs with cystic renal lesions with priors/follow-up exams or surgical pathology. This yielded 567 exams; 31 with collapsed renal cysts (defined as a cystic lesion with a prior exam demonstrating a larger, simple cyst, with dec in size on follow-up exams). 93 lesions (31 collapsed, 29 benign 33 malignant; avg 3.2 cm) in 93 pts (59:34 M:F, avg age 62.8, age range 23-85) were included. 2 radiologists independently evaluated the lesions for the presence of a crenulated rim (undulating border), internal soft tissue and Bosniak category. Fisher's exact test was used. Sens, spec, PPV, and NPV of the crenulated margin for diagnosing benign masses was calculated. Reader agreement was assessed with kappa.

RESULTS
Of the 93 lesions, 60 were benign (31/60 collapsed cysts) 33 malignant. Crenulated rim seen in 17/43 benign cysts (15/31 in collapsed) and 1/33 malignant (p=0.0024); a crenulated rim without internal soft tissue was only seen in benign cysts (p=0.0004). A crenulated rim was significant for diagnosis of a collapsed cyst (p=0.0004). Excellent agreement noted for the crenulated rim (k=0.795). The sens, spec, PPV, NPV, for the crenulated rim sign for a collapsed renal cyst were 49%, 97%, 94%, 67%, respectively. In the absence of internal soft tissue, spec and PPV were 100%. Of collapsed cysts with a crenulated rim sign, additional follow-up imaging (0.5-106 months) showed decr in size and complexity in 19/31(61%) of collapsed cysts. None of the collapsed cysts had growth, progression or metastatic disease. Bosniak category for benign lesions ranged from 1-3. For collapsed cysts: Bosniak 2F was most common (21/31).

CONCLUSION
The presence of a crenulated rim in a renal cystic lesion is a strong predictor of benignity. The presence of this sign highly suggests the diagnosis of a collapsing renal cyst. When this sign is seen, even if the Bosniak category is a 3, consider conservative management instead of surgical resection.

CLINICAL RELEVANCE/APPLICATION
The presence of a crenulated thickened rim in a renal cystic lesion is a strong predictor of a benign collapsing renal cyst. When this sign is seen, even if the Bosniak category of the lesion is a 3, consider conservative management instead of surgical resection.

UR112-ED-SUB6  Penile Ultrasound and Spectral Doppler Ultrasound: Pictorial Review of the Most Common Pathologies Affecting the Penis

Participants
Eduardo Scortegagna JR, MD, Worcester, MA (Presenter) Nothing to Disclose
Anna Luisa Kuhn, MD, PhD, Worcester, MA (Abstract Co-Author) Nothing to Disclose
Larry Z. Zheng, MD, Worcester, MA (Abstract Co-Author) Nothing to Disclose
Young Hwan Kim, MD, Worcester, MA (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1. To review normal ultrasonographic penile anatomy and the most common pathologies affecting the penis
2. To review Color and Spectral Doppler ultrasonographic technique and findings in the evaluation of erectile dysfunction

TABLE OF CONTENTS/OUTLINE
- Review the penile anatomy and the most common pathologies affecting the penis
- Review the Color and Spectral Doppler ultrasonographic technique for proper evaluation of erectile dysfunction
- Samples cases from our institution, correlating penile pathologies and ultrasonographic findings
- Summary
Interventional Oncology Series: Renal and GU Tumors

Sunday, Nov. 27 1:30PM - 6:00PM Room: S405AB

Participants
Debra A. Gervais, MD, Boston, MA (Moderator) Nothing to Disclose

LEARNING OBJECTIVES
1) To appraise the benefits of partial nephrectomy, active surveillance, and tumor ablation (including multiple technology platforms) for RCC. 2) To assess results of renal tumor ablation including published literature and early registry findings. 3) To appraise the role of imaging and biopsy in clinical management decisions in patients considered for tumor ablation. 4) To describe the role of tumor ablation in GU tumors outside the kidney such as prostate tumors, adrenal masses, gynecologic tumors, and RCC metastases.

ABSTRACT

Sub-Events

VSIO11-01  Tumor Ablation and the Renal Mass-Changing Management Paradigms Beyond Guidelines

Sunday, Nov. 27 1:30PM - 1:45PM Room: S405AB

Participants
Debra A. Gervais, MD, Boston, MA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View learning objectives under the main course title.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Debra A. Gervais, MD - 2012 Honored Educator

VSIO11-02  T1b- Tumor Ablation

Sunday, Nov. 27 1:45PM - 2:00PM Room: S405AB

Participants
Thomas D. Atwell, MD, Rochester, MN (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
View learning objectives under the main course title.

VSIO11-03  New versus Old Technology for Renal Tumor Ablation: Are Outcomes Impacted?

Sunday, Nov. 27 2:00PM - 2:15PM Room: S405AB

Participants
Stephen B. Solomon, MD, New York, NY (Presenter) Research Grant, General Electric Company

LEARNING OBJECTIVES
View learning objectives under the main course title.

VSIO11-04  Trajectory of Recovery Following Renal Tumor Ablation Based on Patient Reported Outcomes

Sunday, Nov. 27 2:15PM - 2:25PM Room: S405AB

Participants
Georgianna Schultz, RN, Rochester, MN (Presenter) Nothing to Disclose
Thomas D. Atwell, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Lavonne Speer, RN, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Kristin Saari, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Grant D. Schmit, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Kathleen Yost, PhD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Anil N. Kurup, MD, Rochester, MN (Abstract Co-Author) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc
Robert Thompson, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose

PURPOSE
To determine characteristics of patient recovery following renal tumor ablation based on patient reported outcomes (PROs).
METHOD AND MATERIALS

We derived a battery of questions felt to best measure outcomes following renal tumor ablation using the National Institute of Health's Patient Reported Outcome Measurement Information System (PROMIS) short forms, Brief Pain Inventory (BPI) and 0-10 numerical rating scales (NRS). Outcomes included patient reported pain, physical function (PF), and social activity (SA). Baseline measurements were obtained the day prior to ablation. Subsequent outcomes were then measured at days 1-7 following treatment and 30 days following treatment.

RESULTS

From 2/10/2016 to 3/29/2016, 25 patients had agreed to participate. On day 1 (T1) following ablation, 11/23 (48%) of patients felt that they had completely recovered from the ablation procedure, and average pain NRS question mean score (range 0-10) was 1.52, compared to 0.08 at baseline. 20 patients completed the assessment 7 days (T7) following ablation, with average pain, overall PWB, and overall SA NRS questions improved compared to the T1 assessment, but not quite returned to baseline levels. However, the differences between T7 and pre-procedure scores were much lower than the clinical meaningful difference for a 0-10 scale of 2 points. Seven patients have completed the 30 day assessment at the time this interim dataset was created. Average pain had a mean score of 0.00 which means all 7 patients rated their pain as 0=no pain. PROMIS PWB and SA short forms showed meaningful improvement from T7 to T30 and were essentially consistent with baseline scores.

CONCLUSION

Based on patient reported outcome measurements, pain following renal tumor ablation is minimal. Patients report very little impact on PF and SA, and any such impact resolves quickly following treatment. Continued assessment of PROs will provide evidence to direct quality patient care and assist in patient education.

CLINICAL RELEVANCE/APPLICATION

Patient reported outcomes may allow a procedural practice to track impact of treatment on different aspects of patient well-being. Specific impacts may then be addressed to improve the quality of one's practice.

VSIO11-05 Renal Tumor Ablation Registries and Early ARMOR Findings

Participants
Jeremy C. Durack, MD, New York, NY (Presenter) Scientific Advisory Board, Adient Medical Inc; Investor, Adient Medical Inc;

LEARNING OBJECTIVES

1. Understand the patient registry landscape and role that registries can play in the management of renal masses.
2. Understand the goals, methodology and early findings from the Ablation of Renal Masses Outcomes Registry (ARMOR).

ABSTRACT

LEARNING OBJECTIVES

1) Understand the benefits and drawbacks of registry studies and how registries contribute to our knowledge of renal ablation outcomes.

ABSTRACT

VSIO11-06 Partial Nephrectomy and Tumor Ablation: The Urologist Perspective

Participants
Sarah P. Psutka, MD, MSc, Chicago, IL, (spsutka@cookcountyhhs.org ) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the indications for partial nephrectomy and tumor ablation for small renal masses.
2) Describe partial nephrectomy techniques, risks, and benefits.
3) Compare and contrast the potential risks and complications of partial nephrectomy vs. tumor ablation.
4) Discuss the comparative oncologic outcomes following both partial nephrectomy and tumor ablation.
5) Describe decision-making strategies and decision-aids that may be utilized to optimize the individualized selection of treatment for a small renal mass, taking into account patient-specific factors and competing risks of comorbidities.

ABSTRACT

VSIO11-07 Decision Making: Active Surveillance - When to Follow & When to Intervene

Participants
Stuart G. Silverman, MD, Brookline, MA, (sgsilverman@partners.org) (Presenter) Author, Wolters Kluwer nv

LEARNING OBJECTIVES

View learning objectives under the main course title.

VSIO11-08 Decision Making: Nephrometry Revisited - The Truth about Nephrometry and Ablation

Participants
Grant D. Schmit, MD, Rochester, MN (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
Maximum tumor diameter is superior to the R.E.N.A.L. nephrometry and P.A.D.U.A. scores for prediction of local recurrence following renal cell carcinoma ablation

Sunday, Nov. 27 3:25PM - 3:35PM Room: S405AB

Awards
Student Travel Stipend Award

Participants
Aaron W. Maxwell, MD, Providence, RI (Presenter) Nothing to Disclose
Grayson L. Baird, PhD, Providence, RI (Abstract Co-Author) Nothing to Disclose
Damian E. Dupuy, MD, Providence, RI (Abstract Co-Author) Research Grant, NeuWave Medical Inc Board of Directors, BSD Medical Corporation Stockholder, BSD Medical Corporation Speaker, Educational Symposium

PURPOSE
To evaluate the performance of the R.E.N.A.L. nephrometry and P.A.D.U.A. scoring systems and other tumor biometrics with respect to prediction of local tumor recurrence following thermal ablation for renal cell carcinoma.

METHOD AND MATERIALS
This HIPAA-compliant study was performed with a waiver for informed consent following institutional review board approval. A retrospective evaluation of 207 consecutive patients (131 male, 76 female; mean age 71.9 ± 10.9 years) with 217 biopsy-proven renal cell carcinoma tumors treated with thermal ablation was conducted. Serial post-ablation CT or MR imaging was used to evaluate for local tumor recurrence. For each tumor, R.E.N.A.L. nephrometry and P.A.D.U.A. scores were calculated using imaging-derived tumor morphology data. Several additional tumor biometrics and combinations thereof were also measured, including maximum tumor diameter. Harrell's C index and hazard regression techniques were used to quantify associations with local tumor recurrence.

RESULTS
The R.E.N.A.L. (H.R.=1.43, p=0.003) and P.A.D.U.A. (H.R.=1.80, p<0.0001) scores were significantly associated with recurrence by regression techniques but demonstrated only poor to fair discrimination by Harrell's C index (C=0.68 and 0.75, respectively). Maximum tumor diameter showed the highest discriminatory strength of any individual variable evaluated (C=0.81) and was also significantly predictive by regression techniques (H.R.=2.98, p<0.0001). For every 1 cm increase in diameter, the estimated rate of recurrence risk increased by 198%.

CONCLUSION
Maximum tumor diameter demonstrates superior performance relative to existing tumor scoring systems and other evaluated biometrics for prediction of local tumor recurrence following renal cell carcinoma ablation.

CLINICAL RELEVANCE/APPLICATION
Maximum tumor diameter alone should be considered for use in place of existing scoring systems when stratifying patients according to predicted local tumor recurrence risk prior to thermal ablation for renal cell carcinoma.

Ablation of Renal Cancer Metastases

ABSTRACT
Cystic renal masses account for less than 10% of renal malignancies and are generally indolent. In this talk, I will discuss...
treatment of cystic renal masses in the context of their demographics and clinical behavior.

**VSIO11-12 Renal Mass Ablation Imaging Follow Up: Challenging Cases**

**Participants**
Anil N. Kurup, MD, Rochester, MN, (kurup.anil@mayo.edu) (Presenter) Research Grant, Galil Medical Ltd; Royalties, UpToDate, Inc

**LEARNING OBJECTIVES**
1) Protocol CT and MRI scans for post renal mass ablation follow up. 2) Recognize residual/recurring renal cell carcinoma and its mimics following renal mass ablation. 3) Detect common and uncommon complications related to renal mass ablation.

**ABSTRACT**

**VSIO11-13 Advances in Renal Mass Biopsy: Implications for Decision Making**

**Participants**
William W. Mayo-Smith, MD, Boston, MA (Presenter) Author with royalties, Reed Elsevier; Author with royalties, Cambridge University Press

**LEARNING OBJECTIVES**
View learning objectives under the main course title.

**VSIO11-14 Embolization of Renal Masses and Metastases: Update**

**Participants**
Kamran Ahrar, MD, MBA, Houston, TX, (kahrar@mdanderson.org) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

**VSIO11-15 MRI Guided Ablation of Localized and Recurrent Prostate Cancer**

**Participants**
David A. Woodrum, MD, PhD, Rochester, MN (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**
View learning objectives under the main course title.

**VSIO11-16 Biophysics, Mechanics and Technique of Irreversible Electroporation (IRE) of Prostate Cancer - Why and How We Do It Differently from (Almost) Everybody Else**

**Participants**
Michael K. Stehling, MD, PhD, Offenbach, Germany (Presenter) Investor, InterScience GmbH
Enric Guenter, Dipl Phys, Frankfurt, Germany (Abstract Co-Author) Investor, InterScience GmbH
Stephan Zapf, Frankfurt, Germany (Abstract Co-Author) Nothing to Disclose
Rahel El-Idrissi, Offenbach, Germany (Abstract Co-Author) Nothing to Disclose
Nina Klein, MSc, Offenbach am Main, Germany (Abstract Co-Author) Nothing to Disclose
Boris Rubinsky, PhD, Berkeley, CA (Abstract Co-Author) Consultant, InterScience GmbH

**PURPOSE**
We have employed Irreversible Electroporation (IRE) to treat prostate cancer (PCa) in over 380 patients within 5.5 years. Our technique, based on the biophysics of IRE and our practical experience, differs from that employed others, who emulate brachytherapy. We demonstrate the rationale and technical details of our approach and explain, why we consider it superior.

**METHOD AND MATERIALS**
Computer simulations, in-vitro and in-vivo studies: Based on mass collected impedance data we carried out theoretical, gel-phantom and animal studies to understand the E-field geometry under non-standard electrode geometries (non-parallel, unequal exposure length, etc.), and the effects of the electric current, e.g. electrolysis with gas formation, changes in pH and thermal effects. Mechanics and geometry of electrode placement: Contrary to others, we do not use a brachytherapy grid. This affords higher accuracy electrode positions adjusted to the prostate's shape. Also, grid and prostate move relative to each other during IRE, due to muscle contractions. Diagnostic work-up and follow-up: We employ multi-parametric MRI for treatment planning and follow-up. In most patients, we employ additional 3D-mapping biopsy to determine tumour and Gleason score distribution.

**RESULTS**
During IRE electric currents induce electrolysis, causing gas formation, pH changes, generation of cytotoxic chemicals and...
During IRE, electric currents induce electrolysis, causing gas formation, pH changes, generation of cytotoxic chemicals and temperature rises. These effects can be minimized by adjusting the IRE pulse parameters. Placement of the IRE electrodes without a grid affords higher accuracy (1-2 vs. 5-9 mm) of the electrode positions. It allows non-parallel, shifted and angled electrode geometries better adjusted to the shape of the prostate without affecting the ablation reliability. It also avoids electrode displacement during IRE. Optimal ablation field planning requires MRI and 3D-biopsy which provide complementary information in most cases.

**CONCLUSION**

Based on biophysics, mechanics and experience we have developed an optimized IRE technique for the treatment of prostate cancer. Techniques following the brachytherapy approach are suboptimal and potentially harmful to the patient.

**CLINICAL RELEVANCE/APPLICATION**

Irreversible Electroporation (IRE) is a powerful but complex technology. Understanding of the biophysics and mechanics is required to optimize the intervention technique to minimize toxicity and achieve optimal clinical results in the treatment of prostate cancer.

**VSIO11-17 Ablation for Benign and Malignant Gynecologic Tumors**

**Sunday, Nov. 27 5:20PM - 5:35PM Room: S405AB**

Participants

Peter J. Littrup, MD, Providence, RI (Presenter) Founder, CryoMedix, LLC; Research Grant, Galil Medical Ltd; Research Grant, Endo International plc; Consultant, Delphinus Medical Technologies, Inc

**LEARNING OBJECTIVES**

View learning objectives under the main course title.

**VSIO11-18 Effect of Radiofrequency Ablation (RFA) Heating Parameters and the Suppression of Resultant Heat Shock Proteins on Induced Systemic Tumor Growth in a Small Animal Tumor Model**

**Sunday, Nov. 27 5:35PM - 5:45PM Room: S405AB**

Participants

Gaurav Kumar, PhD, Boston, MA (Presenter) Nothing to Disclose

S. Nahum Goldberg, MD, Jerusalem, Israel (Abstract Co-Author) Consultant, AngioDynamics, Inc; Research support, Cosman Medical, Inc; Consultant, Cosman Medical, Inc; Tatyana Lavchenko, Pharm D, Boston, MA (Abstract Co-Author) Nothing to Disclose

Marwan Moussa, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

Svetlana Gourovich, BSC, Jerusalem, Israel (Abstract Co-Author) Nothing to Disclose

Muneeb Ahmed, MD, Wellesley, MA (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To study variable hepatic RFA heating parameters on activation of heat shock proteins (HSPs) and their effect on modulating distant tumor growth.

**METHOD AND MATERIALS**

First, effect of RFA parameters on local HSP70 expression and cellular infiltration was studied. 24 F344 rats received hepatic RFA (21g electrode, 1 cm tip) at one of three RFA doses that induced the same-sized ablation: 60°Cx10min, 70°Cx5min, or 90°Cx2min, or sham electrode placement without RFA (4 arms, n=6/group). Immunohistochemistry (IHC) of HSP70 at 24h and α-SMA (myofibroblasts), CD68 (macrophages), and CDC47 (cell proliferation) at 7d was performed (n=3/group). Next, to study RFA dose effects on distant tumor growth, animals with subcutaneous R3230 adenocarcinoma (10±1mm) were assigned to 3 different RF doses or sham (n=6/arm). Post-RFA tumor growth rates, cellular proliferation (Ki-67), and microvascular density (MVD) were compared at 7d. Finally, each RF dose was combined with an adjuvant HSP inhibitor (micellar quercetin, 2mg/ml) to study local HSP70 suppression on hepatic RFA-induced distant tumor growth.

**RESULTS**

Hepatic RFA at 70°Cx5 and 60°Cx10 had more periablational HSP70 compared to 90°Cx2min, with similar trends for local α-SMA, CD68, and CDC47 (p<0.01 for all). Lower RF heating (70°Cx5 and 60°Cx10) also resulted in larger distant tumors at 7d (19.2±0.8mm for both) compared to sham (13.5±0.5mm, p<0.001 for all). By comparison, higher RF heating (90°Cx2) led to less distant tumor growth at 7d (16.4±0.7mm, p<0.01 for both), though more than sham (13.5±0.5mm, p<0.01). Ki-67 and MVD correlated with tumor growth (p<0.01 for all). Anti-HSP70 MicQ blocked distant tumor growth at both low-RF (60°Cx10: RF/MicQ 14.5±0.6mm vs. RF 19.1±0.6mm, p<0.001) and high-RF (90°Cx2: RFA/MicQ 14.4±0.5mm vs. RFA:16.4±0.7mm, p<0.01) arms.

**CONCLUSION**

Different hepatic RF heating parameters alter the extent of periablational HSP70 expression, which in turn stimulates variable distant tumor growth in small animals. Modulation of RF heating parameters alone or in combination with adjuvant nanodrug HSP inhibition can reduce these unwanted, off-target systemic tumorigenic effects.

**CLINICAL RELEVANCE/APPLICATION**

Modulating RFA heating parameters with or without adjuvant anti-HSP70 drugs can mitigate the ‘off-target’ tumorigenic effects that can substantially effect clinical practice.

**VSIO11-19 Adrenal Mass Ablation**

**Sunday, Nov. 27 5:45PM - 6:00PM Room: S405AB**

Participants

Muneeb Ahmed, MD, Wellesley, MA (mahmed@bidmc.harvard.edu) (Presenter) Nothing to Disclose
LEARNING OBJECTIVES
View learning objectives under the main course title.

ABSTRACT
Participants
Mark E. Lockhart, MD, Birmingham, AL (mlockhart@uabmc.edu) (Coordinator) Author, Oxford University Press
Maitray D. Patel, MD, Phoenix, AZ (Presenter) Nothing to Disclose
Therese M. Weber, MD, Birmingham, AL (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Describe current best practice recommendations for management of adnexal asymptomatic, incidental, and/or potentially physiologic findings on pelvic US, CT, and MR based on lesion characteristics and patient clinical factors. 2) Understand the reference lines and angles in pelvic MRI that are used in the evaluation of pelvic floor disorders. 3) Understand the typical imaging characteristics of the endometrium and myometrium according to patient age and stage of the reproductive cycle, and review associated benign pathology.

ABSTRACT
This session will present on topics related to pelvic imaging. At the conclusion of the three presentations, the participants should have an improved understanding of imaging characteristics of the ovaries and uterus, including endometrium. Also, the imaging parameters used in evaluation of pelvic floor abnormalities such as organ prolapse and structural abnormalities related to incontinence will be reviewed. In each lecture, the imaging characteristics of a variety of disease processes will be covered.
Renal Doppler, Contrast and Elastography

Sunday, Nov. 27 2:00PM - 3:30PM Room: S103CD

RC110A Renal Doppler: What You Need to Know

Participants
John S. Pellerito, MD, Manhasset, NY, (jpelleri@northwell.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Apply techniques and protocols for the renal Doppler evaluation. 2) Analyze diagnostic criteria for renal artery stenosis and occlusion. 3) Utilize Doppler for the evaluation of renal artery stents. 4) Compare Doppler to other imaging modalities used to evaluate renal vascular disease.

ABSTRACT
Ultrasound visualization of renal lesions using B-mode sonography, contrast enhanced ultrasound and image fusion is explained. This includes the characterization of renal cysts. 2) The Bosniak classification is explained with the five different categories of characterization of renal cysts. A common finding are non-complicated solitary lesions Bosniak type 1. 3) The main differential diagnoses are explained with an emphasis on the renal cell carcinoma.

RC110B Contrast Evaluation of Renal Masses

Participants
Dirk-Andre Clevert, MD, Muenchen, Germany, (dirk.clevert@med.uni-muenchen.de) (Presenter) Speaker, Siemens AG; Speaker, Koninklijke Philips NV; Speaker, Bracco Group;

LEARNING OBJECTIVES
1) Ultrasound visualization of renal lesions using B-mode sonography, contrast enhanced ultrasound and image fusion is explained. This includes the characterization of renal cysts. 2) The Bosniak classification is explained with the five different categories of characterization of renal cysts. A common finding are non-complicated solitary lesions Bosniak type 1. 3) The main differential diagnoses are explained with an emphasis on the renal cell carcinoma.

ABSTRACT
Ultrasound is the most used interdisciplinary non-ionizing imaging technique in clinical routine. Therefore, ultrasound has a special value in the diagnosis and monitoring of cystic renal lesions, which can be classified as non-complicated or complicated and by means of occurrence as solitary or multifocal lesions. The Bosniak classification (I-IV) classifies renal cysts in 5 different categories with the help of ultrasound and computed tomography image criteria and is used for decisions of further clinical treatment. Additionally to normal native B-mode sonography, several new methods are in clinical use to improve diagnostic accuracy of unclear cases. Contrast enhanced ultrasound and MRI/CT are able to find and characterize difficult pathologies. In contrast to multislice-CT (MS-CT), ultrasound image fusion is a real-time imaging technique that can be used in combination with other cross-sectional imaging techniques. This course explains the most important pathologies of cystic lesions of the kidney and stresses the different imaging methods of native B-mode sonography and the new techniques of contrast enhanced ultrasound.

RC110C Renal Elastography: Where Are We?

Participants
Nicolas Grenier, MD, Bordeaux CEDEX, France, (nicolas.grenier@chu-bordeaux.fr) (Presenter) Advisory Board, Supersonic Imagine; Travel support, Guerbet SA

LEARNING OBJECTIVES
1) Explain the principles and limitations of elastographic techniques applied to the kidney. 2) Learn about the impact of the renal structure on elasticity values. 3) Identify the significant structural changes responsible for variations of renal elasticiticy.

ABSTRACT
Ultrasound elastography is a new imaging technique under development that provides information about renal stiffness. Kidney elasticity quantification with ultrasound should be better performed with a quantitative technique, based on shear wave velocity measurements (ARFI or SSI methods). Kidney stiffness changes can be affected by mechanical factors such as external pressure induced by the probe and intrarenal characteristics such as tissue anisotropy, which is high in renal medulla, vascularization, which is high within the cortex, and hydronephrosis. Chronic kidney disease (CKD) incidence and prevalence are increasing in Western countries, due particularly to diabetes mellitus and hypertension-related nephropathies. During progression of such renal parenchymal diseases, cellular density may increase, mainly during acute inflammatory phases, and the interstitial matrix may be invaded by fibrosis. All components of these tissue changes may induce an increase of renal elasticity which is not specifically related to fibrosis. Tubular, glomerular, interstitial and vascular changes may also be responsible for an increase of stiffness. This is why, further studies are now necessary before to understand the real impact of elastography measurement in clinical nephrology. Considering characterization of renal tumors with elastography, clinical experience is still limited. Preliminary results show that benign tumors seem to have lower values of elasticity than malignant ones, but, here too, more experience is also necessary.
Participants
Beth M. Kline-Fath, MD, Cincinnati, OH, (beth.kline-fath@cchmc.org) (Moderator) Nothing to Disclose
Amy R. Mehollin-Ray, MD, Houston, TX, (armeholl@texaschildrens.org ) (Moderator) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

Sub-Events

RC113-01 Congenital Diaphragmatic Hernia Imaging

Sunday, Nov. 27 2:00PM - 2:20PM Room: S102AB

Participants
Amy R. Mehollin-Ray, MD, Houston, TX, (armeholl@texaschildrens.org ) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) Distinguish the various subtypes of diaphragmatic hernia on fetal ultrasound and MRI. 2) Learn to measure lung-head ratio, total fetal lung volume and liver herniation and apply the values to define prognosis. 3) Utilize fetal imaging to prepare the multidisciplinary team for potential fetal and post-natal therapies for diaphragmatic hernia.

ABSTRACT

Participants
Fabian Kording, Hamburg, Germany (Presenter) Nothing to Disclose
Hendrik Kooijmann, PhD, Hamburg, Germany (Abstract Co-Author) Employee, Koninklijke Philips NV
Jin Yamamura, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Manuela Tavares de Sousa, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Mathias Kladeck, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Kurt Hecher, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Gerhard B. Adam, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Bjoern Schoennagel, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose

PURPOSE

Intrauterine growth restriction is associated with an increased perinatal mortality and morbidity and is associated with a decreased oxygen delivery to the fetus. With the relationship between T2 relaxation time and oxygen saturation (sO2), magnetic resonance oximetry represents a valuable method for a direct noninvasive determination of fetal oxygen saturation. The purpose of this work was to investigate a relationship between fetal sO2 and T2 relaxation time using in-vitro fetal blood samples. Parameters describing the T2 relaxation of fetal blood were consecutively validated in-vivo in one fetus.

METHOD AND MATERIALS

A balanced steady-state free precession (SSFP) sequence in combination with T2 preparation pulses was applied at 1.5 Tesla (Achieva, Philips Healthcare, Best, The Netherlands) for T2 determination. Fetal blood for in-vitro measurements was derived from the umbilical cord during abdominal delivery from 9 different fetuses. The blood from each fetus was heparinized and divided into 5 samples with different oxygen saturation levels (30 % to 100%). The relationship between T2 and sO2 was fitted based on the Luz and Meiboom model using measured signal intensities and sO2 values measured using a blood gas analyzer. Consecutively, the fitted parameters (T20, tex and a) were compared between each fetal blood sample and applied to T2 measurements in the left ventricle in one fetus (34 gestation week) using the same SSFP sequence.

RESULTS

Mean parameters of the blood samples were 160±10 ms (T20), 4.5 ms±1.2 (tex) and 0.032±0.002 103sec-1 (a). The mean parameters were retrospectively used to calculate the sO2 for each sample for verification (r = 0.9). Results of measured signal intensities in the left fetal ventricle using the mean calculated parameters resulted in a sO2 value of 98 %.

CONCLUSION

In vitro parameters to calculate blood sO2 were similar for fetal cord blood samples compared to measured sO2 values and measurements were successfully evaluated in-vivo. In conclusion, MR oximetry is a promising method for a noninvasively determination of fetal oxygen saturation. In future, the calculated parameters have to be validated in a larger fetal population.

CLINICAL RELEVANCE/APPLICATION

In vivo MR oximetry within the fetal heart could help in the diagnosis of fetal hypoxia and associated growth abnormalities.

RC113-03 Utility of Virtual Autopsy (Post-mortem MRI) in the Phenotypic Characterization of Stillbirths
Fetal CMR can accurately diagnose persistent LSVC, especially in situations that limit echocardiography.

In 35 (81.4%) out of 43 cases, final diagnosis based on virtual autopsy was concordant with that of conventional autopsy. In 32 cases (72.7%) were correctly diagnosed by fetal CMR, but only 32 cases (72.7%) were correctly diagnosed by fetal US and/or echocardiography before fetal CMR. 32 cases were associated with other cardiovascular abnormalities and 6 cases with extracardiac abnormalities, 6 cases had no associated condition. All the 44 cases of fetal persistent (LSVC) were correctly diagnosed by fetal CMR, but only 32 cases (72.7%) were correctly diagnosed by fetal US and/or echocardiography before fetal CMR. 32 cases were associated with other cardiovascular abnormalities and 6 cases with extracardiac abnormalities, 6 cases had no associated condition. Among the 32 fetuses, the congenital cardiovascular abnormalities included heterotaxy syndromes (n = 8) (7 cases of asplenia and 1 case of polysplenia), tricuspid atresia (n = 1), ventricular septal defects (VSD, n = 5), double outlet right ventricle (DORV, n = 2), complete transposition of great arteries (TGA, n = 2), coarctation of the aorta (CoA, n = 5), double aortic arch (n=1), right aortic arch (RAoA) with vascular ring (n = 3), pulmonary atresia with ventricular septal defect (PA/VSD) (n = 1), tetralogy of Fallot (TOF, n = 2), hypoplastic left heart syndrome (HLHS, n=2). 39 (88.6%) cases the innominate vein were absent, 5 (11.4%) cases had the innominate vein. Approximately 15.9% of patients (7 cases) the fetal persistent LSVC drains directly into the atrium, 37 (84.1%) cases drains into the coronary sinus.

RESULTS

Virtual autopsy had an overall sensitivity and specificity of 77.7% and 99.8% respectively for the detection of malformations. Sensitivity was better for brain and spinal cord (93.1%), renal (96.1%) and pulmonary (91.1%) malformations and relatively poor for cardiovascular (60.9%), musculoskeletal (66.8%) and gastrointestinal (80.6%) malformations. Post-mortem MRI provided additional information over a conventional autopsy in brain and spinal cord malformations in 5 cases. Clinical diagnosis was revised after virtual autopsy in 14 cases (32.5%) and after conventional autopsy in 18 cases (41.8%). In 35 (81.4%) out of 43 cases, final diagnosis based on virtual autopsy was concordant with that of conventional autopsy.

CONCLUSION

Virtual autopsy using post-mortem MRI can be an acceptable alternative to conventional autopsy when refused. Post-mortem MRI allows in situ evaluation of brain and may even give additive value over a conventional autopsy.

CLINICAL RELEVANCE/APPLICATION

Post mortem MRI of still born fetus should be done for genetic counselling and prognostication, when conventional autopsy is refused for any reasons in the evaluation of stillbirths, especially if brain and spinal cord malformations are found on antenatal ultrasonogram.

RC113-04 Cardiovascular Magnetic Resonance of Fetal Persistent Left Superior Vena Cava in Chinese

Participants
Su-Zhen Dong, MD, Shanghai, China (Presenter) Nothing to Disclose
Ming Zhu, Shanghai, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

To show the diagnostic accuracy of fetal cardiovascular magnetic resonance (CMR) for prenatal persistent left superior vena cava (LSVC) in Chinese.

METHOD AND MATERIALS

The prenatal echocardiography (and/or ultrasound) and CMR data of 44 fetuses with persistent LSVC, which confirmed by postnatal diagnoses between January 2010 and June 2015 were reviewed retrospectively. All prenatal CMR was performed at 1.5 T. Imaging sequences included steady-state free-precession (SSFP) sequences, real-time SSFP, single-shot turbo spin echo (SSTSE) and T1-weighted turbo field echo (T1W_TFE) sequences. The images were mostly acquired along the transverse view of the fetal thorax, the four-chamber, short-axis, coronal and oblique sagittal planes of the fetal heart.

RESULTS

All the 44 cases of fetal persistent (LSVC) were correctly diagnosed by fetal CMR, but only 32 cases (72.7%) were correctly diagnosed by first fetal US and/or echocardiography before fetal CMR. 32 cases were associated with other cardiovascular abnormalities and 6 cases with extracardiac abnormalities, 6 cases had no associated condition. Among the 32 fetuses, the congenital cardiovascular abnormalities included heterotaxy syndromes (n = 8) (7 cases of asplenia and 1 case of polysplenia), tricuspid atresia (n = 1), ventricular septal defects (VSD, n = 5), double outlet right ventricle (DORV, n = 2), complete transposition of great arteries (TGA, n = 2), coarctation of the aorta (CoA, n = 5), double aortic arch (n=1), right aortic arch (RAoA) with vascular ring (n = 3), pulmonary atresia with ventricular septal defect (PA/VSD) (n = 1), tetralogy of Fallot (TOF, n = 2), hypoplastic left heart syndrome (HLHS, n=2). 39 (88.6%) cases the innominate vein were absent, 5 (11.4%) cases had the innominate vein. Approximately 15.9% of patients (7 cases) the fetal persistent LSVC drains directly into the atrium, 37 (84.1%) cases drains into the coronary sinus.

CONCLUSION

Fetal CMR can accurately diagnose persistent LSVC, especially in situations that limit echocardiography.
RC113-05  Cardiac MR Imaging of Fetal Congenital Non-Obstructive Aortic Arch Anomalies

Sunday, Nov. 27 2:50PM - 3:00PM Room: S102AB

Participants
Su-Zhen Dong, MD, Shanghai, China (Presenter) Nothing to Disclose
Ming Zhu, Shanghai, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
To illustrate the appearance of fetal non-obstructive aortic arch anomalies at prenatal cardiac magnetic resonance imaging

METHOD AND MATERIALS
Between June 2005 and October 2015, 92 fetuses with congenital non-obstructive aortic arch anomalies which confirmed by postnatal imaging were evaluated using fetal echocardiography and cardiac MRI in our hospital. Cardiac MRI was performed using 1.5T unit. Among the 92 cases, fetal cardiac MRI was performed at 20 to 33 weeks' gestation (mean 24.5 weeks). Imaging sequences included steady-state free-precession (SSFP), real-time SSFP and single-shot turbo spin echo (SSTSE) sequences. The images were mostly acquired along the transverse view of the fetal thorax, the four-chamber, short-axis, coronal and oblique sagittal planes of the fetal heart.

RESULTS
The 92 cases of fetal congenital non-obstructive aortic arch anomalies included double aortic arch (n=26), right aortic arch with aberrant left subclavian artery (n=31), right aortic arch with mirror image branching (n=25), right aortic arch with right ductus arteriosus (n=2), right aortic arch with mirror image branching with retroesophageal ductus (n=3), left aortic arch with aberrant right subclavian artery (n=2) and cervical aortic arch (n=3). The fetal congenital non-obstructive aortic arch anomalies formed vascular ring can be correctly diagnosed using fetal cardiac MRI by experienced doctors; Only 69 cases (75%) were correctly diagnosed as congenital non-obstructive aortic arch anomalies by fetal echocardiography.

CONCLUSION
Fetal cardiac MRI can provide diagnostic information for fetal congenital non-obstructive aortic arch anomalies. Fetal congenital non-obstructive aortic arch anomalies can easily get important clues at the transverse view of aortic arch.

CLINICAL RELEVANCE/APPLICATION
Fetal cardiac MRI can provide accurate diagnostic information for fetal congenital non-obstructive aortic arch anomalies and is recommended as an adjunct to fetal echocardiography.

RC113-06  Maternal-Fetal Attachment in Blind Women Using Physical Model from Three-dimensional Ultrasound and Magnetic Resonance Scan Data: Six Serious Cases

Sunday, Nov. 27 3:00PM - 3:10PM Room: S102AB

Participants
Heron Werner, MD, Rio de Janeiro, Brazil (Presenter) Nothing to Disclose
Bianca Guedes Ribeiro, MD, Rio de Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Pedro Daltro, MD, Rio De Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Tatiana M. Fazecas, MD, Rio de Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Renata A. Nogueira, MD, Rio De Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Jorge Lopes, Rio de Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Gerson Ribeiro, Rio de Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Leise Rodrigues, Rio De Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose

PURPOSE
The objective of this study is to assess the maternal–fetal attachment (MFA) in six blind pregnant women by means three-dimensional (3D) physical models from 3D ultrasound and magnetic resonance imaging (MRI) scan data.

METHOD AND MATERIALS
We performed a prospective observational cross-sectional study with six blind pregnant women who performed 3D ultrasound and MRI exams to build 3D physical models for their fetuses. The MFA was assessed quantitatively by means a questionnaire of three questions, each one with a score ranging from 0 to 3. We considered MFA values > 7 to each preganant woman. The descriptive data were expressed by mean ± standard deviation (SD). The pregnant women were included to this study after providing informed consent.

RESULTS
The mean (±SD) maternal age was 32 ± 2.7 years. The mean gestational age at 3DUS and MRI exams were 23.1 ± 3.7 and 21.3 ± 0.9 weeks, respectively. The mean of gestational age at delivery was 36.5 ± 4.7 weeks and all of them were cesarean sections. The mean newborn weight was 2615.8 ± 871.9 g and the gender was 50% both female and male. The MFA was quantitatively observed in all pregnant women, with maximum value (9) in all of them.

CONCLUSION
The MFA was quantitatively observed in all blind pregnant women using 3D physical models.

CLINICAL RELEVANCE/APPLICATION
The three-dimensional (3D) physical models from 3D ultrasound and magnetic resonance imaging (MRI) scan data were designed to
improve the maternal-fetal attachment (MFA) in blind pregnant women. The techniques described in this study can be applied at different stages of pregnancy and constitute an innovative contribution to research on fetal abnormalities. We believe that physical models will help in the tactile and interactive study of complex abnormalities in multiple disciplines. They may also be useful for prospective parents because a 3D physical model with the characteristics of the fetus should allow a more direct emotional connection to their unborn child.

**RC113-07 Perinatal Imaging of the Airway: Prenatal Imaging, with Postnatal Correlation, Including a Discussion of the EXIT (Ex-Utero-Intrapartum-Treatment) Procedure**

Sunday, Nov. 27 3:10PM - 3:30PM Room: S102AB

Participants
Carol E. Barnewolt, MD, Boston, MA (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Understand how to approach imaging of the fetal airway, using both sonography and MRI when pathology such as cervical teratomas, mediastinal masses, and tracheal atresia are expected to adversely effect airway development and function. 2) Learn how the imager can provide critical imaging support before, during, and after specialized deliveries, particularly the so-called EXIT (ex-utero-intra-partum treatment) delivery.

**ABSTRACT**
**MR Imaging of the Female Pelvis (An Interactive Session)**

**Sunday, Nov. 27 2:00PM - 3:30PM Room: E451B**

**LEARNING OBJECTIVES**

- To know the current indications for MRI in patients with cervix or endometrial cancer.
- To be familiar with the MRI protocol requirements for staging cervix or endometrial cancer.
- To recognise the stages of cervix and endometrial cancer on MRI.
- To be familiar with some common pitfalls when using MRI to stage uterine cancer.

**ABSTRACT**

**RC129A Role of MRI in Staging Endometrial and Cervical Cancer**

**Participants**

Andrea G. Rockall, MRCP, FRCR, London, United Kingdom *(Presenter)* Nothing to Disclose

**LEARNING OBJECTIVES**

1) To explain how to analyze an MR imaging for staging uterin cancer.
2) To develop how to use ADNEX MR SCORING system to classify adnexal masses.
3) To identify pitfalls in MR interpretation and avoid the false negative or false positive of the score.
4) To list the different step to make a good MR report.

**ABSTRACT**

**RC129B Clinical Indications and MR Imaging of Complex and Sonographically Indeterminate Adnexal Masses**

**Participants**

Elizabeth A. Sadowski, MD, Madison, WI *(Presenter)* Nothing to Disclose

**RC129C Interactive Cases**

**Participants**

Isabelle Thomassin-Naggara, MD, Paris, France *(Presenter)* Speakers Bureau, General Electric Company;
Participants
Theodora A. Potretzke, MD, Madison, WI (Presenter) Nothing to Disclose
Adam Froemming, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Michael L. Wells, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Naoki Takahashi, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (Abstract Co-Author) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Meghan G. Lubner, MD, Madison, WI (Abstract Co-Author) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson; Anup S. Shetty, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Naomi R. Drylewicz, MD, PhD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Matthew S. Davenport, MD, Cincinnati, OH (Abstract Co-Author) Royalties, Wolters Kluwer nv; ;
Benjamin Mervak, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Brian T. Welch, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Veena R. Iyer, MD, Minneapolis, MN (Abstract Co-Author) Nothing to Disclose
Seema Mukerjee, MD, White Plains, NY (Abstract Co-Author) Nothing to Disclose
Shannon P. Sheedy, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) Recognize imaging findings seen in disorders of the genitourinary systems. 2) Develop differential diagnosis based on the clinical information and imaging findings. 3) Recognize the clinical importance of diagnosis.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Naoki Takahashi, MD - 2012 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Participants
Anne M. Covey, MD, New York, NY (Presenter) Nothing to Disclose
Muneeb Ahmed, MD, Wellesley, MA (Abstract Co-Author) Nothing to Disclose
Bradley B. Pua, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
John A. Kaufman, MD, Portland, OR (Abstract Co-Author) Advisory Board, Bio2 Technologies, Inc; Consultant, Cook Group Incorporated; Consultant, Guerbet SA; Stockholder, Hatch Medical LLC; Stockholder, VuMedi, Inc; Stockholder, Veniti, Inc; Royalties, Reed Elsevier; Advisory Board, Delcath Systems, Inc; Researcher, W. L. Gore & Associates, Inc; Researcher, EKOS Corporation; Stockholder, EndoShape, Inc; Advisory Board, AV Medical Technologies Ltd; Advisory Board, Javelin Medical
Rocio Perez Johnston, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Lynn A. Brody, MD, New York, NY (Abstract Co-Author) Stockholder, Sirtex Medical Ltd

TEACHING POINTS
1) The objective of the Interventional Radiology Case of the Day at RSNA 2016 is to provide participants the opportunity to review challenging cases and synthesize cogent a differential diagnosis based on limited history and images.
Participants
Richard L. Robertson, MD, Boston, MA (Moderator) Nothing to Disclose

LEARNING OBJECTIVES
1) To describe the Zika epidemic spread. 2) To illustrate the appearance of congenital Zika both prenatal and postnatal using ultrasound, MRI, and CT. 3) To discuss developments from the infectious disease perspectives, including vaccine development.

URL
http://pubs.rsna.org/doi/full/10.1148/radiol.2016161584

Sub-Events

SPSH21A  Introduction: Why is Zika from an Imaging Perspective So Different from other Congenital Infections

Participants
Richard L. Robertson, MD, Boston, MA (Presenter) Nothing to Disclose

SPSH21B  Facing the Zika Epidemic in Brazil: The Epidemiology and the Role of the Radiologist

Participants
Jacob Szejnfeld, MD, Sao Paulo, Brazil, (jacob.cura@gmail.com) (Presenter) Nothing to Disclose

Handout: Jacob Szejnfeld

SPSH21C  Multidomality Prenatal Imaging Findings of Congenital Zika Infection

Participants
Patricia Oliveira-Szejnfeld, MD, Sao Paulo, Brazil, (patricia.fetal@gmail.com) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

ABSTRACT

SPSH21D  New Insights on Imaging and Pathological Correlations on Zika Infection

Participants
Fernanda Tovar-Moll, MD, PhD, Rio de Janeiro, Brazil (Presenter) Nothing to Disclose

SPSH21E  Controlling Zika Virus: Update on Prevention Strategies and Vaccination

Participants
Andrew Hale, MD, Boston, MA (Presenter) Nothing to Disclose

SPSH21F  Panel Discussion

Participants

Participants
LEARNING OBJECTIVES

1) Understand the PI-RADS v2 category assessment to detect and localize significant cancer for both peripheral zone and transitional zone lesions. 2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

ABSTRACT

In this Hands-On Workshop, the participants will be able to review up to 40 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of PI-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their PI-RADS v2 scoring. There will be 50 workstations available. Participants will be able to use their own laptops through a secure WiFi connection.

Controversies in Intravenous Contrast Media 2016: Getting Your Questions Answered

Monday, Nov. 28 8:30AM - 10:00AM Room: E450A

GU SQ

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Richard H. Cohan, MD, Ann Arbor, MI (Coordinator) Nothing to Disclose
Matthew S. Davenport, MD, Cincinnati, OH, (matdaven@med.unich.edu) (Presenter) Royalties, Wolters Kluwer nv;
Robert J. McDonald, MD, PhD, Rochester, MN, (mcdonald.robert@mayo.edu) (Presenter) Nothing to Disclose
Alexander Radbruch, MD, Heidelberg, Germany, (a.radbruch@dkfz.de) (Presenter) Consultant, Guerbet SA; Consultant, Bayer AG; Support, Guerbet SA; Support, Bayer AG; Advisory Board, Guerbet SA; Advisory Board, Bayer AG; Advisory Board, Bracco Group; Advisory Board, AbbVie Inc; Speaker, Guerbet SA; Speaker, Bayer AG; Speaker, Siemens AG; Speaker, prIME Oncology; Advisory Board, General Electric Company;
Jay K. Pahade, MD, New Haven, CT (Presenter) Consultant, Precision Imaging Metrics, LLC

LEARNING OBJECTIVES

1) To review current management recommendations regarding contrast material administration, including a) what to do in patients who have had allergic-like reactions and who require reinjection, b) current thoughts concerning the risks of contrast induced nephrotoxicity, c) recent observations of long-term gadolinium retention in the body, and d) how to minimize the likelihood of errors in management of contrast reactions.

ABSTRACT

Premedication: Is it worthwhile? (Matthew Davenport - University of Michigan) Objectives: During this talk, the attendee will learn the common indications for premedication and premedication regimens; the degree to which premedication reduces the incidence of subsequent reactions, the likelihood of breakthrough reactions, and the costs of premedication. CIN: Does it exist? If not, why are we trying so hard to prevent it (Robert McDonald - Mayo Clinic) Objectives: During this talk, the literature calling into question the existence of CIN will be reviewed and the necessity of prophylaxis in patients who are more likely to develop acute kidney injury will be discussed. Gadolinium Deposition in the Brain: What does this mean and what should we do about it? (Alexander Radbruch - University of Heidelberg, Germany). Objectives: During this talk, the recent literature demonstrating gadolinium retention in the body, including the brain will be reviewed. The potential clinical implications of such retention will be discussed, along with a description of future research that needs to be performed in this area. Treating Contrast Reactions: How can we minimize errors? (Jay Pahade - Yale University) Objectives: During this talk, the indications for epinephrine administration, appropriate dose and route of epinephrine administration; common treatment errors that are made and common problems with current treatment training will be discussed. Possible solutions for reducing treatment errors will be discussed.
Participants

Sub-Events

**RC210A  Uterus and Endometrium**

Participants
Ruth B. Goldstein, MD, San Francisco, CA (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Be able to state the acceptable standards for endometrial assessment in women with abnormal vaginal bleeding. 2) Be able to recognize a uterine abnormality in a postmenopausal woman that warrants further evaluation including tissue sampling or MRI. 3) Be able to recognize and diagnose adenomyosis.

**RC210B  Ovarian Masses**

Participants
Beryl R. Benacerraf, MD, Brookline, MA (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**

1) To learn how to characterize ovarian cysts and determine whether they are benign or malignant. 2) To learn how to recognize the actual tissue diagnosis of an adnexal mass using ultrasound. 3) To learn to recognize non ovarian masses: hydrosalpinx, peritoneal inclusion cysts, appendiceal mass, dilated ureter, rectal lesions etc. 4) To learn the importance of color Doppler as well as recent scoring systems to determine whether or not a mass is malignant.

**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 counseling 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.

**URL**

http://chamie.com.br/download
Fallopian Tube Catheterization (Hands-on)

Monday, Nov. 28 8:30AM - 10:00AM Room: E260

Participants
Amy S. Thurmond, MD, Portland, OR, (thurmondas@gmail.com) (Presenter) Nothing to Disclose
Ronald J. Zagoria, MD, San Francisco, CA, (ron.zagoria@ucsf.edu) (Presenter) Nothing to Disclose
A. Van Moore Jr, MD, Charlotte, NC (Presenter) Nothing to Disclose
Anne C. Roberts, MD, La Jolla, CA (Presenter) Nothing to Disclose
David M. Hovsepian, MD, Stanford, CA, (hovsepian@stanford.edu) (Presenter) Nothing to Disclose
James E. Silberzweig, MD, New York, NY (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Obtain hands-on experience with fallopian tube catheterization using uterine models and commercially available catheters and guidewires. 2) Review the evolution of interventions in the fallopian tubes. 3) Learn safe techniques for fallopian tube recanalization for promoting fertility, and fallopian tube occlusion for preventing pregnancy. 4) Discuss the outcomes regarding pregnancy rate and complications. 5) Appreciate ways to improve referrals from the fertility specialists and expand your practice.

ABSTRACT
Fallopian tube catheterization using fluoroscopic guidance is a relatively easy, inexpensive technique within the capabilities of residency trained radiologists. Fallopian tube catheterization can be used to dislodge debris from the tube in women with infertility, or to place FDA-approved tubal occlusion devices in women who do not desire fertility. The fallopian tube is the 1 mm gateway between the egg and the sperm. Noninvasive access to this structure for promoting, and preventing, pregnancy has been sought for over 160 years. This hands-on course allows participants use commercially available catheters and devices in plastic models for fallopian tube catheterization, and to speak directly to world experts about this exciting procedure.

Active Handout: Amy Suzanne Thurmond

A Cyst or not a Cyst: Density Evaluation of Homogeneous Renal Lesions on a Routine Contrast CT

PURPOSE
To compare Hounsfield units (HU) of renal cysts and of homogenous renal cell carcinoma (RCC) and identify if there is a minimum Hounsfield unit that can be used as a cut off value to classify a mass as benign or malignant on a single post contrast phase CT.

METHOD AND MATERIALS
A waiver from the Institutional Review Board was obtained for this retrospective study. 123 patients with pathologically proven diagnosis of RCC and a post contrast CT scan prior to intervention were included. Two radiologists categorized the RCCs into either homogenous or heterogenous, measured average, max and minimum HU of the lesions on post contrast CT scans. The maximum and minimum HU measurements of the lesion were obtained by placing an ROI in the densest and least dense region anywhere in the lesion. Simple cysts were identified and average HU recorded. Nonparametric tests were used for the non-normal distributed data. Inter reader agreement was tested with Cohen’s kappa test.

RESULTS
There were 116 heterogenous RCCs, 13 homogenous RCCs and 24 cysts. None of the homogenous RCCs had an average HU of less than 42 and no region measured less than 32 HU units within homogenous RCCs. HU are reported as mean, standard deviation (SD) and range. The homogenous and heterogenous RCCs had the following HU: mean 76 (SD 23) 42–116 / 79 (SD 37) 21-243; maximum HU within a lesion 82 (SD 24) 45-120 / 118 (SD 42) 52-282; minimum HU within a lesion 66 (SD) 32-113 / 35 (SD 24) 4-131 (figure 1). Mean HU of renal cysts 14 (SD 8) 3-31. All findings were statistical significant with P values of 0.001 or less. Both readers categorized the RCC into homogenous and heterogenous identically.

CONCLUSION
Out of 129 RCCs none of the 13 homogenous RCCs had HU less than 32 on post contrast CT scans.

CLINICAL RELEVANCE/APPLICATION
Incidental hyperdense renal lesions are common and difficult to differentiate from homogenous RCCs on post contrast CT’s. No homogenous RCCs had a minimum HU less than 32 or a mean HU of less than 42.

Dual Energy CT for Evaluation of Polycystic Kidneys: A Multi Reader Study

PURPOSE
Assessment of polycystic kidneys on CT can be a challenging diagnostic task due to the need to compare multiple lesions between non-contrast and post-contrast image series. Iodine overlay images from dual energy CT (DECT) display iodine content in color, perfectly registered over the corresponding virtual noncontrast (VNC) images. The purpose of this study was to perform a multi reader comparison of DECT iodine overlay images with traditional enhanced and unenhanced CT images in the evaluation of polycystic kidneys with respect to lesion detection, reading time, and diagnostic confidence.

METHOD AND MATERIALS
DECT scans from 26 patients with polycystic kidneys (defined as >10 cysts in either kidney) were evaluated retrospectively. Simulated renal mass protocol (RMP) CT scans were created using VNC and nephrographic phase mixed images through the kidneys. Two radiologists independently evaluated either the simulated RMP CT or a DECT iodine overlay series to evaluate for the presence of cysts.
Aissam Labani, MD, Strasbourg, France (Abstract Co-Author) Nothing to Disclose
Herve Lang Sr, MD, Strasbourg, France (Abstract Co-Author) Nothing to Disclose

PURPOSE
To investigate whether CT perfusion quantitative parameters may help to differentiate benign from malignant renal solid lesions.

METHOD AND MATERIALS
We prospectively evaluated 78 solid renal masses (55 malignant; 23 benign:15 angiomyolipoma, 8 oncocytoma) with MDCT including as part of our examination a renal perfusion using a 320-slice dynamic volume CT unit (Aquilion One, Toshiba Medical Systems) including the whole kidney without table movement. The perfusion protocol included 24 volumes with a total acquisition time until 90 sec, a rotation time of 0.5 sec, 0.5 ml/kg of a highly concentrated contrast medium (Iomeprol 400 mg iodine/ml) with a flow rate of 5-6 ml/sec pushed by 50 ml of saline serum. Perfusion parameters were calculated after a non-rigid motion automatic correction, using the Patlak model with the dedicated software of our CT unit. Mean values of quantitative parameters as arterial flow (AF), blood volume (BV) and clearance (Cl) were recorded from ROI located in the tissue part of the renal mass. Correlations were done with pathological data obtained either by US guided biopsy (6), surgical removal of the masses (62 masses) or follow up (10 masses).

RESULTS
Radiation dose was 7-10 mSv (mean 8.3). Lesions ranged from 2.2 to 6.5 cm in diameter. Concerning AF, our results were 285±27, 67±18 and 29 ±29 ml/100 g/min for clear cell, papillary renal carcinomas and benign masses, respectively. For BV and Cl, our results were: 49±13, 48±11 ml/100 g (p=0.37) and 15±6, 29±10 ml/100 g/min (p<0.01) for malignant and benign lesions, respectively. Cl was significantly higher in benign lesions than in malignant masses. AF value was significantly higher in clear cell RCC than in papillary renal carcinoma and BV did not show any difference. In the ROC analysis, the best Cl cut-off value for differentiating malignant from benign masses was 13.5 ml/100 g/min (sensitivity: 76%; specificity: 95% - AUC: 87.2). Concerning the tumoral grade of malignant lesions, there was no statistically significant difference between parameters.

CONCLUSION
Among CT perfusion parameters, the clearance value seems to be an interesting and efficient parameter to orientate towards benignancy. Renal perfusion is feasible in clinical practice with a reasonable radiation dose.

CLINICAL RELEVANCE/APPLICATION
Clearance value could discriminate between benign and malignant renal solid lesion. Renal perfusion is feasible in clinical practice.
To develop a model based on MRI feature to predict the subtypes of renal cell carcinoma (RCC) and distinguish from oncocytoma and angiomyolipoma (AML).

METHOD AND MATERIALS

We included 241 renal masses that had partial nephrectomy or nephrectomy from January 2010 to September 2015. Features evaluated include T1- and T2-weighted signal intensity, signal loss on chemical shift and frequency selective images, India Ink artifact on opposed phase images, and dynamic enhancement features. Other findings include necrosis, cystic component and hemorrhage. In addition, apparent diffusion coefficients (ADC) from diffusion-weighted imaging (DWI) were evaluated. The association of MRI features among the pathological categories was evaluated using chi-squared and Mann-Whitney test. Variables with P < 0.1 among pathological category groups were entered into a multinominal logistic regression analysis. Goodness of fit was assessed by Pearson chi-squared and likelihood test of model coefficients. The predictive ability of the model was determined by constructing a classification table.

RESULTS

Renal pathology included: RCC clear cell (n=122), RCC papillary (n=55), RCC chromophobe (n=13), oncocytoma (n=19), AML (n=15), unclassified (n=17). All imaging characteristics except location and lesion size were significantly different among pathology groups. 205 masses contained all imaging features and were included in the multinominal logistic regression model. MRI features that were statistically significant to predict and discriminate RCC clear cell (predictive value 89.8%) were T2 appearance (homogeneous vs. heterogeneous), T2 signal intensity and ADC. For RCC papillary, (predictive value 88.1%) DWI and T2 signal intensity were significant and for AML, (predictive value 92.9%) DWI and avid early enhancement. RCC chromophobe and oncocytoma had the lowest statistically predicted value with 46.2% and 21.4%. The model correctly classified 79.5% of all diagnosis (Table).

CONCLUSION

MRI features for discriminating RCC were statistically significant for subtypes clear cell and papillary, as well as AML. However differentiation of RCC chromophobe and oncocytoma still remains challenging with MRI.

CLINICAL RELEVANCE/APPLICATION

Preoperative assessment and characterization of suspicious renal lesions using multiparametric MRI could help determine surgical management and guide therapy and surveillance imaging.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator

SSC06-06 Quantitative Volumetric Histogram Analysis of Diffusion-Weighted Magnetic Resonance Imaging: An Initial Experience of Solid Renal Cell Carcinoma with Different Prognosis

Monday, Nov. 28 11:20AM - 11:30AM Room: N228

Participants
and Li, Wuhan, China (Presenter) Nothing to Disclose
haojie Li, Wuhan, China (Abstract Co-Author) Nothing to Disclose
Dao Y. Hu, MD, PhD, Wuhan, China (Abstract Co-Author) Nothing to Disclose
Zhen Li, MD, PhD, Wuhan, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

The purpose of this study was to determine whether quantitative volumetric histogram analysis on diffusion-weighted MRI (DWI) is helpful for distinguishing clear cell RCC (ccRCC) from papillary RCC (pRCC) and chromophobe RCC (chRCC) which having different prognosis.

METHOD AND MATERIALS

A total of 51 patients with solid renal tumors who underwent surgery and had histopathology available were included in this retrospectively study. These patients were divided into two group: Group A (better prognosis, 18 with pRCC and 13 with chRCC) and Group B (worse prognosis, 20 with ccRCC). In addition to routine renal MRI and DWI (b=0, 800s/mm2) were performed on a 3-T system (Discovery 750, GE Medical System, Milwaukee, Wis, USA). Quantitative volumetric tumor regions of interest (ROIs) were drawn on all slices of the ADC maps to obtain histogram parameters, including ADCmean, ADCmedian, ADC10%, ADC25%, ADC75%, ADC90%, entropy, skewness and kurtosis. Multiple receiver operating characteristic (ROC) curves analysis was used to determine and compare the diagnostic value of each significant parameter.

RESULTS

Group B had significantly higher ADCmean, ADCmedian, ADC10%, ADC25%, ADC75%, and ADC90% values compared to Group A (P=0.003, P=0.003, P=0.002, P=0.008, P=0.014, respectively). Majority ADC value of Group B was concentrated on the left of the histogram but Group A was concentrated on the right of the histogram (skewness=-0.16±0.54, 0.40±0.64, respectively, P=0.002). There were no significant difference was found on kurtosis and entropy (P=0.110, P=0.620, respectively).
During ROC curves analysis, compared with Group A and Group B, the ADC10% value generated the highest AUC for differentiating these two groups (AUC, 0.753; Sensitivity, 65%; Specificity, 84%; cut-off value, 0.839×10⁻³ mm²/s), while the ADCmean value generated more higher AUC for differentiating these two groups (AUC, 0.731; Sensitivity, 50%; Specificity, 93%; cut-off value, 1.430×10⁻³ mm²/s).

**CONCLUSION**

Quantitative volumetric histogram analysis on DWI showed a significant shift towards skewness and higher ADCmean, ADCmedian, ADC10%, ADC25%, ADC75%, and ADC90% in better prognosis patients with pRCC and chRCC compared with worse prognosis with ccRCC.

**CLINICAL RELEVANCE/APPLICATION**

Volumetric tumor ADC histogram parameters can be used as a quantitative tool to distinguish three subtypes renal cell carcinomas which having different prognosis.

**SSC06-07 Diagnostic Accuracy of Virtual Non-contrast Enhanced Dual-energy CT for Diagnosis of Lipid-rich Adrenal Adenoma: A Systematic Review and Meta-analysis**

**PURPOSE**

To use systematic review and meta-analysis to determine the diagnostic accuracy of dual-energy (DE) virtual non-contrast enhanced computed tomography (vNECT) for the diagnosis of lipid rich adrenal adenomas; the comparator test is non-contrast enhanced CT (NECT).

**METHOD AND MATERIALS**

Search of multiple databases was performed on Oct. 23, 2015 for eligible studies. Inclusion criteria were: adrenal lesion imaged with contrast-enhanced DE CT with vNECT series generated with Hounsfield Unit (HU) attenuation values and acceptable reference standard. Inclusion and data extraction were performed independently by two reviewers with disagreements resolved by consensus. Risk of bias was assessed using QUADAS-2. Summary estimates of diagnostic accuracy were generated using the bivariate random effects model and subgroup analyses were done to evaluate for sources of heterogeneity.

**RESULTS**

Five studies (170 patients and 192 adrenal lesions) were included. The pooled sensitivity and specificity for lipid rich adenomas on vNECT imaging series were 0.75 (95% CI: 0.53, 0.89) and 0.96 (95% CI: 0.88, 0.99). For the same studies and patients, the pooled sensitivity and specificity for lipid rich adenomas on the comparator test (NECT) were 0.97 (95% CI: 0.91, 0.99) and 0.97 (95% CI: 0.91, 0.99). There was a consistent trend towards higher HU values on vNECT series and differences in vNECT HU values depending on the timing of contrast enhanced DE CT. Moderate risk of bias was identified in the areas of index test (3/5 studies) and reference standard (5/5 studies)- primarily from lack of clear reporting.

**CONCLUSION**

vNECT images generated from dual-energy CT demonstrated comparable specificity with decreased sensitivity compared to NECT for the diagnosis of lipid rich adenomas. The reason for this may be because vNECT overestimated HU when compared to NECT. Additional potential reasons include timing of vNECT relative to contrast injection as well as issues related to the quality of included studies.

**CLINICAL RELEVANCE/APPLICATION**

Diagnosis of lipid-rich adenomas using vNECT shows similar specificity but diminished sensitivity when compared with NECT.

**SSC06-08 Adrenal Gland Iron Deposition: A Heretofore Ignored MRI Finding**

**PURPOSE**

To use systematic review and meta-analysis to determine the diagnostic accuracy of dual-energy (DE) virtual non-contrast enhanced computed tomography (vNECT) for the diagnosis of lipid rich adrenal adenomas; the comparator test is non-contrast enhanced CT (NECT).

**METHOD AND MATERIALS**

Search of multiple databases was performed on Oct. 23, 2015 for eligible studies. Inclusion criteria were: adrenal lesion imaged with contrast-enhanced DE CT with vNECT series generated with Hounsfield Unit (HU) attenuation values and acceptable reference standard. Inclusion and data extraction were performed independently by two reviewers with disagreements resolved by consensus. Risk of bias was assessed using QUADAS-2. Summary estimates of diagnostic accuracy were generated using the bivariate random effects model and subgroup analyses were done to evaluate for sources of heterogeneity.

**RESULTS**

Five studies (170 patients and 192 adrenal lesions) were included. The pooled sensitivity and specificity for lipid rich adenomas on vNECT imaging series were 0.75 (95% CI: 0.53, 0.89) and 0.96 (95% CI: 0.88, 0.99). For the same studies and patients, the pooled sensitivity and specificity for lipid rich adenomas on the comparator test (NECT) were 0.97 (95% CI: 0.91, 0.99) and 0.97 (95% CI: 0.91, 0.99). There was a consistent trend towards higher HU values on vNECT series and differences in vNECT HU values depending on the timing of contrast enhanced DE CT. Moderate risk of bias was identified in the areas of index test (3/5 studies) and reference standard (5/5 studies)- primarily from lack of clear reporting.

**CONCLUSION**

vNECT images generated from dual-energy CT demonstrated comparable specificity with decreased sensitivity compared to NECT for the diagnosis of lipid rich adenomas. The reason for this may be because vNECT overestimated HU when compared to NECT. Additional potential reasons include timing of vNECT relative to contrast injection as well as issues related to the quality of included studies.

**CLINICAL RELEVANCE/APPLICATION**

Diagnosis of lipid-rich adenomas using vNECT shows similar specificity but diminished sensitivity when compared with NECT.
paraspinal muscle ROI on in-phase GRE sequences.

RESULTS

19 (37%) of 52 cases had evidence of adrenal gland iron deposition. Of those, 18 (95%) had hepatic involvement, 18 (95%) had splenic involvement, and 14 (74%) had marrow involvement. None had solitary adrenal gland involvement. 6 of 19 (32%) had mild iron overload, 5 of 19 cases (26%) had moderate iron overload, and 8 of 19 cases (42%) had severe iron overload based on ferritin levels (p=0.94). Average liver-to-paraspinal muscle ROI ratios were 0.61 and 1.03 in cases with and without adrenal involvement (p=0.027), respectively. Average spleen-to-paraspinal muscle ROI ratios were 0.55 and 0.74 in cases with and without adrenal involvement (p>0.05), respectively.

CONCLUSION

Adrenal gland involvement in hemosiderosis is not negligible. It typically occurs in combination with other visceral organ involvement, and more commonly seen in patients with severe hepatic involvement. Serum ferritin levels and presence of adrenal gland involvement appear unrelated.

CLINICAL RELEVANCE/APPLICATION

Radiologists should be aware of possible adrenal gland involvement in cases of hemosiderosis, specifically in cases where the spleen, liver, and/or bone marrow are involved.

SSC06-09 Can CT Textural Analysis Differentiate between Lipid-poor Adrenal Adenomas and other Solid Adrenal Lesions? A Preliminary Study

Participants
Shaunagh McDermott, FFR(RCSI), Boston, MA (Presenter) Nothing to Disclose
Rodrigo Canellas, MD, Cambridge, MA (Abstract Co-Author) Nothing to Disclose
Hei Shun Yu, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Colin J. McCarthy, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Michael S. Gee, MD, PhD, Jamaica Plain, MA (Abstract Co-Author) Nothing to Disclose
Michael A. Blake, MBBCh, Boston, MA (Abstract Co-Author) Editor with royalties, Springer Science+Business Media Deutschland GmbH

PURPOSE

To retrospectively evaluate the diagnostic performance of texture analysis for the discrimination of lipid-poor adenomas from other solid adrenal lesions.

METHOD AND MATERIALS

We identified 22 patients who underwent adrenal washout protocol CT prior to a CT-guided adrenal biopsy between 2006 and 2014. Final diagnosis was based on pathology or stability on imaging for at least one year. Two patients were excluded due to incomplete follow-up. CT textural analysis (CTTA) was assessed using a commercially available research software program (TexRAD) that applies a filtration-histogram technique for characterizing tumor heterogeneity. Filtration step selectively filters and extracts texture features at different anatomical scales varying from 2mm (fine features) to 6mm (coarse features). Receiver operating characteristics (ROC) was performed to assess sensitivity and specificity for differentiating between the benign and malignant adrenal lesions.

RESULTS

Of the 20 adrenal lesions analyzed, 10 (50%) were biopsy-proven metastases and 10 (50%) were adenomas. None of the lesions measured less than 10 HU on the non-contrast study to suggest they were a lipid-rich adenoma. Both the unfiltered mean image intensity and mean positive pixels (mpp) were significantly lower in the adenomas compared to the metastases (p < 0.006, and p < 0.003 respectively). Using a mpp threshold of 29, CTTA identified adenomas with a sensitivity of 70% and a specificity of 90% (AUC=0.9). Adrenal washout protocol CT had a sensitivity of 40% and a specificity of 90%. Combining the two techniques, if lesions were not characterized as an adenoma on washout protocol CT, then using a mpp threshold of 29 resulted in an overall sensitivity of 90% and specificity of 90%.

CONCLUSION

Our preliminary results show that CTTA might be a useful quantitative method to help differentiate lipid-poor adenomas from metastases.

CLINICAL RELEVANCE/APPLICATION

The increasing use of CT has led to more-frequent identification of adrenal lesions. The ability to differentiate adenomas from malignant lesions with CTTA may reduce the need for further imaging or tissue sampling.
PURPOSE
To investigate the changes of dynamic contrast-enhanced MR imaging (DCE-MRI) parameters in the patients with advanced cervical squamous carcinoma before and after concurrent chemo-radiotherapy (CCRT), and to correlate the parameters with final tumour response to therapy.

METHOD AND MATERIALS
Forty-five patients with advanced cervical squamous cancer underwent DW-MRI before CCRT (preTx), 4 weeks (postT1) after initiating treatment and at 1 month (postT2) after the end of treatment. DCE-MRI was obtained using a 3D fast field echo sequence in the axial plane (TR/TE 3.6/1.8 ms, flip angle 15°, acquisition time 5 min). Images were obtained immediately after a bolus injection of gadolinium DTPA (Magnevis,GE) at a rate of 3 ml/s. Pharmacokinetic analysis was performed according to extended tofts model, and the following quantitative parameters were calculated: volume transfer constant (Ktrans), rate constant (kep) and fraction of extravascular extracellular volume (Ve). DCE-MRI parameters were calculated in the tumour and normal myometrium. Final response to treatment as determined by changes in tumour size and volume was correlated with pre-treatment DCE-MRI parameters at each point.

RESULTS
Before therapy, the mean values of Ktrans, kep and Ve in the tumors were significantly lower than those in the myometrium (P<0.05). DCE-MRI parameters in the tumors showed significantly increased changes in response to CCRT (P<0.05) and in particular Ktrans and Ve demonstrated early significant increase (postT1) (P<0.01), but those in normal myometrium did not show a significant difference (P>0.05). Ktrans of the tumors at (preTx) was statistically associated with tumour size or volume change at postT1 and postT2. Changes of Ktrans and kep in tumor at postT1 had a significant correlation with tumor size and volume change at postT2.

CONCLUSION
DCE-MRI parameters may help evaluate early changes of cervical squamous cancer to CCRT.

CLINICAL RELEVANCE/APPLICATION
DCE-MRI parameters, as early biomarkers, have the potential to evaluate therapeutic responses to CCRT in advanced cervical squamous cancers.

PURPOSE
Evaluation of a qualitative response assessment scoring system at MRI and 18F-FDG PET-CT following chemo-radiation for locally advanced cervical carcinoma and correlation with patient outcome.

METHOD AND MATERIALS
Evaluation of a qualitative response assessment scoring system at MRI and 18F-FDG PET-CT following chemo-radiation for locally advanced cervical carcinoma and correlation with patient outcome.
To investigate the response to therapy for vulvar carcinoma using post-therapy imaging with F-18 fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) and compare the metabolic response to local regional control and survival outcomes.

METHOD AND MATERIALS

This was a retrospective study of 23 women with vulvar cancer. Radiation intent was definitive in 12 patients (52%), adjuvant radiation after surgery in 8 patients (35%), and neoadjuvant radiation prior to surgery in 3 patients (13%). All patients received intensity modulated radiation treatment to a mean dose of 55.6 Gy (range 49.6 to 70 Gy). Prior to any treatment, all patients received a staging FDG-PET/CT. Post-treatment whole body FDG-PET/CT was performed at 0.2 to 7 months (median 2.5 months) after completion of radiation therapy.

RESULTS

Of 77 patients with median (range) age of 45 (24-75) years, 39 (51%) had complete response (CR) on MRI (Score M1), 10 relapsed (26%). Of 29 with complete metabolic response (CMR, Score P1/2) on PET, 2 (7%) recurred. Of 21 patients with CR on MRI and PET-CT, 2 relapsed (10%). Of 32 patients (42%) with partial response (PR) at MRI (Score M2), 15 relapsed (47%). All 8 patients with M2 and negative PET-CT remained disease free at follow-up. Of 38 patients (49%) with indeterminate uptake on PET (Score P3/4), 19 relapsed (50%). Recurrence was lower in patients with M1 (6/15, 40%) compared to M2 (11/21, 52%). 5/6 patients (83%) with significant signal intensity at MRI (Score M3) relapsed. PET-CT demonstrated progressive disease (PD, Score P5) in 9 patients (12%). Kaplan-Meier demonstrated a highly statistically significant difference in PFS and OS between patients with CMR, indeterminate uptake, PMR and PD (Log-rank, P< 0.0001). Chi2 test demonstrated a highly statistically significant association between increasing qualitative score and risk of recurrence or death (P<0.001).

CONCLUSION

MRI and PET-CT provide complementary information post CRT in locally advanced cervical cancer. Qualitative scoring systems in this clinical scenario predict outcome and may help guide further patient management.

CLINICAL RELEVANCE/APPLICATION

In the era of precision medicine, objective MRI and PET-CT response assessment criteria may help guide an individualized approach to subsequent patient management in locally advanced cervical cancer.
The post-treatment FDG-PET showed no evidence of disease (complete metabolic response) in 13 patients. Residual disease or progressive disease on FDG-PET was seen in 10 patients. A Cox proportional hazards model of clinical outcome indicated that post-treatment PET response was the most significant predictor of biopsy-proven local-regional control (HR=6.89, 95% CI 1.8-43.9, p=0.01) and overall survival (HR 9.16, 95% CI 1.05-79.6, p=0.045) compared to other prognostic parameters. The 2-year local-regional control rate was 90% for patients with no evidence of disease vs. 22.5% for patients with residual or progressive disease on post-treatment PET. The 2 year overall survival was 100% for patients with no evidence of disease vs. 42.8% for patients with residual or progressive disease.

CONCLUSION
In this single-institution study of women with vulvar cancer, the post-treatment FDG response on whole-body FDG-PET/CT was predictive of local regional control and survival.

CLINICAL RELEVANCE/APPLICATION
Post-treatment 18F-FDG PET/CT may help physicians identify a subset of patients diagnosed with vulvar cancer at a higher risk of recurrence who may benefit from salvage therapy, such as surgery or radiation.

SSC15-06 Pelvic Bone Marrow Sparing in Volumetric Modulated Arc Therapy Reduced the Hematologic Toxicity for Cervical Cancer
Monday, Nov. 28 11:20AM - 11:30AM Room: S104A

Participants
Yao Sun, Oak Brook, IL (Presenter) Nothing to Disclose
Zhiyong Yuan, Tianjin, China (Abstract Co-Author) Nothing to Disclose
zhao tao, tianjin, China (Abstract Co-Author) Nothing to Disclose

ABSTRACT
Purpose/Objective(s): To determine if bone marrow sparing (BMS) in volumetric modulated arc therapy (VMAT) reduce the hematologic toxicity compared with VMAT without BMS.Materials/Methods: Two groups of 10+ patients with cervical cancer at our institution were enrolled respectively. All the patients received postoperative VMAT to 50.4Gy to the pelvic lymphatics and vagina. All plans were generated using our in-house-developed automatic inverse planning (AIP) algorithm. One group was treated with BMS-VMAT, while the other group was treated with VMAT without BMS. Planning objectives for PTV were minimum dose =95%, maximum dose = 107%,. The pelvic bone marrow (PBM) was limited to V5 t-test. The X2test was used to compare rates of hematologic toxicity. Results: All the patients were clinical stage IA2-IIB. The median age was 54 years old. After radical hysterectomy, eleven patients were diagnosed to have lymphovascular space involvement (LVSI); 5 patients had primary tumor size larger than 4cm; 9 patients had more than a third of stromal invasion. No patients had positive lymph node, parametria or positive surgical margins. The two groups resulted in equivalent homogeneity (1.07±1.2% vs 1.10±3.1%; P=0.210) and conformity index (0.84±2.7% vs 0.827±1.2%; P=0.444). The PBM dose metrics showed a significant decrease in V5 (83.1%±3.2% vs 89.0%±0.8%; P=0.037) and V10 (74.8%±1.6% vs 82.3%±  2.1%; P=0.008) in the BMS-VMAT group compared to the VMAT group. However, V30 and V40 of PBM dose metrics were not significantly different between the two groups. The nadir for WCC (P=0.008) and ANC (P=0.004) were significantly reduced in the VMAT group compared to the BMS-VMAT group. In the BMS-VMAT group, 16.7% had grade 2 or higher hematologic toxicity (HT) compared with 56.7% in the VMAT group (P=0.036).Conclusion: BMS-VMAT reduced irradiation of PBM compared to VMAT without BMS, especially in the low dose radiation (V5 and V10). This analysis supports the hypothesis that low dose radiation of PBM is associated with acute HT during postoperative radiotherapy for cervical cancer. Techniques to limit pelvic bone marrow irradiation can reduce HT in cervical cancer patients.

SSC15-07 Incidence and Prognostic Value of NFkB-p65 Nuclear Versus Cytoplasmic Expression in Locally Advanced Cervical Cancer Patients Treated Definitively with Concurrent Chemoradiation
Monday, Nov. 28 11:30AM - 11:40AM Room: S104A

Participants
Darlene G. Attiah, MS, Chicago, IL (Presenter) Nothing to Disclose
Tamer Refaat Abdelrahman, MD, PhD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Irene Helenowksi, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Jonathan B. Strauss, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
William Small JR, MD, Maywood, IL (Abstract Co-Author) Speakers Bureau, Carl Zeiss AG; Advisory Board, Varian Medical Systems, Inc
Eric D. Donnelly, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose

ABSTRACT
This study aims to report the incidence of NFkB-p65 nuclear versus cytoplasmic over-expression in locally advanced cervical cancer patients treated definitively with concurrent chemoradiation therapy (CRT) and their respective prognostic values on treatment outcomes.

METHOD AND MATERIALS
This IRB approved retrospective study included locally advanced cervical cancer patients, stages IIB through IVA treated definitively with CRT. Evaluation of both nuclear and cytoplasmic immunoreactivity for NFkB-p65 was performed applying the same immunohistochemistry staining protocol reported by Garg et al. and scored quantitatively by 3 pathologists blinded to the treatment outcomes. Overall survival (OS), progression free survival (PFS), local regional control (LC), and distant metastases free survival (DMFS) rates were obtained via the Kaplan-Meier method and differences between groups were evaluated by the Log-Rank test.

RESULTS
The study evaluated 28 eligible patients with a median age of 51 ± 10 years. None of the patients expressed pretreatment NFkB-p65 nuclear immunoreactivity, whereas 15 (53.6%) and 13(46.4%) had cytoplasmic expression with a recurrence H-index ≥180 and <180, respectively. For patients with pretreatment cytoplasmic NFkB H-index ≥180, and <180, the 5-year OS were 49.45% and 64.10% (P-Value = 0.34), PFS were 39.29% and 57.69% (P-value = 0.21), LC were 78.57% and 69.23% (P-value = 0.86), and DMFS were 49.11% and 76.92% (P-value = 0.18), respectively.
CONCLUSION

This study demonstrated that NFκB-p65 have a significantly higher incidence of cytoplasmic versus nuclear expression. Cytoplasmic NFκB-p65 over-expression (H-index ≥180) was associated with a non-statistically significant trend towards poor clinical outcomes in locally advanced cervical cancer patients treated definitively with CRT.

CLINICAL RELEVANCE/APPLICATION

NFκB-p65 have a significantly higher incidence of cytoplasmic versus nuclear expression, and did not demonstrate significant association with treatment outcomes in locally advanced cervical cancer patients treated definitively with CRT.

SSC15-08 Outcomes of a Single Institution Study of Radiation Sandwiched between 6 Cycles of Chemotherapy for Surgically Staged High-Risk Endometrioid Adenocarcinoma

Monday, Nov. 28 11:40AM - 11:50AM Room: S104A

CONCLUSION

This study demonstrated that NFκB-p65 have a significantly higher incidence of cytoplasmic versus nuclear expression. Cytoplasmic NFκB-p65 over-expression (H-index ≥180) was associated with a non-statistically significant trend towards poor clinical outcomes in locally advanced cervical cancer patients treated definitively with CRT.

CLINICAL RELEVANCE/APPLICATION

NFκB-p65 have a significantly higher incidence of cytoplasmic versus nuclear expression, and did not demonstrate significant association with treatment outcomes in locally advanced cervical cancer patients treated definitively with CRT.

Awards

Student Travel Stipend Award

Participants

Sujith Baliga, MD, New York, NY (Presenter) Nothing to Disclose

ABSTRACT

Purpose/Objective(s): The optimal treatment modality for patients with high-risk endometrial cancers, including the sequencing of radiation and chemotherapy, is not yet well established. Here we report our experience of radiation "sandwiched" between 6 cycles of chemotherapy for patients with surgically staged high-risk endometrioid adenocarcinoma (EA). Materials/Methods: From April 2010 – June 2014, 27 patients with Stage IA-IVB histologically confirmed high-risk EA were treated with a combination of adjuvant sandwich chemoradiation. Inclusion criteria include patients with histologically documented EA defined by the following: IA Grade 3 with LVSI, IB G2 or IB G3, any surgical Stage II or Stage III disease, and any surgical Stage IV disease with no residual macroscopic tumor. Chemotherapy consisted of a combination of Carboplatin (AUC 6 pre-RT and AUC 5 post-RT) and Paclitaxel (175 mg/m2). Chemotherapy was administered every 21 days for 3 cycles, followed by a planned chemotherapy break during which external beam radiotherapy (EBRT) and 3 high dose rate (HDR) brachytherapy vaginal cylinder treatments were sequentially delivered. Chemotherapy was resumed after the completion of EBRT and typically overlapped with the HDR brachytherapy. Post-RT chemotherapy was administered for 3 cycles. EBRT consisted of 45 Gy to the pelvis utilizing IMRT, and extended field RT (EFRT), to include the para-aortic (PA) nodes, was used if 2 or more pelvic lymph nodes were involved or if there was PA disease. RTOG toxicity criteria were used to calculate the cumulative gastrointestinal (GI), genitourinary (GU), and hematologic toxicity. Results: Mean age of our cohort at diagnosis was 58 years. The median follow up was 25 months. 7 patients had Stage I disease (25%), 5 patients had Stage II disease (17.9%), 4 patients had Stage IIIA disease (14.3%), 6 patients had Stage IIIC1 disease (25%), 4 patients had Stage IIIC2 disease (14.3%) and 1 patient had Stage IVB disease (3.6%). There were no local or distant failures in our cohort. The rate of acute Grade 2 GI and GU toxicity was 10.7% and 0%, respectively. Acute grade 3 GI toxicity occurred in 1 patient (3.6%). The rate of late grade 3 GU or GI toxicity was 3.6% and 3.6%, respectively. The rate of acute grade 3 thrombocytopenia, anemia, and neutropenia were 7.1%, 3.6%, and 35.7%, respectively. 7.1% of patients required chemotherapy dose reduction and 17.9% of patients required cycle delay. Conclusion: In patients with high risk EA, adjuvant sandwich chemoradiation results in excellent loco-regional and distant control with acceptable toxicity.
Evaluating the Performance of PI-RADS v2 in the Non-Academic Setting

**PURPOSE**
To evaluate the utility of PI-RADS v2 to diagnose clinically significant prostate cancer (CS-PCa) with magnetic resonance ultrasound (MR/US) fusion guided prostate biopsies in the non-academic setting.

**METHOD AND MATERIALS**
IRB approved retrospective analysis of men whom underwent prostate multiparametric MRI and subsequent MR/US fusion biopsies at a single non-academic center from 11/2014 - 3/2016. Indications for prostate MRI included elevated PSA, abnormal digital rectal exam and/or negative transrectal ultrasound biopsy. Prostate MRIs were performed on a 3-Tesla scanner with a surface body coil including T2, diffusion-weighted (b-values: 10, 400, 800, 1200) and dynamic contrast enhancement sequences. The Prostate Imaging Reporting and Data System (PI-RADS) v2 scoring algorithm was utilized on all patients. MR/US fusion biopsies were performed in all cases with a suspicious lesion. Mixed effect logistic regression analyses were used to determine the ability of PI-RADS v2 alone and combined with PSA density (PSAD) to predict CS-PCa (defined as Gleason score ≥7 per PI-RADS v2 guidelines). Performances of PI-RADS v2 and combined with PSA density (PSAD) were compared utilizing receiver-operating characteristic (ROC) curves derived from the logistic models.

**RESULTS**
170 patients underwent prostate MRI with a total of 282 PI-RADS lesions. MR/US fusion diagnosed 71 CS-PCa. Of the remaining lesions, 168 were negative and 33 were Gleason score 3+3 prostate cancer. The overall PI-RADS v2 score is a statistically significant predictor of CS-PCa (p<0.001). For each one-point increase in the overall PI-RADS v2 score, the odds of having CS-PCa increases by 4.2 (95%CI=2.2-8.3). The area under the ROC curve for PI-RADS v2 to discriminate CS-PCa positive patients was 0.69 (95%CI = 0.63-0.76). PSA was an independent predictor on the multivariate model (p=0.03), and the model that included PI-RADS and PSAD revealed an area under the ROC of 0.76 (95%CI=0.69-0.82), statistically higher than that of PI-RADS v2 alone (p<0.001). The rate of CS-PCa was about twice higher in men with high PSAD (≥0.15) compared to men with low PSAD (<0.15) when a PI-RADS 4 or 5 lesion was detected (p=0.005).

**CONCLUSION**
PI-RADS v2 is a strong predictor of CS-PCa in the non-academic setting and can be further strengthened when utilized with PSAD.

**CLINICAL RELEVANCE/APPLICATION**
PI-RADS v2 is a new scoring algorithm which appears applicable and fairly accurate in a non-academic center.

---

Identifying a Large-Scale Radiomic Profiling Imaging Signature for non-Invasive, Computational Model Training Based Discrimination of Prostate Cancer Aggressiveness

**PURPOSE**
To evaluate the utility of PI-RADS v2 to diagnose clinically significant prostate cancer (CS-PCa) with magnetic resonance ultrasound (MR/US) fusion guided prostate biopsies in the non-academic setting.
Prostate cancer (PC) is a leading cause of cancer-related morbidity and mortality in men, but its management is hampered by diagnostic uncertainty leading to over- and undertreatment of disease. We study the potential of a large-scale radiomic approach to distinguish low- to intermediate risk PC (lrPC) (Gleason score (GS)≤3+4 and pathological T-stage (pT)≤2c) from clinically significant aggressive (aPC) PC ((GS)≥4+3 and pT≥3a).

**METHOD AND MATERIALS**

Index lesions of 137 patients with radical prostatectomy (RPE) – proven PCa were manually segmented on T2-weighted images and ADC maps. After intensity normalization, a total of 6095 quantitative radiomics features [including first-order, volume and shape features, texture features and features based on undecimated (UWT) and discrete (DWT) wavelet transforms] were automatically extracted and z-score transformed. We performed feature selection and model training with a penalized logistic regression (PLR) procedure to generate a sparse model with good prediction accuracy, while simultaneously promoting the grouping of strongly correlated predictors. The model prediction was compared to ADC metrics and PI-RADS (V1 and V2) scoring in its ability to predict the pathological assessment.

**RESULTS**

The final classifier incorporated 25 features and achieved differentiation of lrPC from aPC with ROC AUC of 95.9% and accuracy of 91.2% (sensitivity: 96.7%; specificity: 80.0%, PPV: 90.8% NPV: 92.3%), which was significantly better than ROC AUC of mean ADC (92.8%, p=0.049), median ADC (92.6%, p=0.040), 10th percentile of ADC (90.2%, p=0.010), PI-RADS version 1 (71.0%, p<0.001) and PI-RADS version 2 (70.0%, p<0.001).

**CONCLUSION**

Good imaging-based discrimination accuracy between lrPC and aPC was achieved using a large scale radiomic signature in RPE proven PC, which performed significantly better than imaging assessment using classical ADC metrics or clinical assessment using PI-RADS.

**CLINICAL RELEVANCE/APPLICATION**

A trained computational model training based classifier may be able to support clinical assessment of PCa aggressiveness in the future.

**GU212-SD-MOA3 Hyperpolarized MRS/PET/Ultrasound Molecular Image Fusion for Improved Diagnosis and Guided Biopsy of Prostate Cancer**

Station # 3

**Participants**

Keerthi S. Valluru, MS, Stanford, CA (Presenter) Nothing to Disclose
Jae Mo Park, PhD, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Sunita Bachawal, PhD, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Changhao Liu, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Valentina Taviani, PhD, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Praveen Gulaka, PhD, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Yami Saenz, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Stephen A. Felt, DVM, MPH, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Jesse G. Vilches-Moure, DVM, PhD, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Bruce L. Daniel, MD, Stanford, CA (Abstract Co-Author) Research Grant, General Electric Company
Zhen Cheng, PhD, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Daniel M. Spielman, PhD, Stanford, CA (Abstract Co-Author) Nothing to Disclose
Juergen K. Willmann, MD, Stanford, CA (Abstract Co-Author) Research Consultant, Bracco Group; Research Grant, Siemens AG; Research Grant, Bracco Group; Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company; Advisory Board, Lantheus Medical Imaging, Inc; Advisory Board, Bracco Group

**PURPOSE**

Blinded transrectal ultrasound (TRUS) biopsy can fail to identify prostate cancer (PCa) in 10-25% of patients [1]. Novel molecular imaging techniques such as Hyperpolarized 13C Magnetic Resonance Spectroscopy (HMRS) with pyruvate [2], PET imaging with 68Ga-NODAGA-RM1 [3], and ultrasound molecular imaging (USMI) with vascular endothelial growth factor receptor type-2 (VEGFR-2) targeted microbubbles (BR55, Bracco Suisse SA) [4] can facilitate improved cancer detection. In this study, we investigated the feasibility of real-time HMRS/PET/USMI fusion and TRUS biopsy in canine PCa in vivo.

**METHOD AND MATERIALS**

60e6 Ace-1 cells [5] were orthotopically-transplanted in the prostate of immunosuppressed dogs (n=3, 10-12Kg). Two weeks later, simultaneous pre-operative HMRS/PET/MRI was performed with 68Ga-NODAGA-RM1 (~1mCi) dynamic PET scan in all the dogs and an additional 18F-FDG (~2mCi) scan in dogs 2 and 3. 1H-MRI and HMRS (250mM pyruvate, 0.8mL/Kg) images were acquired using 13C/1H dual-tuned endorectal receive and 13C clamshell transmit coils. Subsequently, USMI (BR55, 0.05mL/Kg) and real-time fusion with TRUS (dog 1:HMRS/MRI, dog 2:HMRS/PET/MRI, dog 3:HMRS/PET/MRI+Biopsy) was implemented followed by histological analysis (H&E) of the resected prostate and biopsy samples.

**RESULTS**

In all dogs, Ace-1 tumors were seen on TRUS and T2-weighted MRI, while USMI revealed peripheral binding in tumors, associated with rapid clearance (~3 minutes), possibly due to low affinity of BR55 for canine VEGFR-2. In dog 1, 68Ga PET showed no specific uptake but HMRS showed increased 13C-lactate production in tumor (lactate/pyruvate=0.5). H&E confirmed PCa with ~1 mm heterogenic nests surrounded by inflammatory cells. In dog 2, FDG-PET and HMRS showed elevated metabolic activity with lactate/pyruvate=0.64 in tumor, with no 68Ga-tracer uptake. On H&E, extracapsular growth of PCa was confirmed. In dog 3, 18F-FDG and 68Ga showed increased uptake in tumor with little signal observed on HMRS. Overall, in each dog the tumors were confirmed to be viable at least by one physiological imaging modality showing the benefit of multimodality imaging in improving the diagnosis of PCa.

**CONCLUSION**

Real-time HMRS/PET/MR fusion guided TRUS biopsy of focal PCa is feasible.
**CLINICAL RELEVANCE/APPLICATION**

Our study lays the foundation for clinical translation of a multimodality imaging approach for improved guided biopsy results in patients with prostate cancer.

**GU213-SD-MOA4**  
**Acute Non-Hemorrhagic Adrenal Infarction in Pregnancy: Incidence, MRI Features, and Outcome**

**Participants**

Sha-har Admoni, MD, Boston, MA (Presenter) Nothing to Disclose  
Jeffrey P. Guenette, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose  
Wendy B. Landman, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose  
Servet Tatli, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

Non-hemorrhagic adrenal infarction is a rare cause of acute abdominal or back pain in pregnancy. The diagnosis is often overlooked, as pregnant women do not typically undergo CT or MRI with gadolinium-based contrast material due to potential fetal toxicity. Recently, case reports have described non-hemorrhagic adrenal infarction on unenhanced MRI. This study aims to measure the incidence of non-hemorrhagic adrenal infarction in pregnant women presenting with acute symptoms, describe the MRI features, and evaluate outcomes.

**METHOD AND MATERIALS**

All 444 consecutive MRI scans performed on pregnant women from May 2005 to April 2015 were reviewed. Studies with an indication other than acute pain (n=30) and those not fully including the adrenals (n=35) were excluded. The remaining MRI examinations were retrospectively evaluated by two radiologists, and abnormal morphological and signal characteristics were recorded. Patient demographics and outcomes were gathered from the medical record.

**RESULTS**

In 5 (1.3%) of 379 studies in 4 patients (ranging 16-35 weeks gestational age), findings were suggestive of non-hemorrhagic adrenal infarction. MRI features included unilateral adrenal gland enlargement and retroperitoneal edema centered at the adrenal. No additional imaging findings were found to explain the patients’ symptoms. The patients presented with severe acute abdominal/flank pain with nausea and/or vomiting. All patients had tenderness to palpation without peritoneal signs on exam, leukocytosis (11.4-20.0 thousand cells/μL), and a bland urinalysis. None had a personal or family history of thrombophilia. Patients were treated with IV fluids, analgesia, antiemetics, bowel regimen, and, in two cases, anticoagulation. Symptoms eventually resolved, and all women delivered healthy babies.

**CONCLUSION**

Non-hemorrhagic adrenal infarction was identified in 1.3% of non-contrast abdominal MRI examinations performed in pregnant women with acute abdominal/back pain. Imaging features included unilateral adrenal gland enlargement and surrounding edema. This diagnosis is often overlooked in pregnant women, as CT and gadolinium-based contrast are typically avoided. Therefore, it must be recognized by its unenhanced MRI characteristics.

**CLINICAL RELEVANCE/APPLICATION**

Due to avoidance of CT and gadolinium in pregnancy, diagnosis of non-hemorrhagic adrenal infarction must be made on unenhanced MRI by recognizing edema surrounding an enlarged adrenal gland.

**GU214-SD-MOAS**  
**Ultrasound (US) of Indeterminate Adnexal Cysts: Incidence of Ovarian Cancer**

**Awards**

**Student Travel Stipend Award**

**Participants**

Elizabeth B. Maddox, Madison, WI (Presenter) Nothing to Disclose  
Elizabeth A. Sadowski, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose  
Krupa Patel-Lippman, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose  
Ashish P. Wasnik, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose  
Viktoriya Paroder, MD,PhD, Bronx, NY (Abstract Co-Author) Nothing to Disclose  
Sarah Averill, Madison, WI (Abstract Co-Author) Nothing to Disclose  
Lisa Barnholz, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose  
Laura Huffman, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose  
Katherine E. Maturen, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose  
Alexander D. Blaty, BS, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose  
Jessica B. Robbins, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

Most ovarian lesions can be characterized on ultrasound (US) as benign appearing or worrisome for malignancy, and appropriately triaged. However, when cystic lesions have avascular septations and/or solid components or are larger than 5cm they are incompletely characterized by US and considered sonographically indeterminate (Ekeroth E et al. Am J Obstet Gynecol 2001). The rate of ovarian cancer development in ovarian lesions characterized as benign or potentially malignant is well documented; however there is a paucity of data on the incidence of ovarian cancer in US indeterminate ovarian lesions. The goal of our study was to determine the incidence of ovarian cancer in sonographically indeterminate lesions.

**METHOD AND MATERIALS**

This is an IRB approved retrospective review of transvaginal US studies performed consecutively at 3 institutions from January to June 2011. Adnexal cystic lesions were considered indeterminate if they met one of the following criteria: presence of septations or soft tissue elements without Doppler vascularity, or cyst size >5 cm. Surgical pathology or resolution on follow-up were the...
inclusion criteria end-points. The incidence of benign and malignant ovarian neoplasms was calculated.

RESULTS
166 cystic adnexal lesions in 158 women (mean age 43 ± 14 years) met the inclusion criteria. 71.7% (119/166) of US indeterminate lesions resolved on follow up or were physiologic cysts on pathology. 24.1% (40/166) were benign ovarian neoplasms (cystadenomas; dermoids). 3.0% (5/166) were borderline or low-grade ovarian neoplasms. 1.2% (2/166) were clear cell or high-grade serous/endometroid carcinomas.

CONCLUSION
In our cohort of sonographically indeterminate lesions, 71.7% were non-neoplastic, 24.1 % were benign ovarian neoplasms, and 4.2% were either borderline tumors or carcinomas. Study accrual is ongoing to increase the number of indeterminate lesions. Continued analysis will be important to accurately assess the incidence of ovarian cancer in sonographically indeterminate lesions, which may help guide management of women with indeterminate adnexal lesions in the future.

CLINICAL RELEVANCE/APPLICATION
Determining the incidence of ovarian cancer in sonographically indeterminate adnexal lesions is an important step in the formulation of appropriate recommendations for follow up of these lesions.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Katherine E. Maturen, MD - 2014 Honored Educator

GU215-SD- MOA6 Role of 64 Slice MDCT Urethrography In Evaluation Of Male Urethral Pathologies

PURPOSE
Urethral pathologies are traditionally imaged on retrograde urethrography for anterior and micturating cystourethrography for posterior urethra, but have limitations which can be overcome by Multi-Detector CT Urethrography (MDCTU); the role of which is assessed in this study.

METHOD AND MATERIALS
After institutional ethical approval and informed consent 50 males with urethral complaints underwent Conventional Urethrography (CU) and MDCTU on 64 slice CT. Visualization of urethra, presence, level, cause and extent of urethral pathology were assessed by two radiologists independently and compared with surgery/ cystoscopy or IOU. Wilcoxon signed rank test, intraclass correlation coefficients (for length and severity) and Kappa for interobserver agreement was used for statistical analysis.

RESULTS
Visualization of anterior urethra was adequate 96% on CU, 98% on MDCTU with substantial (kappa=0.66) & perfect agreement (kappa=1.0) respectively. Posterior urethra seen in 98% (MDCTU) Vs 48% (CU) (p value<0.05) & perfect (kappa=0.932) and substantial (kappa=0.658) agreement for MDCTU & CU respectively. For assessment anterior urethral pathologies perfect agreement was noted for CU & MDCTU (kappa=0.93 and 0.949 respectively). Visualization of posterior urethra was not possible in 52% on CU and 2% on MDCTU (p value< 0.05). Interobserver agreement was perfect (CU & MDCTU kappa=0.9178 & 0.916 respectively). 48 strictured urethral segments were present in 83.8% patients. The specificity (97.8%) and PPV (97.5% - CU Vs 97.9%-MDCTU) for both CU & MDCTU was comparable but sensitivity & NPV was higher for MDCTU (Sensitivity: 97.9% Vs 83.3% & NPV: 97.8% Vs 84.9%). Level of stricture was determined in 37 on CU Vs 48 on MDCTU. The mean stenosis was 72.76% on CU Vs 73.16% on MDCTU, with excellent ICC of 0.962. Mean length was 16.40 mm on CU Vs 18.66 mm on MDCTU, with ICC of 0.978 & perfect agreement. MDCTU was superior to CU in detecting PUDDs, false tracts & urethral calculus also. The mean effective dose was 2.61±0.898 mSv on CU & 3.63±2.416 mSv on MDCTU.

CONCLUSION
MDCTU was superior to CU, in visualization and pathology detection of the urethra, especially posterior urethra.

CLINICAL RELEVANCE/APPLICATION
MDCTU is a reliable and superior in visualization and pathology detection especially of posterior urethra and has the potential to replace CU as gold standard investigation for urethral evaluation.

UR115-ED- MOA7 Contrast-enhanced Ultrasound (CEUS) of Cystic and Solid Renal Lesions: Introduction and Imaging Primer

Participants
Mittul Gulati, MD, La Canada Flintridge, CA (Abstract Co-Author) Nothing to Disclose
Amen S. Aivazi, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Phillip M. Cheng, MD, MS, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Chidubem G. Ugwueze, MS, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
TEACHING POINTS

1. Background on contrast-enhanced ultrasound (CEUS) of focal renal lesions.
2. Differentiating features and examples of cystic and solid renal lesions on both conventional ultrasound and CEUS.

TABLE OF CONTENTS/OUTLINE

OUTLINE:
1. CEUS technique in evaluation of focal renal lesions.
2. Advantages and limitations of renal CEUS.
3. Differentiating features of cystic renal lesions on CEUS, with examples and analogues to Bosniak CT classification.
4. Differentiating features of solid renal lesions on CEUS, with examples including:
   - clear cell renal cell carcinoma
   - papillary renal cell carcinoma
   - angiomyolipoma (both typical and lipid-poor)
   - oncocytoma
   - renal pseudotumor
   - metastases
   - lymphoma
5. Overview of quantitative imaging (time-intensity curves, or TIC) derived from CEUS, and the utility of TICs in differentiating renal lesions.

SUMMARY

After reviewing this exhibit the participant will:
1. Be familiar with technique, advantages, and limitations of CEUS in evaluation of cystic and solid renal lesions.
2. Be familiar with the CEUS appearance of a variety of common cystic and solid renal lesions.
3. Understand the emerging role of CEUS derived quantitative imaging in differentiating renal lesions.
Lunch & Learn: Transitioning to DR, Clinical and Financial Benefits Beyond Preventing Reimbursement Penalties: Supported by Fujifilm (invite-only)

Monday, Nov. 28 12:30PM - 1:30PM Room: S403B

Participants

PARTICIPANTS

Jerry Thomas, MS, FAAPM, DABR, CHP, DABSNM Wichita, KS
William Tobin BS, Tyler, TX

PROGRAM INFORMATION

This course does not offer CME credit.
**Texture Analysis as an Image-Based Discriminator between T1 Renal Cell Carcinoma and pT3 Renal Cell Carcinoma**

Participants
Zhen J. Wang, MD, Hillsborough, CA (Moderator) Stockholder, Nextrast, Inc

SUB-EVENTS

GU216-SD-MOB1

**Diagnostic Utility of MR Biomarkers Derived from Fat-suppressed T1-weighted 3D Gradient-echo Imaging in Distinguishing Malignant from Benign Solid Renal Tumors and Subtyping of Renal Cell Carcinoma**

**PURPOSE**
Clear cell renal cell carcinomas (ccRCC) smaller than 7 cm may be upstaged to pT3 based on imaging or histopathological evidence of vascular invasion. This study evaluated if Gray Level Co-occurrence Matrix (GLCM) textures features could differentiate between T1 and pT3 tumors.

**METHOD AND MATERIALS**
In this retrospective cohort study, Computerized Tomography (CT) images of 8 patients with pT3 RCC and 21 patients with T1 RCC tumors were extracted using semi-automated segmentation on Synapse 3D (Fujifilm, Stamford, CT). Two and three dimensional GLCM calculations were performed on each tumor. These calculations, 2D and 3D respectively, extracted thirteen GLCM features: mean gray value (MGV), standard deviation (SD), inverse difference moment (IDM), difference variance (DV), entropy (ENT), contrast (CON), sum of squares variance (SQV), sum entropy (SE), sum average (SA), angular second moment (ASM), Correlation (COR), information measures of correlation1 (IMC1), and IMC2. Descriptive analyses based on t-test or Wilcoxon Rank Sum test, depending on data distribution and with box whisker plot were used to illustrate the difference in imaging parameter between patient categories.

**RESULTS**
GLCM Calculations were technically successful for all cases. Features extracted in 2D found significant differences, p < 0.01, between the two groups: MCC in all four phases (see figure) and ASM (0.02 vs 0.01), HOM (0.43 vs 0.36), CON (7.94 vs 6.05), and uniformity (0.12 vs 0.15) in the nephrographic phase. 3D features did not find significant differences between the two groups on all phases and texture features.

**CONCLUSION**
Five image texture features may help distinguish between T1 and pT3 Clear Cell RCC tumors with the nephrographic venous phase being of high importance for the discrimination.

**CLINICAL RELEVANCE/APPLICATION**
Quantitative texture metrics can distinguish between tumors with different biologic behavior with potential to allow for image-based patients' risk stratification.

**PURPOSE**
To assess the ability of MR biomarkers derived from fat-suppressed T1-weighted 3D gradient-echo (3D T1 GRE) imaging to discriminate benign from malignant lesions, as well as subtypes of renal cell carcinoma (RCC) from one another, among a cohort of pathologically confirmed solid renal masses.
METHOD AND MATERIALS

The cohort consisted of 291 renal masses (245 RCC, 5 non-RCC malignant, 41 benign lesions) in 267 patients. For the qualitative portion, 3D T1 GRE sequences were independently reviewed by 2 radiologists who were blinded to additional imaging or patient data. Lesions were visually examined for internal T1 hyperintense foci (defined as discrete nonhomogeneous foci greater in signal than normal renal cortex). For the quantitative portion, a single radiologist measured lesion-to-cortex ratios (T1 ratio) via averaged regions of interest. Univariate logistic regression was used to assess the ability of each variable to predict malignancy and RCC subtype. Odds ratios (OR), AUC statistics, and 95% confidence intervals for each variable were also calculated. For the qualitative variable, inter-observer agreement was measured with the Kappa coefficient.

RESULTS

Intra-lesion T1 hyperintense foci were significantly predictive of malignancy, with an OR of 5.912 (95% CI, 1.762-19.839, P=0.004) and AUC of 0.6331 (95% CI, 0.5785-0.6878). Inter-observer agreement was good, with a Kappa coefficient of 0.7136. A higher T1 ratio was also significantly predictive of malignancy, with an OR of 10.691 (95% CI, 1.749-65.359, P=0.0103) and AUC of 0.6110 (95% CI, 0.5194-0.7026). While a higher T1 ratio was predictive of papillary RCC (pRCC) over clear cell RCC (ccRCC) (Odds ratio=4.14, 95% CI 1.348-12.717, P=0.0131), T1 hyperintense foci were not helpful in differentiating RCC subtypes.

CONCLUSION

Both T1 hyperintense intra-lesion foci and a high lesion-to-cortex T1 signal ratio are significantly predictive of malignancy in this cohort of solid renal masses, with good inter-observer agreement. Additionally, a higher T1 signal ratio is also predictive of the pRCC over the ccRCC subtype.

CLINICAL RELEVANCE/APPLICATION

Image features derived from T2-weighted, chemical shift, dynamic post-contrast, and diffusion weighted imaging have been shown to be useful in the characterization of solid renal tumor histology. 2 additional useful biomarkers can also be obtained from fat-suppressed 3D T1 GRE imaging, which is already included in routine clinical protocols.

GU219-SD-MOB4  Clear Cell Renal Cell Carcinoma: Discrimination from Chromophobe RCC and Papillary on MDCT using CAD Derived Peak Lesion Enhancement Relative to Renal Cortex

Method and materials

With IRB approval for this HIPAA-compliant retrospective study, we queried our clinical databases to obtain a cohort of histologically proven renal masses with preoperative MDCT with four phases (unenhanced, corticomedullary (CM), nephrographic (NP), and excretory (EX)). The lesion was segmented in each phase. A CAD algorithm selected a 0.5cm region of interest (ROI) of peak lesion enhancement ≤300HU within the 3D lesion contour. A 0.5cm ROI was placed in normal renal cortex. A radiologist approved lesion contours and ROI placement. Relative enhancement derived from volumetric 3D lesion contour and a Computer Aided Diagnostic (CAD) algorithm to derive lesion enhancement relative to uninvolved renal cortex can discriminate ccRCC from RCC subtypes (chromophobe RCC (chrRCC) and papillary RCC (pRCC)) on four phase MDCT.

RESULTS

The participants consisted of 291 renal masses (245 RCC, 5 non-RCC malignant, 41 benign lesions) in 267 patients. For the qualitative portion, 3D T1 GRE sequences were independently reviewed by 2 radiologists who were blinded to additional imaging or patient data. Lesions were visually examined for internal T1 hyperintense foci (defined as discrete nonhomogeneous foci greater in signal than normal renal cortex). For the quantitative portion, a single radiologist measured lesion-to-cortex ratios (T1 ratio) via averaged regions of interest. Univariate logistic regression was used to assess the ability of each variable to predict malignancy and RCC subtype. Odds ratios (OR), AUC statistics, and 95% confidence intervals for each variable were also calculated. For the qualitative variable, inter-observer agreement was measured with the Kappa coefficient.

RESULTS

Intra-lesion T1 hyperintense foci were significantly predictive of malignancy, with an OR of 5.912 (95% CI, 1.762-19.839, P=0.004) and AUC of 0.6331 (95% CI, 0.5785-0.6878). Inter-observer agreement was good, with a Kappa coefficient of 0.7136. A higher T1 ratio was also significantly predictive of malignancy, with an OR of 10.691 (95% CI, 1.749-65.359, P=0.0103) and AUC of 0.6110 (95% CI, 0.5194-0.7026). While a higher T1 ratio was predictive of papillary RCC (pRCC) over clear cell RCC (ccRCC) (Odds ratio=4.14, 95% CI 1.348-12.717, P=0.0131), T1 hyperintense foci were not helpful in differentiating RCC subtypes.

CONCLUSION

Both T1 hyperintense intra-lesion foci and a high lesion-to-cortex T1 signal ratio are significantly predictive of malignancy in this cohort of solid renal masses, with good inter-observer agreement. Additionally, a higher T1 signal ratio is also predictive of the pRCC over the ccRCC subtype.

CLINICAL RELEVANCE/APPLICATION

Image features derived from T2-weighted, chemical shift, dynamic post-contrast, and diffusion weighted imaging have been shown to be useful in the characterization of solid renal tumor histology. 2 additional useful biomarkers can also be obtained from fat-suppressed 3D T1 GRE imaging, which is already included in routine clinical protocols.
RESULTS and Kruskal-Wallis techniques. One-way ANOVA was applied for group comparison with Bonferroni correction.

by two radiologists with 10+ years experience. All the quantitative and qualitative parameters were analyzed with one-way ANOVA distance (DD). Finally, the degree of distortion, the efficiency of fat saturation and overall image quality were independently scored different sequences, the distance between the anatomical marker on T2W TSE and b=0 maps were defined as the distorted muscle were measured. The coefficients of variances of ADC were calculated. To evaluate the distortion of images obtained using ERLangen, Germany, Table1). The signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR), and ADC values of gluteus maximus of DWI sequences, including: Siemens prototype iShim, RESOLVE and SS-EPI on a 3T MR scanner (MAGNETOM Skyra, Siemens AG, Erlangen, Germany,Table1). The signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR), and ADC values of gluteus maximus

METHOD AND MATERIALS

A retrospective study of 152 consecutive patients who underwent both TVUS and SIS for evaluation of abnormal uterine bleeding and infertility. TVUS images were obtained by Philips and GE machines and were reviewed by two independent observers who were blinded to the outcome. For each patient, a grade was given for the diagnosis of endometrial polyp. Grade 0: Negative for polyp, Grade: I when the diagnosis of polyp is equivocal and grade II positive for polyp. SIS was performed within three months using GE, Voluson E8. The imaging criteria included for the diagnosis of polyps are: well circumscribed echogenic lesion, stalk flaw pattern, the presence of cysts in an endometrial echogenic lesion. The results of the TVUS were compared with that of the SIS and then correlated with the hysteroscopy results which were considered the gold standard for the final diagnosis. Statistical analysis was performed. Confidence intervals were computed using generalized estimating equations to account for repeated measurements per patient.

RESULTS

152 patients who underwent both TVUS and SIS were selected. Seven patients were excluded for having non-diagnostic TVUS images by at least one reader, leaving 145 for analysis. From the combined assessments of both readers, 47% were negative for polyps by TVUS, 28% equivocal, and 25% positive. Inter-reader agreement was good with Cohen's kappa = 0.67 (95% CI: 0.57-0.77). SIS has greater sensitivity (p<0.001) and specificity (p<0.03) than TVUS when grade II polyp diagnosis was considered, however SIS and TVUS have similar sensitivity in cases when grade I and grade II polyp diagnosis is considered by TVUS.

CONCLUSION

When confidence is high that a polyp is present or absent on TVUS, SIS is not necessary to confirm their presence. Indeterminate or equivocal cases still benefit from SIS to confirm that a polyp is indeed present or absent.

CLINICAL RELEVANCE/APPLICATION

TVUS is of high enough sensitivity and specificity, equal to that of SIS such that when confidence is high that TVUS is positive or negative, SIS is not necessary to confirm the findings on TVUS prior to hysteroscopy. However when the findings are equivocal, SIS adds to diagnostic confidence significantly.

Honored Educators

Participants
Shaimaa A. Fadl, MD, Seattle, WA (Presenter) Nothing to Disclose
Ahmed S. Sabry, MD, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
Daniel S. Hippe, MS, Seattle, WA (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company
Amal Al Obadi, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
Theodore J. Dubinsky, MD, Seattle, WA (Abstract Co-Author) Stockholder, Global Cancer Technology; Grant, Toshiba Corporation

GU221-S0- MOB6 Diffusion-weighted Imaging in the Bladder: A Comparison between iShim, Resolve and SS-EPI at 3T

Participants
hongyi li, Changchun, China (Abstract Co-Author) Nothing to Disclose
Mengchao Zhang, Changchun, China (Presenter) Nothing to Disclose
Hong Zeng, MD, PhD, Changchun, China (Abstract Co-Author) Nothing to Disclose
Qinglei Shi, Beijing, China (Abstract Co-Author) Nothing to Disclose
Tianyi Qian, PhD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Lin Liu, Changchun, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

To evaluate the image quality of diffusion-weighted imaging in the bladder acquired using a prototype iShim readout segmentation of long variable echo trains (RESOLVE) and conventional single-shot echo-planar-imaging (SS-EPI) sequences at 3T.

METHOD AND MATERIALS

Twenty patients (17 males age 62±3.52) with focal bladder lesions and ten healthy volunteers (18 males, age 35±4.23) were enrolled and underwent diffusion-weighted imaging MR exam of the bladder. The protocol included routine MR exam and three types of DWI sequences, including: Siemens prototype iShim, RESOLVE and SS-EPI on a 3T MR scanner (MAGNETOM Skyra, Siemens AG, Erlangen, Germany,Table1). The signal-to-noise ratio (SNR), contrast-to-noise ratio (CNR), and ADC values of gluteus maximus muscle were measured. The coefficients of variances of ADC were calculated. To evaluate the distortion of images obtained using different sequences, the distance between the anatomical marker on T2W TSE and b=0 maps were defined as the distorted distance (DD). Finally, the degree of distortion, the efficiency of fat saturation and overall image quality were independently scored by two radiologists with 10+ years experience. All the quantitative and qualitative parameters were analyzed with one-way ANOVA and Kruskal-Wallis techniques. One-way ANOVA was applied for group comparison with Bonferroni correction.

RESULTS
The SNR and CNR of iShim (54.18±24.84, 42.04±22.81) were higher than RESOLVE (24.14±11.93, p<0.01; 28.30±11.67, p<0.01) and SS-EPI (50.36±28.30, p=0.02; 39.55±26.57, p=0.01). The iShim's distortions were larger than RESOLVE but smaller than SS-EPI. The subjective evaluation score of iShim in fat saturation efficiency and overall image quality were higher than RESOLVE and SS-EPI. The coefficient of variation of iShim was the lowest, and significant difference was found between SS-EPI and iShim sequences. No significant difference was found between ADC values measured with the different sequences.

CONCLUSION

The iShim sequence shows better performances than RESOLVE and SS-EPI in the DWI exam of the bladder. It has the best image quality, fat saturation efficiency, SNR and CNR, and reproducibility of ADC. It could also reduce the susceptibility artifacts and distortions compared to SS-EPI.

CLINICAL RELEVANCE/APPLICATION

The iShim sequence shows better performances in bladder DWI exam and this exam is recommended to make the diagnosis of bladder cancer more accurate.

Penile Ultrasound, Is It Useful?

Station #7

Participants
Paula Gallego Ferrero, MD, Santander, Spain (Presenter) Nothing to Disclose
Alejandro Fernandez Florez, MD, Santander, Spain (Abstract Co-Author) Nothing to Disclose
Beatriz Garcia Martinez, BDS, Santander, Spain (Abstract Co-Author) Nothing to Disclose
Victor Fernandez Lobo, Santander, Spain (Abstract Co-Author) Nothing to Disclose
Marta Drake Perez, MD, Santander, Spain (Abstract Co-Author) Nothing to Disclose
Elena Yllera Contreras, MD, Santander, Spain (Abstract Co-Author) Nothing to Disclose
Gerardo Lopez Rasines, MD, Santander, Spain (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS

To revise the anatomical characteristics of the penis and its normal ultrasound (US) appearance. To recognize and illustrate the sonographic features of penile pathologies and their differential diagnosis.

TABLE OF CONTENTS/OUTLINE

PURPOSE
The purpose of this study is to determine the negative predictive value (NPV) of the sonographic secondary signs of appendicitis when the appendix is not visualized. The secondary signs of appendicitis seen on ultrasound (US) include free fluid, hyperemia, lymphadenopathy, and phlegmon formation.

METHOD AND MATERIALS
A retrospective review was completed looking for ultrasound images and reports that did not visualize the appendix in its entirety and also specifically stated that no secondary signs of appendicitis were visualized. The review spans 2013-2015. 130 studies were found meeting the inclusion criteria.

RESULTS
Of the 130 total studies, 95 did not have imaging follow up or surgery for appendicitis. Either the ultrasound revealed an alternate diagnosis (example: mesenteric adenitis) or the patient was discharged with an alternate clinical diagnosis (example: constipation). 35 studies had follow up imaging with CT (31), MRI (2) or US (2). Of the 31 follow up CTs, 4 did not visualize the appendix (and the patients were discharged) and the remaining 27 revealed normal appendices. The 2 MRI examinations showed normal appendices and the patients were discharged. One repeat ultrasound was negative and the patient was discharged. The other repeat ultrasound was positive and the patient was taken to surgery and had pathology proven appendicitis. The negative predictive value for absent secondary signs of appendicitis when the appendix is not visualized is 97%. CT, MRI, and repeat US that visualized a negative appendix were considered true negatives.

CONCLUSION
When the appendix is not visualized clinicians are often left to make a decision on whether or not to subject the patient (often pediatric) to ionizing radiation (CT), a lengthy MRI or a repeat US. It is important that radiologists and technologists look for the secondary signs of appendicitis when the appendix is not visualized. The radiologist should specifically mention the lack of secondary signs when appropriate. Based on the findings of this study, such a statement carries a high NPV. Armed with such information, the clinicians will be better suited in making the difficult decision in regards to further imaging or intervention.

CLINICAL RELEVANCE/APPLICATION
Secondary signs of appendicitis carry a high negative predictive value and should be evaluated for when the appendix is not visualized on ultrasound.

PURPOSE
Patients with traumatic injury to extremities are often evaluated at hospital trauma centers by computed tomography angiography (CTA) to evaluate for vascular injury, which can utilize arterial and venous phases. The purpose of this study is to assess whether the venous phase contributes added value to the diagnostic study.

METHOD AND MATERIALS
Institutional IRB approval was obtained. Retrospective analysis of a radiology information system at a level I trauma center identified adult patients evaluated for injury by upper or lower extremity CTA between September, 2014 and September, 2015 with both arterial and venous phases. Images were evaluated by a diagnostic radiologist for diagnosis of “no injury”, “arterial injury”, “venous injury” or “vasospasm”, made by the arterial phase alone, or in conjunction with the venous phase. Statistical analysis utilized McNemar test and Kappa agreement values (a p value of < 0.05 was considered significant).

RESULTS
There were 157 studies performed on 154 patients, 131 (83%) male and 23 (17%) female (mean age 39). Studies comprised 49 upper and 108 lower extremities. Most common mechanisms of injury were gunshot wound (63), motor vehicle accident (26), and stab wound (13). There were 99 diagnoses of no injury, 35 arterial injuries, 16 vasopasm, and 7 venous injuries. Four diagnoses were changed between interpreting the arterial phase alone and both phases together: three venous injuries including one deep vein thrombosis, and one vasospasm. Only the case of deep vein thrombosis resulted in a change in clinical management. Overall there was no significant difference in diagnosis between the two methods (p > 0.125). There was high agreement for diagnosis of no injury (Kappa 0.99), arterial injury (0.96), and vasopasm (0.97), and moderate agreement in diagnosing venous injury (0.59) (p < 0.001).

CONCLUSION
The venous phase of CTA extremity studies for trauma does not add statistically significant value in diagnosing vascular injury and can be safely removed from the imaging protocol, thereby decreasing patient scan time and radiation dose.

CLINICAL RELEVANCE/APPLICATION
CT angiography studies of extremities for vascular trauma can be accurately performed with an arterial phase only and do not require a venous phase.

SSE06-03 Toward an MDCT-based Decision Support Tool for Bleeding Pelvic Fractures using Semi-automated Volumetric Hematoma Analysis and Probabilistic Modeling: Preliminary Results

Monday, Nov. 28 3:20PM - 3:30PM Room: N227B

Participants
David Dreizin, MD, Baltimore, MD (Presenter) Nothing to Disclose
Nikki Tirada, MD, Brookline, MA (Abstract Co-Author) Nothing to Disclose
Uttam Bodanapally, MD, Baltimore, MD (Abstract Co-Author) Nothing to Disclose
Eliot L. Siegel, MD, Baltimore, MD (Abstract Co-Author) Board of Directors, Brightfield Technologies; Board of Directors, McCoy; Board of Directors, Carestream Health, Inc; Founder, MedPerception, LLC; Founder, Topoderm; Founder, YYESIT, LLC; Medical Advisory Board, Bayer AG; Medical Advisory Board, Bracco Group; Medical Advisory Board, Carestream Health, Inc; Medical Advisory Board, Fovia, Inc; Medical Advisory Board, McKesson Corporation; Medical Advisory Board, Merge Healthcare Incorporated; Medical Advisory Board, Microsoft Corporation; Medical Advisory Board, Koninklijke Philips NV; Medical Advisory Board, Toshiba Corporation; Research Grant, Anatomical Travelogue, Inc; Research Grant, Anthro Corp; Research Grant, Barco nv; Research Grant, Dell Inc; Research Grant, Evolved Technologies Corporation; Research Grant, General Electric Company; Research Grant, Herman Miller, Inc; Research Grant, Intel Corporation; Research Grant, MModal IP LLC; Research Grant, McKesson Corporation; Research Grant, RedRick Technologies Inc; Research Grant, Steelcase, Inc; Research Grant, Virtual Radiology; Research Grant, XYBIX Systems, Inc; Research, TeraRecon, Inc; Research Grant, Bracco Group; Research, Medical Corporation; Research Grant, Microsoft Corporation; Speakers Bureau, Bayer AG; Speakers Bureau, Siemens AG; Daniel C. Mascarenhas, BS, Cinnaminson, NJ (Abstract Co-Author) Nothing to Disclose
Louis Bivona, Baltimore, MD (Abstract Co-Author) Nothing to Disclose
Edward H. Herskoviits, MD, PhD, Baltimore, MD (Abstract Co-Author) Consultant, BioClinica, Inc; Shareholder, Galileo CDS, Inc;

PURPOSE
No single CT sign, including intravenous contrast extravasation (ICE), predicts the need for angioembolization with sufficient accuracy. ICE is only up to 60% sensitive. Active bleeding on angio (AB) is often seen w/o ICE. Pelvic hematoma volumes are predictive of AB, but have not been validated for point of care use because time consuming slice-by-slice segmentation was employed. We aimed to developed a multivariate probabilistic model and online calculator incorporating rapid pelvic hematoma segmentation.

METHOD AND MATERIALS
A retrospective cohort of 116 patients were selected. Inclusion criteria: age > 18, blunt pelvic trauma; arterial phase MDCT prior to angio. Exclusion criteria: no angio was performed; CT only after angio. Institutional IRB approval was obtained. Retrospective analysis of a radiology information system at a level I trauma center.

RESULTS
The variable with the strongest correlation with AB was hematoma vol (p<0.001). Age and the greatest diameter of blush were also explanatory and included in the model. Osteopenia; fractures and diastasis; and # of vessels dropped out during successive forward selection and backward elimination steps. Logit transformation was performed to derive a probabilistic formula: \( P = e^{[(0.027*age) + (0.004*hematoma vol) + (0.036*diameter largest blush) - 3.014]/(1+e^{[(0.027*age) + (0.004*hematoma vol) + (0.036*diameter largest blush) - 3.014]})} \). A prototype online active bleed calculator was developed- age(yrs) diameter(mm), and hematoma vol(mL) is entered to determine probability of AB.

CONCLUSION
Prior work using manual segmentation found that hematoma vols<200mL result in 5% likelihood of AB, and vols> 500mL have 45% likelihood. Our model provides a greater degree of practicality because 1) rapid segmentation can be done at the point of care, and 2) the model is highly granular. For example, an intermediate sized hematoma of 321 mL, even without blush, results in high likelihood (56%) of AB in an elderly (73yo) victim of blunt trauma.

CLINICAL RELEVANCE/APPLICATION
The proposed model can be used at the point of care to guide trauma/ER radiologists, interventionalists, and trauma surgeons in assessing likelihood of active bleeding (AB) in patients with pelvic fractures. A prototype online active bleed calculator was developed and validated for use at the point of care.
The proposed model can be used at the point of care to guide trauma/ER radiologists, interventionalists, and trauma surgeons in determining the need for angiography.

**SSE06-04  Colonic Wall Thickening: Can Iodine Quantification Using Dual Source Dual Energy CT Differentiate Diverticulitis from Adenocarcinoma?**

**METHOD AND MATERIALS**

Institutional review board approval was obtained, with no informed consent required, for this retrospective analysis. 146 consecutive patients with acute diverticulitis were scanned using a standard protocol on a 128-section dual source, dual energy CT system (100/140 keV). Patients who did not follow up colonoscopy, which served as the gold standard, or who received large volumes of positive oral contrast were excluded. This left 52 patients for analysis, 8 with proven colonic adenocarcinoma and 44 with diverticulitis. Using the virtual non-contrast application, iodine maps and virtual non-contrast datasets were created for all patients. The coloured iodine maps were superimposed onto the virtual non-contrast images to provide both iodine distribution and anatomic detail. The iodine concentration was recorded within the thickened bowel wall using a region of interest analysis (mg/ml). The two groups were compared using two tailed unpaired t tests and the sensitivity and specificity were established.

**RESULTS**

The average iodine concentration was 1.41±0.56 mg/ml (range 0.2-2.7 mg/ml) in bowel wall thickening due to diverticulitis and 3.15±0.57 mg/ml (range 2.5-4.3 mg/ml) in bowel wall thickening due to adenocarcinoma. This difference was statistically significant (p < 0.0001). Using a threshold of 2.5 mg/ml, the sensitivity for identifying adenocarcinoma was found to be 100% and the specificity 95.5%.

**CONCLUSION**

Using a threshold value of 2.5 mg/ml, dual energy CT iodine quantification was found to have a high sensitivity and specificity for distinguishing colonic wall thickening due to diverticulitis from thickening due to adenocarcinoma.

**CLINICAL RELEVANCE/APPLICATION**

Identifying the cause of colonic wall thickening, which is generally regarded as a nonspecific CT finding, will allow for appropriate patient referral and triage for colonoscopy.

**SSE06-05  Evaluation of Pancreatic Injury: Correlation between Pancreas Injury Grade (PIG) Scoring on MDCT and Clinical Features and other Organ Injuries**

**METHOD AND MATERIALS**

The proposed model can be used at the point of care to guide trauma/ER radiologists, interventionalists, and trauma surgeons in determining the need for angiography.

Participants with PIG scoring scale from I to V on MDCT included 13, 5, 11, 7, and 2 patients. Among 38 patients, 23 patients (60.5%) had associated other organ injuries and 4 patients (10.5%) expired early due to unstable vital sign with active arterial bleeding in liver or abdominal cavity and their PIG scoring was grade I (n=2), grade III (n=1) and grade V (n=1). Their injury types were out car accident (n=3), in car accident (n=22), fall down (n=2) and blunt trauma (n=11). Patients with high PIG scoring had characteristics of associated duodenal injury, vascular injury, and treatment choice of operation with statistical significance (p < 0.05). And no statistical significant correlations were between PIG scoring and other associated organ injuries in abdomen except...
Focused abdomino pelvic CT in children with suspected acute appendicitis: Assessing accuracy and radiation dose reduction by limiting the scan field

Monday, Nov. 28 3:50PM - 4:00PM Room: N227B

Awards
Student Travel Stipend Award

Participants
Andrew Fox, MD, Montreal, QC (Presenter) Nothing to Disclose
Christine Saint-Martin, MD, Montreal, QC (Abstract Co-Author) Nothing to Disclose

PURPOSE
Imaging is widely used in cases of suspected appendicitis with ultrasound the most common first-line modality in pediatric patients. When sonography is non-diagnostic, a complete abdominopelvic CT is often used as an adjunct to rule in the diagnosis prior to OR. CT has diagnostic superiority over sonography but the associated radiation is a concern and thus methods to reduce radiation are of great interest. The concept of Z-axis limitation with combined analysis of accuracy and radiation dose reduction is yet to be studied in the pediatric population.

METHOD AND MATERIALS
Data was collected from PACS between January 2010-present. The upper limit of the appendix was correlated with the superior endplate of the corresponding vertebra. Subsequently, an upper limit Z-axis for interpretation was set based on the average location of the appendix in our series (μ - 2σ), to include >97.5% of the visualized appendices. The studies were then revisited to assess diagnostic accuracy over this focused range, assessing detection of both primary pathology and incidental findings. Radiation dose reduction will be calculated using the Radimetrics software suite.

RESULTS
On the initial scans, the appendix was identified in 116/125 patients and not visualized in 9 patients. The average scan range was 438mm. 27 scans were positive for appendicitis and alternate pathology was identified in 17 patients. The average upper limit of the appendix minus 2 SD corresponded to the L2 vertebra. From L2 caudally, the appendix was completely visualized in 115 scans, and partially visualized in 1 scan. All of the positive appendicitis cases were diagnosed over the limited scan range. 10 alternate diagnoses were completely identified, and 2 were partially identified. 5 cases of pulmonary pathology were missed. The average Z-axis Delta was 141mm, corresponding to a 32% reduction in scan field. Radiation dose reduction is being calculated.

CONCLUSION
Focused abdominopelvic CT for appendicitis in the pediatric population reduces the scan range by approximately 32%, while maintaining 100% diagnostic accuracy for appendicitis (radiation dose reduction pending). Alternate abdominal pathology was either completely or partially identified over this limited range.

CLINICAL RELEVANCE/APPLICATION
By limiting the scanning range of CTs performed for appendicitis, we are hoping to significantly reduce radiation dose to the patient, while maintaining diagnostic accuracy.
### SSE10-01 Genitourinary Keynote Speaker: The Role of Urothelial Imaging in Hematuria and Urothelial Tumors

**Participants**
Harris L. Cohen, MD, Memphis, TN (*Moderator*) Nothing to Disclose
Elaine M. Caoili, MD, MS, Ann Arbor, MI (*Moderator*) Nothing to Disclose

### SSE10-02 Diagnostic Yield of a Hematuria Protocol CT in Young Patients with Hematuria in a Military Population

**Participants**
Robert M. Marks, MD, San Diego, CA (*Presenter*) Nothing to Disclose
Terrel L. Galloway, MD, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Laura R. Mace, DO, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Andrew Ma, BS, San Diego, CA (*Abstract Co-Author*) Nothing to Disclose
Richard S. Montgomery, MD, San Antonio, TX (*Abstract Co-Author*) Nothing to Disclose
Ryan Rockhill, MD, Chula Vista, CA (*Abstract Co-Author*) Nothing to Disclose
William W. Reynolds JR, MD, Camp Pendleton, CA (*Abstract Co-Author*) Nothing to Disclose

**PURPOSE**
To assess the diagnostic yield of a computed tomography (CT) hematuria protocol in patients less than 50 years of age with a history of military service; who are at increased risk of urological malignancies secondary to harmful practices and work-related exposures.

**METHOD AND MATERIALS**
One hundred and thirty-seven consecutive patients less than 50 years of age with a history of military service who underwent a hematuria CT between 2013 and 2014 for new onset of hematuria were included in this IRB-approved single-center retrospective study with waiver of informed consent. Initial review of the clinical interpretations of the hematuria studies grouped the studies into negative and positive exams for any urological findings. Review of the patients’ medical records and subsequent radiology studies determined micro vs. gross hematuria at presentation and any findings after their hematuria CT consistent with a urological malignancy on follow-up evaluation. The positive exams were reviewed by second readers, blinded to the clinical interpretation of the hematuria CT, who first read the unenhanced images. The readers characterized findings as visible on non-contrast CT alone or they requested and read the contrast enhanced images. Each urological finding was recorded for each patient.

**RESULTS**
Of the 137 included patients, 106 had microscopic hematuria and 33 had gross hematuria. There were a total of 99 negative examinations of the 137 included patients. Of the 38 patients with urological findings, 17 had nephrolithiasis which was visible on the non-contrast study alone. Contrast was requested 14 times which confirmed 12 benign cysts and 2 congenital UPJ obstructions. The readers found no evidence for a urological malignancy in any of the patients. Record reviews confirmed that no urological malignancies were later diagnosed in any of the 137 included patients.

**CONCLUSION**
An unenhanced CT may be appropriate to evaluate new onset microscopic, and possibly gross hematuria, in patients younger than 50, even in patients with an increased risk of urologic cancer. Further prospective trials are needed to confirm our findings.

**CLINICAL RELEVANCE/APPLICATION**
An unenhanced CT alone may be appropriate in the initial evaluation of hematuria in patients 50 years of age and younger, even in those at increased risk for urologic malignancy. The lack of a contrast enhanced phase decreases radiation exposure and eliminates the risk of contrast reactions.

### SSE10-03 Detection of Bladder Cancer: Diagnostic Strategy of CT Urography as a Prior Examination-A Prospective Study

**Participants**
See Hyung Kim, Daegu, Korea, Republic Of (*Abstract Co-Author*) Nothing to Disclose
Leehi Joo, Daegu, Korea, Republic Of (*Presenter*) Nothing to Disclose

**PURPOSE**
To prospectively assess diagnostic strategy of CT urography to flexible cystoscopy (FC) as a priority examination for detecting
To prospectively assess diagnostic strategy of CT urography to flexible cystoscopy (FC) as a priority examination for detecting bladder cancer.

**METHOD AND MATERIALS**

The institutional review board approved our study, with a waiver of informed consent. 3280 CT urograms in 3050 consecutive patients (1967 men, mean age, 60±15.1 years, range; 40–88 years; 1083 women, mean age, 54±14.9 years, range; 40–83 years) assessed for patients with over 35 years with gross hematuria, persistent microhematuria, or a history of urothelial tumor, were included in the study. We examined CT urography as two prior methods. First, patients with definite lesion by CT urography are referred directly for rigid cystoscopy (RC), and patients with negative or probable lesion referred for FC. Second, patients with definite lesion by CT urography are referred directly for RC, probable lesion referred for FC, and negative lesion referred for clinical follow-up. Performance characteristics for both methods were determined by using the standard reference. Ninety-five percent confidence intervals were estimated for each test characteristic.

**RESULTS**

The overall sensitivity, specificity, accuracy, positive predictive value, and negative predictive value (NPV) for detecting bladder cancer were 95.2% (141/148), 95.4% (1374/1439), 95.4% (1515/1587), 69.1% (141/204) and 99.2% (1374/1384) for first method and 93.4% (143/153), 93.3% (1437/1540), 93.3% (1580/1693), 61.1% (143/234) and 98.4% (1437/1459) for second method. The NPVs were higher in patients assessed for persistent microhematuria (99.7%, 517/519; 99.3%, 590/594). However, accuracies was considerably lower in patients with a prior urothelial tumor (90.6%, 165/182; 85.7%, 145/1696).

**CONCLUSION**

CT urography as a prior examination is accurate for detecting bladder cancer in patients at high-risk. The high NPVs in persistent microhematuria may obviate the supplemental use of FC.

**CLINICAL RELEVANCE/APPLICATION**

CT urography as a prior examination is recommended for detecting bladder cancer in patients at high-risk.

### SSE10-04 CT Urography: Are We Getting Better at Detecting Bladder Cancer?

**Monday, Nov. 28 3:30PM - 3:40PM Room: E351**

**Awards**

**Student Travel Stipend Award**

**Participants**

Tony W. Trinh, MD, Salt Lake City, UT (Presenter) Nothing to Disclose

Daniel I. Glazer, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

Cheryl A. Sadow, MD, Weymouth, MA (Abstract Co-Author) Nothing to Disclose

V. Anik Sahni, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose

Stuart G. Silverman, MD, Brookline, MA (Abstract Co-Author) Author, Wolters Kluwer nv

**PURPOSE**

To compare current CT urography (CTU) performance characteristics in the detection of bladder cancer to that performed from 2000-2005, shortly after introduction of the technique into clinical practice.

**METHOD AND MATERIALS**

A retrospective medical record review of patients undergoing 1,049 CT urograms at our institution for hematuria or a history of urothelial cancer between 7/1/2011 and 12/31/2013 was conducted in this IRB-approved, HIPAA-compliant study. Of these, 607 had cystoscopy performed within 6 months for correlation and were included. 442 examinations were excluded due to lack of cystoscopy (n=346), prior cystectomy (n=85), and poor image quality (n=11). Surgical pathology or at least 2 years of clinical follow-up was used as the reference standard. Performance characteristics were calculated and compared to a similar cohort from 2000-2005.

**RESULTS**

A total of 76 bladder cancers were detected in the study with prevalence varying based on indication (history of urothelial cancer: 42%, gross hematuria: 12%, microscopic hematuria: 3%). Overall, CTU yielded a sensitivity of 83.5% (76/91), a specificity of 91.2% (468/513), a positive predictive value of 62.8% (76/121), and a negative predictive value of 96.9% (468/483). Sensitivity and specificity varied based on indication (history of urothelial cancer: 83.6% and 89.3%, gross hematuria: 79.0% and 87.3%, microscopic hematuria: 60.0% and 97.0%). Similar analysis of the 2000-2005 cohort demonstrated a sensitivity and specificity of 79% (117/149) and 94% (649/689), respectively.

**CONCLUSION**

CT urography remains an accurate non-invasive test for diagnosing bladder cancer with test characteristics not significantly changing over time.

**CLINICAL RELEVANCE/APPLICATION**

Given the high negative predicative value of CTU, cystoscopy may not be necessary in patients presenting with hematuria and no prior history of urothelial cancer.

### SSE10-05 Optimization of B-value in iShim Diffusion-weighted MR Imaging of the Bladder: To Improve the Visualization of Bladder Cancer and T Staging Accuracy

**Monday, Nov. 28 3:40PM - 3:50PM Room: E351**

**Participants**

Mengchao Zhang, Changchun, China (Presenter) Nothing to Disclose

hongyi li, Changchun, China (Abstract Co-Author) Nothing to Disclose

Hong Zeng, MD, PhD, Changchun, China (Abstract Co-Author) Nothing to Disclose
Lin Liu, Changchun, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
To determine the optimal b-value of diffusion-weighted imaging in the bladder acquired using a prototype ss-epi sequence for integrated slice-specific dynamic shimming (iShim) for visualizing bladder cancer and making accurate T staging at 3.0-T.

METHOD AND MATERIALS

Fifty-five patients (37 males, 18 females, mean age 62±3.52) with bladder cancer confirmed by pathology underwent iShim-DWI with seven b-values (200, 400, 600, 800, 1000, 1500, and 2000 s/mm²) at 3.0 T scanner (MAGNETOM Skyra, Siemens AG, Erlangen, Germany). For each b value, the iShim-DWI findings of bladder cancer (type1=clear hyperintensity relative to the surrounding bladder, type2=hyperintensity with an unclear distal border, and type3=isointensity) were retrospectively evaluated and image quality {subjective scoring:4=excellent (no problems were noticed in the image and the bladder was clearly shown), 3=good (the image suffered from only minor degradation and was suitable for the evaluation of the cancer), 2=moderate (image quality was not good but usable for the evaluation of the cancer), and 1=poor (image quality precluded assessment of the cancer and the pancreas was barely shown)}, measured tumor-to-bladder signal intensity (SI) ratios and, T staging of bladder cancer. DWI findings, image quality, tumor-to-bladder SI ratios and T staging were compared between the seven b-values.

RESULTS

There was a significantly higher incidence of tumors showing clear hyperintensity on iShim-DWI with b-value of 800 s/mm² than on that with b-value of 200, 400, 600, 1000, 1500, 2000 s/mm² (P<0.01). The image quality was decreased when b-values increased from 800 to 2000 s/mm² or decreased from 800 to 200s/mm² (P< 0.001). The highest scores of image quality were observed with b-value of 2000 s/mm². There were highest signal intensity ratios (4.22±0.62,4.33±0.62,5.56±0.33, 3.98±0.11) between the bladder cancer and bladder wall around the cancer, distal bladder wall. cavity of bladder and the Muscle with b-value of 800 s/mm². Diagnostic performance in overall accuracy for diagnosis of tumor staging and differentiation of T1 from T2 to T4 were best (Table4, 5)

CONCLUSION

The using of b =800 s/mm² in iShim-DWI of the bladder can improve the delineation of bladder cancer and the accuracy of T staging at3.0T.

CLINICAL RELEVANCE/APPLICATION

The iShim sequences is recommended to make diagnosis of bladder cancer more accurate.

SSE10-06 Fused High-B-Value Diffusion-Weighted Imaging and T2-Weighted Imaging Helps Evaluate Depth of Invasion in Bladder Cancer: Preliminary Results

Monday, Nov. 28 3:50PM - 4:00PM Room: E351

Awards
Student Travel Stipend Award

Participants
Minsu Lee, MD, Seoul, Korea, Republic Of (Presenter) Nothing to Disclose
Sung Park, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Young Taik Oh, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Dae Chul Jung, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Su-Jin Shin, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Nam Hoon Cho, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Young Deuk Choi, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose

PURPOSE

To investigate diagnostic performance of fused high-b-value diffusion-weighted imaging (DWI) and T2-weighted imaging (T2WI) to evaluate depth of invasion in bladder cancer.

METHOD AND MATERIALS

Consecutive 62 patients with surgically confirmed urothelial carcinoma in the urinary bladder were included. The patients underwent preoperative 3T magnetic resonance imaging including high-b-value DWI. An experienced genitourinary radiologist analyzed the depth of invasion (e.g., T-stage, <2 versus ≥2) by using T2WI, DWI, fused DWI and T2WI, and contrast-enhanced T1-weighted imaging (CE-T1WI), respectively. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were investigated. The univariate and multivariate logistic regression tests were conducted to analyze which imaging techniques are useful to assess the depth of invasion.

RESULTS

The rate of patients with surgically confirmed T-stage of 2 or greater were 41.9% (26/62). The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were 50.0%, 55.6%, 44.8%, 60.6%, and 53.2% with T2WI, 57.7%, 77.8%, 65.2%, 71.8%, and 69.4% with DWI, 80.8%, 77.8%, 72.4%, 84.8%, and 79.0% with fused DWI and T2WI, and 73.1%, 66.7%, 61.3%, 77.4%, and 69.4% with CE-T1WI, respectively. In univariate analysis, the use of DWI, fused DWI and T2WI, and CE-T1WI were significant for the detection of T-stage of 2 or greater (p< 0.05), while fused DWI and T2WI was the only significant imaging technique in multivariate analysis (odds ratio= 10.549; p = 0.004).

CONCLUSION

Fused high-b-value DWI and T2WI may be useful to assess the depth of invasion in bladder cancer.

CLINICAL RELEVANCE/APPLICATION

Fused MRI may be the useful noncontrast MR imaging technique to evaluate the depth of tumor invasion, and it could help to decide surgical approach and extent in bladder TCC patients.
PURPOSE
In 2010, the Society of Radiologists in Ultrasound (SRU) published a consensus statement directing management of asymptomatic adnexal cysts. The guidelines, based on the literature and expert opinion, have not been formally evaluated for diagnostic efficacy. The purpose of this study is to evaluate the predictive power of the guidelines for a large group of cysts with known outcomes.

METHOD AND MATERIALS
IRB approved retrospective review of US-detected adnexal cysts from Jan-Jun 2011. Cysts with surgical diagnosis, ≥ 2 years imaging stability or resolution, or normal pelvic exam ≥ 2 years after index study were included. We applied the SRU guidelines based on imaging features (SRU 0=no followup needed; SRU 1=ultrasound followup; SRU 2=MR characterization; and SRU 3=surgical evaluation), and compared ratings with final outcome (benign non-neoplastic, benign neoplasm, malignant neoplasm). Where guidelines give two options, we binarized into “Surgically Focused” and “MRI Center” contexts.

RESULTS
570 cysts in 500 women were included, of which 475 (83.3%) were benign non-neoplastic, 77 (13.5%) benign neoplasms, and 18 (3.2%) malignant neoplasms. In surgically focused context, proportions of neoplasm and malignancy respectively were 1.1% and 0% in the SRU 0 group, 16.8% and 0.6% in SRU 1, 47.6% and 0% in SRU 2, and 47.7% and 15.6% in SRU 3 (p <.0001 for both trends by Cochran-Armitage test). In MRI center context, proportions of neoplasm and malignancy were 1.1% and 0% in the SRU 0 group, 17.2% and 0.6% in SRU 1, 38.3% and 5.0% in SRU 2, and 80.9% and 52.4% in SRU 3 (p <.0001, both trends). 82 (89%) fewer benign cysts were sent to surgical evaluation in the MRI center context. In logistic regression including age, menopause, and cyst size, SRU rating remained a highly significant predictor of both neoplasm and malignancy (OR 4.94, 95%CI 1.62, 15.11; p=.005 for malignancy).

CONCLUSION
SRU consensus guidelines effectively risk-stratified adnexal cysts in this study. Interpretation of guidelines in MRI center context markedly reduced the number of benign cysts sent for up-front surgical evaluation.

CLINICAL RELEVANCE/APPLICATION
Society of Radiologists in Ultrasound (SRU) 2010 adnexal cyst management guidelines appropriately stratified cysts and cystic masses into low, intermediate, and high risk categories.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Katherine E. Maturen, MD - 2014 Honored Educator
Participants
Elizabeth B. Maddox, Madison, WI (Presenter) Nothing to Disclose
Elizabeth A. Sadowski, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Krupa Patel-Lippman, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Ashish P. Wasnik, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Viktoriya Paroder, MD, PhD, Bronx, NY (Abstract Co-Author) Nothing to Disclose
Sarah Averill, Madison, WI (Abstract Co-Author) Nothing to Disclose
Lisa Barnhill, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Laura Huffman, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Katherine E. Maturen, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Alexander D. Blaty, BS, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Jessica B. Robbins, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose

Purpose
Most ovarian lesions can be characterized on ultrasound (US) as benign appearing or worrisome for malignancy, and appropriately triaged. However, when cystic lesions have avascular septations and/or solid components or are larger than 5 cm they are incompletely characterized by US and considered sonographically indeterminate (Ekerhovd E et al. Am J Obstet Gynecol 2001). The rate of ovarian cancer development in ovarian lesions characterized as benign or potentially malignant is well documented; however there is a paucity of data on the incidence of ovarian cancer in US indeterminate ovarian lesions. The goal of our study was to determine the incidence of ovarian cancer in sonographically indeterminate lesions.

Method and Materials
This is an IRB approved retrospective review of transvaginal US studies performed consecutively at 3 institutions from January to June 2011. Adnexal cystic lesions were considered indeterminate if they met one of the following criteria: presence of septations or soft tissue elements without Doppler vascularity, or cyst size >5 cm. Surgical pathology or resolution on follow-up were the inclusion criteria end-points. The incidence of benign and malignant ovarian neoplasms was calculated.

Results
166 cystic adnexal lesions in 158 women (mean age 43 ± 14 years) met the inclusion criteria. 71.7% (119/166) of US indeterminate lesions resolved on follow up or were physiologic cysts on pathology. 24.1% (40/166) were benign ovarian neoplasms (cystadenomas; dermoids). 3.0% (5/166) were borderline or low-grade ovarian neoplasms. 1.2% (2/166) were clear cell or high-grade serous/endometroid carcinomas.

Conclusion
In our cohort of sonographically indeterminate lesions, 71.7% were non-neoplastic, 24.1% were benign ovarian neoplasms, and 4.2% were either borderline tumors or carcinomas. Study accrual is ongoing to increase the number of indeterminate lesions. Continued analysis will be important to accurately access the incidence of ovarian cancer in sonographically indeterminate lesions, which may help guide management of women with indeterminate adnexal lesions in the future.

Clinical Relevance/Application
Determining the incidence of ovarian cancer in sonographically indeterminate adnexal lesions is an important step in the formulation of appropriate recommendations for follow up of these lesions.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Katherine E. Maturen, MD - 2014 Honored Educator

SSE11-03 A Comparative Study between the use of Transvaginal Ultrasound (TVUS) and Saline Infusion Sonohysterogram (SIS) for Diagnosis of Endometrial Polyps

Participants
Shaimaa A. Fadl, MD, Seattle, WA (Presenter) Nothing to Disclose
Ahmed S. Sabry, MD, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
Daniel S. Hippe, MS, Seattle, WA (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company
Amal Al Obadli, Doha, Qatar (Abstract Co-Author) Nothing to Disclose
Theodore J. Dubinsky, MD, Seattle, WA (Abstract Co-Author) Stockholder, Global Cancer Technology; Grant, Toshiba Corporation

Purpose
To determine the level of confidence in detecting endometrial polyps on TVUS in patients with abnormal uterine bleeding or infertility and to determine if SIS is necessary when the level of confidence is high.

Method and Materials
A retrospective study of 152 consecutive patients who underwent both TVUS and SIS for evaluation of abnormal uterine bleeding and infertility. TVUS images were obtained by Philips and GE machines and were reviewed by two independent observers who were blinded to the outcome. For each patient, a grade was given for the diagnosis of endometrial polyp. Grade 0: Negative for polyp, Grade: I when the diagnosis of polyp is equivocal and grade II positive for polyp. SIS was performed within three months using GE, Voluson E8. The imaging criteria included for the diagnosis of polyps are: well circumscribed echogenic lesion, stalk flaw pattern, the presence of cysts in an endometrial echogenic lesion. The results of the TVUS were compared with that of the SIS and then correlated with the hysteroscopy results which were considered the gold standard for the final diagnosis. Statistical
analysis was performed. Confidence intervals were computed using generalized estimating equations to account for repeated measurements per patient.

RESULTS

152 patients who underwent both TVUS and SIS were selected. Seven patients were excluded for having non-diagnostic TVUS images by at least one reader, leaving 145 for analysis. From the combined assessments of both readers, 47% were negative for polyps by TVUS, 28% equivocal, and 25% positive. Inter-reader agreement was good with Cohen's kappa = 0.67 (95% CI: 0.57-0.77). SIS has greater sensitivity (p<0.001) and specificity (p=0.03) than TVUS when grade II polyp diagnosis was considered, however SIS and TVUS have similar sensitivity in cases when grade I and grade II polyp diagnosis is considered by TVUS.

CONCLUSION

When confidence is high that a polyp is present or absent on TVUS, SIS is not necessary to confirm their presence. Indeterminate or equivocal cases still benefit from SIS to confirm that a polyp is indeed present or absent.

CLINICAL RELEVANCE/APPLICATION

TVUS is of high enough sensitivity and specificity, equal to that of SIS such that when confidence is high that TVUS is positive or negative, SIS is not necessary to confirm the findings on TVUS prior to hysteroscopy. However when the findings are equivocal, SIS adds to diagnostic confidence significantly.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Theodore J. Dubinsky, MD - 2012 Honored Educator
Theodore J. Dubinsky, MD - 2013 Honored Educator

SSE11-04  Value of 4-Dimensional Hysterosalpingo-contrast Sonography with SonoVue in the Assessment of Patency of the Fimbriated Extremity of Fallopian-Tube

Monday, Nov. 28 3:30PM - 3:40PM Room: E353B

Participants

wei q. wang, guangzhou, China (Presenter) Nothing to Disclose
Ya f. Gong, guangzhou, China (Abstract Co-Author) Nothing to Disclose
qi u. zhou, guangdong, China (Abstract Co-Author) Nothing to Disclose
zh i. y. chen, guangdong, China (Abstract Co-Author) Nothing to Disclose

CONCLUSION

Four D- SonoVue-HyCoSy could dynamically show fimbria end shape, contrast agent overflow conditions. It should be considered clinically valuable as a practical, non-invasive, primary investigatory tool for evaluating the patency and function of the fimbriated extremity of the fallopian tube and a viable alternative to the lap and dye procedure, which was widely used in clinical.

Background

It is estimated that 30% to 35% of infertility is caused by tubal factors and evaluation of tubal status is an important initial step in the diagnostic work-up of infertile women. It is very important to evaluate the patency of fallopian tubes in the diagnosis and treatment of infertility. Hysterosalpingo-contrast sonography (HyCoSy) method currently available to assess tubal patency include two-dimensional HyCoSy (2D-HyCoSy), and three-dimensional HyCoSy (3D-HyCoSy). Previous investigations, using lap and dye findings as the gold standard, have shown that the diagnostic accuracy of 2D HyCoSy is about 65-85%, and that of 3D HyCoSy is 90%. FourD-HyCoSy, has achieved the aim of a real-time, dynamic, intuitive examination. The aim of this study was to evaluate the accuracy of using 4D HyCoSy with SonoVue in assessing the patency of the fimbriated extremity of the fallopian tube.

Evaluation

Our results show that 4D SonoVue-HyCoSy had a sensitivity of 93.8%, specificity of 92.2% and diagnostic accuracy of 92.9%. The test positive rates of 4D SonoVue-HyCoSy versus lap and dye were not significantly different. The accuracy of 4D HyCoSy was slightly higher than other tests.

Discussion

It is very important to evaluate the patency of fallopian tubes in the diagnosis and treatment of infertility. During the 4D-HyCoSy examination, Sonologist faces challenges in diagnosis. Using frame dynamic playback technology, 4D-HyCoSy dynamic real-time imaging method to carefully observe the developing of fallopian tube shape and whether there is contrast agent overflow in tube end. After contrast agent injection, 0.9% saline solution was injected to observed whether the liquid will flow from the fallopian tube then flow in the corresponding side of fallopian tube end. It contribute to determine the patency of the fallopian tube end.

SSE11-05  The Value of Real-time Elastography Applied in Hysteromyoma before and after the Treatment of Sclerotherapy

Monday, Nov. 28 3:40PM - 3:50PM Room: E353B

Participants

Xia Zhou, MD, Suzhou, China (Presenter) Nothing to Disclose
Yang-Gui Xie, Nantong, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

To study the clinic value of real-time elastography (RTE) applied in examining hysteromyoma before and after the treatment of sclerotherapy.
METHOD AND MATERIALS

Ninety-three premenopausal women (mean age was 46±3 years) with 99 uterine fibroids were prospectively included for ultrasound guided treatment of uterine fibroids by injecting lauromacrogol at a dose of 10-20ml during the year from July 2012 to July 2015. Each fibroid was examined by conventional ultrasound and RTE before treatment and the 1st and the 6th month after treatment. Fibroid size, volume, blood supply and strain ratio (SR) were obtained and compared. According to the blood supply of the fibroids disappeared or not in the 6th month after treatment, all fibroids were divided into two groups, no blood supply group and residual blood supply group, and the differences of SR were analysed. SR performance in predicting curative effect was also evaluated by receiver operating characteristic (ROC) curve analyses.

RESULTS

A total of 99 fibroids, no blood supply group (n=59), and residual blood supply group (n=40). Prior to the treatment, all data demonstrated no statistical significance except SR (2.7±1.8 vs. 1.3±0.8, P<0.05). One month after treatment, the volume of the fibroids decreased by 38% (P<0.05); the difference of SR between the two groups demonstrated statistical significance (2.8±2.1 vs. 1.2±0.6, P<0.05), but the SR in both groups demonstrated no statistical significance compared with the baseline (P>0.05). Six months after treatment, the fibroid volume decreased by 58% (P<0.05); the difference of SR between the two groups also demonstrated statistical significance (3.8±3.1 vs. 1.8±0.9, P<0.05), and the SR of the two groups both increased significantly compared with the baseline (P<0.05). Area under the ROC curve (AUC) was 0.7 for SR, the cutoff level at 1.715 provided a high specificity (78%) and a high sensitivity (71%) for a prediction of cured fibroid at the 6th month after treatment.

CONCLUSION

RTE has the potential to serve as a non-invasive tool in elevating curative effects of sclerotherapy in fibroids.

CLINICAL RELEVANCE/APPLICATION

Strain ratio provided by RTE can predict curative effect of sclerotherapy procedure on fibroids. Meanwhile, it can also be applied in the follow-up evaluation of the curative effect combined with conventional ultrasound after treatment.

Participants
Yasmine Ahmed, Cleveland, OH (Presenter) Nothing to Disclose
David Sheyn, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Alex Soriano, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Sangeeta T. Mahajan, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Adonis Hijaz, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Nami R. Azar, MD, Highland Heights, OH (Abstract Co-Author) Nothing to Disclose

PURPOSE

Bladder disorders are diagnosed by urodynamics, which is invasive and can provoke anxiety. Noninvasive methods are limited to sonographic assessment of the post-void residual. Shear wave elastography (SWE) is a novel technology that measures propagation of shear waves in tissue that can be used to calculate Young’s modulus (E). Our purpose was to assess feasibility of SWE in assessing the bladder neck of continent women undergoing pelvic ultrasound.

METHOD AND MATERIALS

Women were recruited from a large gynecology practice at a tertiary medical center after being scheduled for a pelvic ultrasound. Women were instructed to drink 32 oz of water 1 hour prior to the ultrasound. They then underwent a trans-abdominal ultrasound. Bladder volume (mL) and multiple thickness (mm) measurements were obtained of the anterior and posterior bladder neck, then, SWE was performed to measure shear-wave velocity (m/s) in multiple regions of the bladder neck (Figure 1). The average shear-wave velocity was used to calculate the Young’s modulus (E) of each region of the bladder using the equation: E = 3pc², where c is shear wave velocity and p is tissue density (1000 cm³). Descriptive statistics, including means, medians, standard deviations, and ranges were obtained. The relationship between bladder elasticity and age, gravidity, parity, BMI, bladder neck thickness, and bladder volume were assessed using Spearman’s correlation coefficients. Statistical analysis was performed using Stata, version 14.0.

RESULTS

55 women were imaged. Eight were excluded due to incomplete measurements and 4 were excluded for presence of urinary incontinence. Of the 43 women remaining, average age was 37 (+/-9.7) years, average BMI was 30 (+/-7.6) m/kg², 23 were multiparous, 6 were primiparous and 9 were nulliparous. A significant positive correlation was seen between age and bladder stiffness (r = 0.41052, p = 0.008). There were no significant relationships between bladder neck stiffness and BMI, bladder neck thickness, bladder volume, or pregnancy history.

CONCLUSION

Trans-abdominal shear wave elastography is feasible for evaluating the bladder neck and able to demonstrate age related changes in tissue stiffness.

CLINICAL RELEVANCE/APPLICATION

SWE may be a useful adjunct for evaluation of mechanical and physiologic bladder disorders.
Participants
Theodora A. Potretzke, MD, Madison, WI (Presenter) Nothing to Disclose
Adam Froemming, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Michael L. Wells, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Naoki Takahashi, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (Abstract Co-Author) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Meghan G. Lubner, MD, Madison, WI (Abstract Co-Author) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson; Anup S. Shetty, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Richard Tsai, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Monica R. Drylewicz, MD, PhD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Matthew S. Davenport, MD, Cincinnati, OH (Abstract Co-Author) Royalties, Wolters Kluwer nv;
Benjamin Mervak, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Brian T. Welch, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Veena R. Iyer, MD, Minneapolis, MN (Abstract Co-Author) Nothing to Disclose
Seema Mukerjee, MD, White Plains, NY (Abstract Co-Author) Nothing to Disclose
Shannon P. Sheedy, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) Recognize imaging findings seen in disorders of the genitourinary systems. 2) Develop differential diagnosis based on the clinical information and imaging findings. 3) Recognize the clinical importance of diagnosis.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Naoki Takahashi, MD - 2012 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Prostate MRI (Hands-on)

Tuesday, Nov. 29 8:00AM - 10:00AM Room: S401AB

GU MR

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credit: 0

Participants
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (Presenter) Research Consultant, SPL Medical
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands, (jurgen.futterer@radboudumc.nl) (Presenter) Research Grant, Medtronic, Inc; Research Grant, Siemens AG
Roel D. Mus, MD, Nijmegen, Netherlands (Presenter) Nothing to Disclose
Geert M. Villeirs, MD, PhD, Ghent, Belgium (Presenter) Nothing to Disclose
Baris Turkbey, MD, Bethesda, MD (Presenter) Nothing to Disclose
Jeffrey C. Weinreb, MD, New Haven, CT (Presenter) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA, (antonio.westphalen@ucsf.edu) (Presenter) Scientific Advisory Board, 3DBiopsy LLC; Research Grant, Verily Life Sciences LLC
Rianne R. Engels, Cuijk, Netherlands (Presenter) Nothing to Disclose
Joyce G. Bomers, Nijmegen, Netherlands (Presenter) Nothing to Disclose
Renske L. Van Delft, Nijmegen, Netherlands (Presenter) Nothing to Disclose
Laura I. Stoilescu, Nijmegen, Netherlands (Presenter) Nothing to Disclose
Daniel J. Margolis, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Patrik Zamecnik, MD, Heidelberg, Germany (Presenter) Officer, SPL Medical BV
Sadhna Verma, MD, Cincinnati, OH (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Understand the Pi-RADS v2 Category assessment to detect and localize significant cancer for both peripheral zone and transitional zone lesions.
2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

ABSTRACT
In this Hands-On Workshop, the participants will be able to review up to 40 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of PI-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their PI-RADS v2 scoring. There will be 50 workstations available. Participants will be able to use their own laptops through a secure WiFi connection.

Active Handout: Renske Lian Van Delft

Participants

MSES31A  Acute Pelvic Pain

Participants
Marcia C. Javitt, MD, Haifa, Israel (Presenter) Consultant, Bayer AG;

LEARNING OBJECTIVES
1) How to classify the many causes of acute pelvic pain. 2) When and how to triage patients to appropriate imaging. 3) How to identify surgical emergencies. 4) Whether to recommend specific therapy quickly. 5) How to prevent unnecessary interventions. 6) Ways to minimize health care expenses.

ABSTRACT
Acute pelvic pain is pain of less than about 3 months duration. Patients with acute pelvic pain can be categorized into patients with a positive versus those with a negative pregnancy test (beta-human chorionic gonadotropin). The objectives of this talk are to: 1) provide a scheme to understand the causes of acute pelvic pain; 2) triage the diagnostic imaging workup using the clinical presentation and laboratory data; and 3) achieve a tailored differential diagnosis useful to guide appropriate treatment in female patients presenting with acute pelvic pain. The course will cover obstetrical, postpartum, gynecologic, infectious, inflammatory, and neoplastic causes of acute pelvic pain. Patients with acute pelvic pain may have characteristic findings on US, CT, and MRI that permit specific diagnosis of their conditions. Becoming familiar with these patterns on cross sectional imaging empowers the radiologist to identify the cause of the pain and aid the referring clinicians to institute prompt and appropriate treatment for these important and sometimes life-threatening conditions.

MSES31B  Sonography in Patients with Renal Colic

Participants
Ruth B. Goldstein, MD, San Francisco, CA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) To state the advantage and safety of using sonography in the initial evaluation of patients with renal colic. 2) To state the risk/benefits of starting the imaging evaluation with sonography vs CT. 3) To be able to optimize the renal/bladder sonogram in patients with renal colic. 4) To state the most common locations of ureteral stones in patients presenting to the ED with renal colic.

MSES31C  Imaging of Hematuria

Participants
Alessandro Furlan, MD, Pittsburgh, PA, (furlana@upmc.edu) (Presenter) Book contract, Reed Elsevier; Research Grant, General Electric Company

LEARNING OBJECTIVES
1) Identify the role of imaging studies in the assessment of patients with hematuria according to current national and international guidelines. 2) Describe basic technical aspects of cross-sectional imaging tests used in patients with hematuria. 3) List the most common causes of hematuria and the key diagnostic imaging features.

ABSTRACT
Hematuria, defined as the presence of red blood cell in the urine, is a common presentation of multiple genitourinary diseases including benign (e.g. stones) and malignant disorders. Imaging plays a key role for the evaluation of patients with hematuria as delineated in multiple guidelines. This presentation will discuss 1) the current guidelines for the management of patients with hematuria, 2) the basic technical imaging aspects of CT urography and MR urography and 3) the key imaging findings for the diagnosis of the most common causes of hematuria.

MSES31D  Interventional Management of Uterine Bleeding-Not Just Fibroids

Participants
Philip D. Orons, DO, Pittsburgh, PA, (oronspd@upmc.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Define causes of acute and chronic uterine bleeding. 2) Identify appropriate patients for transcatheter, medical, or surgical therapy based on patient presentation, imaging findings, and clinical circumstances. 3) Describe the clinical presentation and imaging findings of uterine arteriovenous malformations. 4) Compare outcomes of surgical and percutaneous therapy for the treatment and prevention of postpartum hemorrhage.
ABSTRACT

Uterine bleeding is a common and serious condition that may be associated with a high degree of morbidity and even mortality, particularly when occurring postpartum. The clinical presentation and potential long-term effects of uterine bleeding vary by etiology. Appropriate treatment is dictated by patient presentation and clinical and imaging findings. This presentation will discuss etiology, clinical presentation, and treatment options for multiple causes of acute and chronic uterine bleeding.
Predicting Outcomes for Genitourinary Malignancies: Role of Radiomics in Clinical Practice

Tuesday, Nov. 29 8:30AM - 10:00AM Room: S405AB

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

FDA Discussions may include off-label uses.

Participants
Ivan Pedrosa, MD, Dallas, TX (Coordinator) Nothing to Disclose
Ivan Pedrosa, MD, Dallas, TX (Presenter) Nothing to Disclose
Maryellen R. Sun, MD, Boston, MA, (msun@bidmc.harvard.edu) (Presenter) Nothing to Disclose
Masoom A. Haider, MD, Toronto, ON (Presenter) Consultant, Bayer AG;

LEARNING OBJECTIVES

1) Recognize the differences in the biologic behavior and prognosis between cystic and solid renal cancers and learn how the imaging phenotype can be helpful in guiding management decisions when incorporated into the radiology report. 2) Assess tumor aggressiveness of urothelial carcinomas of the upper tract and bladder with imaging and understand the added value of this information in disease management. 3) Use imaging characteristics of aggressive prostate cancer and the 'index lesion' to distinguish clinically significant prostate cancers from indolent ones.

ABSTRACT

The development of imaging phenotypes in genitourinary (GU) malignancies, supported by the application of Radiomics, has improved our understanding of the relationship between imaging phenotypes and clinical outcomes. Radiomics are based on the extraction of more information that what may be obvious to the eye with the use of quantitative and advanced feature analysis techniques. Radiomics provide a platform for whole-tumor analysis in vivo, and offer the opportunity for investigating pathophysiologic phenomena (e.g. blood flow, vascular permeability, tumor proliferation) that are difficult to examine in ex vivo tissue - these image-based features may serve as surrogate biomarkers of tumor aggressiveness. Furthermore, radiomics correlate with genetic profiles that predict tumor aggressiveness and provides a pathway toward the understanding of tumor heterogeneity, classification, and risk stratification. This refresher course will review the correlation between imaging phenotypes and the clinical behavior of renal, prostate, and urothelial malignancies. We will show how radiomics can be incorporated into radiology reports in patients with GU malignancies and emphasize how radiomics features can be used to affect patient care.
**First Trimester Ultrasound**

Tuesday, Nov. 29 8:30AM - 10:00AM Room: S402AB

- **AMA PRA Category 1 Credits™:** 1.50
- **ARRT Category A+ Credits:** 1.50

**Participants**

**Active Handout:** Carol Beer Benson  

**Sub-Events**

**RC310A  Ectopic Pregnancy**

Participants  
Peter M. Doubilet, MD, PhD, Boston, MA (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**

1) More accurately diagnose tubal ectopic pregnancies. 2) Diagnose unusual ectopic pregnancies, including cervical and interstitial pregnancies. 3) Distinguish early intrauterine pregnancy from ectopic pregnancy.

**ABSTRACT**

**Active Handout:** Peter Michael Doubilet  

**RC310B  Diagnosis of Failed Pregnancy**

Participants  
Mindy M. Horrow, MD, Philadelphia, PA, (horrowm@einstein.edu) (*Presenter*) Spouse, Employee, Merck & Co, Inc

**LEARNING OBJECTIVES**

1) Review normal embryonic development in the first trimester. 2) Describe issues related to safe interpretation of first trimester pregnancy including definitely normal, definitely abnormal and indeterminate findings that require follow up. 3) List criteria that are diagnostic for pregnancy failure and distinguish from those that are suspicious for pregnancy failure.

**ABSTRACT**

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at:  
https://www.rsna.org/Honored-Educator-Award/

Mindy M. Horrow, MD - 2013 Honored Educator  
Mindy M. Horrow, MD - 2016 Honored Educator

**RC310C  Mid-late First Trimester**

Participants  
Carol B. Benson, MD, Boston, MA (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Recognize the importance of evaluating the developing fetal head during the late first trimester for early detection of large neural tube defects. 2) Incorporate measurement of the nuchal translucency into their assessment of the fetuses of gestational age 11-14 weeks. 3) Recognize sonographic abnormalities of the ventral wall to distinguish normal physiologic bowel herniation from defects including omphalocele and gastroschisis.

**ABSTRACT**

This lecture will discuss the sonographic appearance of fetal anatomy in the latter part of the third trimester in order to help participants recognize abnormalities of the fetus at this early gestational age. While many anomalies cannot be detected until later in pregnancy, the discussion will focus on those anomalies that can be detected in the first trimester. Specific topics covered will be central nervous system anomalies, including anencephaly, encephalocele and holoprosencephaly, ventral wall defects including omphalocele and gastroschisis, bladder outlet obstruction, and skeletal anomalies including skeletal dysplasias. Detection of anomalies early in gestation, before the second trimester, permits time to assess the fetus for other anomalies, syndromes, and aneuploidy.
Interactive Game: When Do Imaging Findings Make a Difference?

Tuesday, Nov. 29 8:30AM - 10:00AM Room: E450B

GU  MK  NR  OI

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants

Sub-Events

RC318A  Neuro

Participants
Birgit B. Ertl-Wagner, MD, Munich, Germany, (Birgit.Ertl-Wagner@med.lmu.de) (Presenter) Board Member, Koninklijke Philips NV; Board Member, Bracco Group; Board Member, Springer Science+Business Media; Consultant, MMI Munich Medical International GmbH; Consultant, Koninklijke Philips NV; Consultant, Springer Science+Business Media; Consultant, Thieme Medical Publishers, Inc; Consultant, Bracco Group; Institutional Research Grant, Eli Lilly and Company; Institutional Research Grant, F. Hoffmann-La Roche Ltd; Institutional Research Grant, Guerbet SA; Institutional Research Grant, Merck KGaA; Institutional Research Grant, Bayer AG; Institutional Research Grant, Novartis AG; Speaker, Siemens AG; Author, Springer Science+Business Media; Author, Thieme Medical Publishers, Inc; Author, Bracco Group; Author, Springer Science+Business Media; Author, Thieme Medical Publishers, Inc; Stockholder, Siemens AG; Travel support, Siemens AG;

LEARNING OBJECTIVES

1) To comprehend the importance of signs in neuroimaging for diagnostic decision making. 2) To understand in which instances imaging findings have a direct consequence for therapeutic decision making. 3) To appreciate the therapeutic consequences of selected neuroimaging findings.

RC318B  Musculoskeletal

Participants
David M. Panicek, MD, New York, NY, (panicekd@mskcc.org) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) Assess imaging features that facilitate specific diagnoses of musculoskeletal lesions. 2) Describe scenarios in which various imaging features of musculoskeletal lesions lead to more accurate tumor staging and treatment response assessment. 3) Detect musculoskeletal complications of tumors and their treatment.

RC318C  Pelvis

Participants
Caroline Reinhold, MD, MSc, Montreal, QC (Presenter) Consultant, GlaxoSmithKline plc

LEARNING OBJECTIVES

1) Understand the role of imaging in the management of gynaecological malignancies. 2) Assess imaging features that allow accurate staging of gynaecological malignancies. 3) Be familiar with pitfalls that can result in staging errors using imaging. 4) Understand the changes in imaging appearance post treatment.

ABSTRACT

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Caroline Reinhold, MD, MSc - 2013 Honored Educator
Caroline Reinhold, MD, MSc - 2014 Honored Educator
**SSG05**

**Genitourinary (Multiparametric Prostate MRI)**

Tuesday, Nov. 29 10:30AM - 12:00PM Room: N229

**Participants**
Andrew B. Rosenkrantz, MD, New York, NY (Moderator) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA (Moderator) Scientific Advisory Board, 3DBiopsy LLC; Research Grant, Verily Life Sciences LLC
Ronaldo H. Baroni, MD, Sao Paulo, Brazil (Moderator) Nothing to Disclose

**Sub-Events**

**SSG05-01**  **Comparison of Initial and Subspecialist Second Opinion Reads of Multiparametric Magnetic Resonance Imaging of the Prostate Prior to Repeat Biopsy**

Tuesday, Nov. 29 10:30AM - 10:40AM Room: N229

**Participants**
Nienke L. Hansen, MD, Aachen, Germany (Presenter) Nothing to Disclose
Brendan C. Koo, MBChB, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Ferdia A. Gallagher, PhD, FRCR, Cambridge, United Kingdom (Abstract Co-Author) Research support, General Electric Company
Anne Warren, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Christof Kastner, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Tristan Barrett, MBBS, BSc, Guildford, United Kingdom (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To investigate the value of second-opinion evaluation of multiparametric magnetic resonance imaging (mpMRIs) of the prostate by subspecialised uroradiologists at a tertiary center for the detection of significant cancer in transperineal MR/US fusion prostate biopsy.

**METHOD AND MATERIALS**

Evaluation of prospectively acquired initial and second-opinion radiology reports of 158 patients who underwent mpMRI at regional hospitals prior to transperineal MR/US fusion biopsy at a tertiary referral center over a 3-year period. Gleason score (GS) 7-10 cancer and all cancer detection rates, positive (PPV) and negative (NPV) predictive values (±95% confidence intervals) were calculated for mpMRIs that were reported as negative, equivocal, or suspicious for cancer and compared by Fisher's exact test.

**RESULTS**

Disagreement between the initial and the second-opinion report was observed in 54% of cases (86/158). mpMRIs were more often called negative in subspecialist reads than in initial reports (41% vs. 20%; p=0.0001) with significantly higher NPV for GS 7-10 in subspecialist second-reads (0.89 (±0.08) vs. 0.72 (±0.16) for external reports; p=0.04). mpMRIs were less often called suspicious in subspecialist reads than in initial reports (39% vs. 51%; p=0.04) with significantly higher PPV for subspecialist second-reads (0.56 (±0.12) vs. 0.34 (±0.10) for external reports; p=0.01). For equivocal cancer suspicion, the PPV was 0.18 (±0.13) for subspecialist reads and 0.24 (±0.12) for external reads; p=1.00.

**CONCLUSION**

Second reading of prostate mpMRIs by subspecialised uroradiologists significantly improved the NPV and PPV. If biopsy is to be avoided on the basis of a negative MRI, Urologists need to be aware of the experience of the reporter and potential for variation in negative predictive values. Reporter experience may also reduce overcalling and therefore avoid overtargeting of lesions.

**CLINICAL RELEVANCE/APPLICATION**

Variation in reporting performance needs to be acknowledged, particularly with mpMRI being increasingly used in order to target or avoid prostate biopsy.

**SSG05-02**  **Negative Predictive Value of Prostate Magnetic Resonance Imaging among Men with Negative Prostate Biopsy and Elevated PSA: A Retrospective Cohort Study**

Tuesday, Nov. 29 10:40AM - 10:50AM Room: N229

**Participants**
Kirsteen R. Burton, MD, MBA, Toronto, ON (Presenter) Nothing to Disclose
Glen Lo, MBBS, Perth, Australia (Abstract Co-Author) Nothing to Disclose
Neil Fleshner, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Antonio Finelli, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Masoom A. Haider, MD, Toronto, ON (Abstract Co-Author) Consultant, Bayer AG;
Sangeet Ghai, MD, Toronto, ON (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To estimate the negative predictive value (NPV) of multiparametric-MRI (mp-MRI) for clinically significant cancer at a mean follow-up of 6.8 years.
METHOD AND MATERIALS

IRB approved, retrospective cohort study of diagnostic performance of prostate MRI examinations performed between 2004-2009. The oldest MRI per individual patient was eligible for study inclusion. Patients with Gleason score 6 disease at outset and negative initial MRI who remained on active surveillance were included in the study. Presence of any volume Gleason 4 component or higher at follow-up biopsy was considered as clinically significant disease. Follow-up duration and subsequent prostate cancer diagnoses (and scores) were determined by chart review in July 2015, by the most recent prostate biopsy result, outpatient clinic letter and from data linkage to the hospital’s Cancer Registry. Diagnostic performance was estimated from contingency tables.

RESULTS

During the study period, 727 prostate MRI studies were performed, with 541 MRI examinations ultimately included in the analysis. Median patient age was 63 years. Within our sample of 541 men, 132 men (24.4%) had a negative initial MRI (73 with previous negative biopsy and median PSA 10; and 59 with low-volume Gleason 6 disease, median PSA 6). At median follow up 81.4 months, 115/132 men (87.1%) remained on watchful waiting or active surveillance without any disease or clinically significant disease. Within this group, 70/73 men (95.9%) remained free of clinical disease at a median follow up of 81 months. A total of 409 men (75.6%) had a positive MRI at the initial read. Of these, clinically significant cancer was present in 237/409 on biopsy (positive predictive value (PPV) = 58%). Within this group, the PPV of MRI in patients with prior negative biopsy was significantly lower (16.7%) in comparison to patients on active surveillance (63.4%).

CONCLUSION

Our long-term study showed that mp-MRI demonstrated a high clinical NPV and is very useful to rule out clinically significant prostate cancer, more so in patients with prior negative biopsy.

CLINICAL RELEVANCE/APPLICATION

In men with prior negative biopsy and a negative MRI, the risk of developing clinically significant disease over a median of 6.7 years is extremely low therefore these patients could be clinically followed less frequently.

SSG05-04  B-Value and Mode Dependence of Diffusion Weighted Imaging in Peripheral Zone Prostate Cancer Detection

Tuesday, Nov. 29 10:50AM - 11:00AM Room: N229

Participants

Debo Zhi, MS, Hefei, China (Abstract Co-Author) Nothing to Disclose
Yuping Chen, Hefei, China (Abstract Co-Author) Nothing to Disclose

METHOD AND MATERIALS

240 consecutive patients (mean age, 66.4±8.8 years; range, 40-82 years) with normal digital rectal examination (DRE) results but elevated total prostate-specific antigen (t-PSA) levels (4-20/ml) or normal t-PSA but falling f/t PSA (<0.16) were enrolled in this retrospective study. All patients underwent 3-T abbreviated prostate MRI protocol including T2WI and DWI. Transrectal ultrasound guided random systematic biopsy was performed subsequently. All MRI image data were read by 2 experienced radiologists, who were blinded to the PSA data, in consensus according to PI-RADS v2. The effectiveness of abbreviated prostate MRI protocol in screening clinical significant PCa was evaluated by the receiver operating characteristic (ROC) analysis. The thresholds to recommend biopsy were obtained from the Youden J statistics.

RESULTS

There were finally 104/240 men (43.3%) diagnosed with clinical significant PCa, with normal DRE but moderate elevated t-PSA (mean, 10.59 ng/ml; range, 4.09-19.85 ng/ml). Abbreviated prostate MRI based on PI-RADS v2 achieved high areas under ROC curve of 0.905. For the threshold of PI-RADS v2 score of 4 or greater, the sensitivity, specificity, PPV and NPV were 0.885, 0.904, 0.876 and 0.911. The accuracy of abbreviated prostate MRI protocol for PCa detection is 89.5%. While for the score threshold of 3 or greater, the sensitivity, specificity, PPV, NPV and accuracy were 0.933, 0.750, 0.740, 0.936 and 0.829.

CONCLUSION

Abbreviated prostate MRI based on PI-RADS v2 allows screen clinical significant PCa in men with normal DRE and moderate elevated t-PSA for initial biopsy.

CLINICAL RELEVANCE/APPLICATION

Abbreviated prostate MRI based on PI-RADS v2 might be a promising screen method for men with equivocal biopsy indications, which would reduce overdiagnosis and overtreatment for this cohort of patients in some extend.
PURPOSE
To evaluate the b value and mode dependence of diffusion weighted imaging in peripheral zone prostate cancer detection.

METHOD AND MATERIALS
78 patients with peripheral PCAs underwent DW-MRI using 21 b-values (0-4500s/mm2) at 3.0T. The mean signal intensities of ROIs placed in normal peripheral tissue and peripheral PCAs were fitted using four models (conventional mono-exponential, bi-exponential, stretched-exponential, and kurtosis). To validate the dependence of modes on the b-values, the b-values were divided into four different ranges: 0-1000, 0-2000, 0-3200, and 0-4500 s/mm2, titled as groups A, B, C, and D, respectively. ADC, D, D*, f, DDC, α, Dapp, Kapp were estimated for every group. In order to test goodness-of-fit, adjusted coefficient of determinant (R2) for groups were calculated among different models. Receiver operating characteristic curve (ROC) analysis was performed and the area under the curve (AUC) was obtained to evaluate and compare the diagnostic accuracy of parameters in distinguishing cancerous tissues from normal PZ.

RESULTS
The bi-exponential and the stretched-exponential models provide the highest adjusted R2 among the four models in every group. The kurtosis model provide the medium goodness-of-fit. The mono-exponential model provide the lowest goodness-of-fit in the four groups. Whether in the benign PZ or in the cancerous tissue, the mean value of ADC, D, D*, α, Dapp significantly decrease with the increasing of b value. Yet, the mean value of f and Kapp significantly increase with the decreasing of the b value. Different from the parameters above, the DDC and α calculated from the stretched exponential model have no significant variation with the increasing of b value. ADC, DDC and Kapp of group B, C and D provide the highest AUC. No significant differences between group B, C and D about AUC value of ADC, DDC and Kapp (all p>0.05).

CONCLUSION
Higher b-value and more complicated models provide no additional diagnostic value than conventional mono-exponential at b-value about 2000s/mm2 in peripheral zone prostate cancer detection. However, DDC derived from stretched-exponential model is an promising parameter for it’s good diagnostic performance and stability though the b-value adopted.

CLINICAL RELEVANCE/APPLICATION
Higher b-value and more complicated models provide no additional diagnostic value than conventional mono-exponential at b-value about 2000s/mm2 in peripheral zone prostate cancer detection.

SSG05-05 Computer-Aided Diagnosis for Prostate Cancer mpMRI: A Multi-Reader Study

Tuesday, Nov. 29 11:10AM - 11:20AM Room: N229

Awards
Trainee Research Prize - Medical Student

Participants
Matthew Greer, BS, Cleveland Heights, OH (Presenter) Nothing to Disclose
Nathan S. Lay, PhD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Joanna Shih, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Tristan Barrett, MBBS, BSc, Guildford, United Kingdom (Abstract Co-Author) Nothing to Disclose
Leonardo K. Bitencourt, MD, PhD, Rio De Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Samuel Borofsky, MD, Washington, DC (Abstract Co-Author) Nothing to Disclose
Ismail M. Kabakus, MD, PhD, Ankara, Turkey (Abstract Co-Author) Nothing to Disclose
Yan Mee Law, MBBS, Singapore, Singapore (Abstract Co-Author) Nothing to Disclose
Jamie Marko, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Haytham M. Shebel, MD, Mansoura, Egypt (Abstract Co-Author) Nothing to Disclose
Francesca Mertan, BS, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Maria Merino, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Peter Pinto, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Peter L. Choyke, MD, Rockville, MD (Abstract Co-Author) Researcher, Koninklijke Philips NV; Researcher, General Electric Company; Researcher, Siemens AG; Researcher, Aspyrian Therapeutics, Inc; Researcher, ImagInAb, Inc; Researcher, Aur Biosciences, Inc
Ronald M. Summers, MD, PhD, Bethesda, MD (Abstract Co-Author) Royalties, iCAD, Inc; 
Baris Turkbey, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose

PURPOSE
Computer-aided diagnosis (CAD) of prostate mpMRI has the potential to assist inexperienced readers and improve agreement among readers. We conducted a multi-reader study to assess the accuracy and agreement of CAD-assisted mpMRI.

METHOD AND MATERIALS
9 radiologists (with n=3 high, n=3 moderate, n=3 low experience with prostate MRI) from 8 institutions participated. In order to detect a 10% difference in sensitivity between MRI and CAD 77 total patients were needed. Test cases were consecutive patients with ERC MRI at 3T (T2W, ADC, b2000, and DCE MRI) and subsequent prostatectomy. Control cases were patients with no lesions on ERC MRI and no positive TRUS biopsy. Readers were blinded to all outcomes, asked to detect up to 3 lesions, and use PIRADS v2 for evaluation of MRI without CAD. After 5 weeks, readers evaluated MRI with CAD by detecting lesions on CAD alone and then accepted or rejected these lesions using PIRADS v2 criteria on MRI. Lesions were correlated to whole mount prostatectomy specimens processed with customized 3D-printed molds. Average sensitivity, specificity, and positive predictive value (PPV) were calculated on a per-patient and per-lesion basis. Index of specific agreement (ISA) was calculated among all readers and experience levels. Paired student t-test was used to compare time to make reads.

RESULTS
There were 163 patients (n=110 cases, n=53 controls) with a median PSA of 0.19 ng/m2 for cases and 0.09 ng/m2 for controls. On lesion based analysis the average sensitivity for detecting index lesions of any grade was 78% for MRI and 86% for CAD (p=0.02). When all lesions of any grade were included the sensitivity was 52% for MRI and 60% for CAD (p=0.001). Index lesion sensitivity increased 7.6% on average for each reader with CAD (p=0.02). On a per-patient basis the average specificity of CAD...
and MRI were 57% and 70% (p=0.003), respectively. ISA was 72% for detection of lesions with CAD versus 57% (p<0.001) for MRI alone. Agreement between high and low experience readers improved from 60% to 72% with CAD (p<0.001). No difference was observed in time to make reads (p=0.645).

CONCLUSION
With the assistance of CAD, readers of varying experience were able to detect intermediate and high grade index lesions on mpMRI with high sensitivity and agreement.

CLINICAL RELEVANCE/APPLICATION
The addition of CAD to mpMRI could bridge the gap between readers of varying experience for detecting high grade prostate cancer.

SSG05-06 Multiparametric Magnetic Resonance Imaging Versus Partin Tables and Memorial Sloan Kettering Cancer Center Nomogram in Assessing Risk Category of Prostate Cancer: A Study in Patients Addressed to External Beam Radiation Therapy

Tuesday, Nov. 29 11:20AM - 11:30AM Room: N229

PURPOSE
To evaluate the impact on risk stratification of prostate cancer (PCa) of Multiparametric Magnetic Resonance Imaging (mpMRI) as compared to Partin Tables (PT) and Memorial Sloan Kettering Cancer Center (MSKCC) nomogram in patients addressed to External Beam Radiation Therapy (EBRT).

METHOD AND MATERIALS
In this bicentric study, we prospectively performed pre-ERBT staging mpMRI in fifty-three patients with biopsy-proven PCa. Examination were acquired on a 3.0T magnet, with a protocol including high-resolution multiplanar T2-weighted imaging, diffusion-weighted imaging (maximum b-value 2000 sec/mm2) and dynamic contrast-enhanced imaging after i.v. injection of 0.1 mmol/Kg of Gd-BOPTA. Patients’ risk group was assessed in accordance with the National Comprehensive Cancer Network (NCCN) categories, by combining prostate-specific-antigen level, Gleason score and the T-stage as defined by mpMRI vs PT or MSKCC. On a per-patient basis, we calculated the agreement between mpMRI and nomograms in assessing ≤T2 vs ≥T3 stage (Cohen’s kappa), as well as mpMRI-induced rate of changes in risk group assignment (slow risk vs intermediate risk vs ≥high risk). Additional thirty-five patients with post-operative histological diagnosis served as a validation group for mpMRI.

RESULTS
mpMRI showed poor agreement with PT (k=0.30) and MSKCC (k=0.33) in defining ≤T2 vs ≥T3 stage. In particular, mpMRI modified the T stage in 18/53 patients (34.0%;95%C.I. 21.9-48.4) compared to both nomograms, mainly in terms of downstaging (18.9% and 28.3% for PT and MSKCC, respectively). This translated into mpMRI-induced change in risk group assignment in 17/53 of both PT and MSKCC cases (32.1%;95%C.I. 20.3-46.4), with a prevalent effect of downgrading ≥high risk to intermediate risk category (17% of patients). In the validation group of surgical patients, mpMRI showed 85.7% accuracy in assessing ≥T3 stage.

CONCLUSION
mpMRI changed PT- and MSKCC-related T staging of PCa in about one-third of patients, translating into a modification of risk category in 32.1% of cases, mainly in terms of ≥high-to-intermediate risk downgrading.

CLINICAL RELEVANCE/APPLICATION
mpMRI refines nomograms-based risk stratification, especially in patients initially assessed as ≥high-risk, thus impacting on the EBRT regimen (e.g., duration of concomitant hormonal therapy).

SSG05-07 Utility of Multi-parametric MRI to Predict Pathological Stage and Surgical Margins in Anterior Prostate Cancers

Tuesday, Nov. 29 11:30AM - 11:40AM Room: N229

PURPOSE
Clinical staging of anterior prostate cancer (APC) is limited and studies evaluating MRI for staging of APC are lacking. Moreover, there are higher rates of positive surgical margins (PSM) after radical prostatectomy (RP) in APC. This study evaluates subjective
and quantitative MRI, to predict extraprostatic extension (EPE) and PSM in APC.

**METHOD AND MATERIALS**

With IRB approval, 25 patients underwent RP with APC (>2/3 of tumor anterior to urethra; 21 transition zone, 4 anterior peripheral zone tumors) and MRI between 2012-2015. Two blinded radiologists assessed MRI for: tumor size (mm), invasion of anterior fibromuscular stroma (AFMS), whether tumor crosses midline and EPE. Radiologists measured leading edge of tumor (relative to prostate capsule) on b>1000 mm²/sec EPI fused onto T2W. Comparisons were performed using chi-square, regression and ROC.

**RESULTS**

Age and PSA were 65.2 ± 5.9 years and 9.91 ± 7.62 ng/mL with no difference by EPE or PSM (p>0.05). Rates of EPE and PSM were 52% (13/25) and 40% (10/25). Gleason scores were: 3+3=6 (N=1), 3+4=7 (N=12), 4+3=7 (N=9), 4+4=8 (N=1) and 4+5=9 (N=2). Tumor size was 19.6 ± 8.3 (7-33) mm overall; larger tumors were associated with EPE and PSM (p=0.009 and 0.011). AUC for size predicting EPE/PSM were 0.79 (SE=0.09, CI0.62-0.97) and 0.77 (0.11, 0.55-0.99) with size ≥16mm yielding sensitivity/specificity (SENS/SPEC) of 76.9/66.7% and 80/60% respectively. 52% (13/25) of tumors crossed the midline, this was associated with EPE and PSM (p=0.009 and 0.002). 72% (18/25) tumors invaded AFMS, this was not associated with EPE or PSM (p>0.05). Radiologist impression of EPE had SENS/SPEC of 61.5/75.0%. Leading edge of tumor was 1.3 ± 3.7 (-7 -10) mm overall and was associated with both EPE and PSM (p=0.011 and 0.013). AUC for leading edge predicting EPE/PSM were 0.79 (SE=0.09, CI0.61-0.98) and 0.77 (0.09, 0.59-0.96) with ≥2mm extension yielding SENS/SPEC of 76.9/75% and 70/73.3% respectively.

**CONCLUSION**

In anterior prostate cancers, size of tumor, extension across midline and the leading edge of tumor are findings associated with extraprostatic extension and positive surgical margins after RP.

**CLINICAL RELEVANCE/APPLICATION**

Diagnosis of extraprostatic spread of tumor in anterior prostate cancers is possible with MRI. These findings correlate with positive surgical margin rates after radical prostatectomy and may alter surgical approach or management.

**SSG05-08**  **PI-RADS Version 2: Quantitative Analysis Helps Reliable Interpretation of Diffusion-Weighted Imaging for Peripheral Zone Prostate Cancer**

Tuesday, Nov. 29 11:40AM - 11:50AM Room: N229

Participants
Sung Yoon Park, Seoul, Korea, Republic Of (Presenter) Nothing to Disclose
Su-Joon Shin, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Dae Chul Jung, MD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Nam Hoon Cho, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Young Deuk Choi, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Koon Ho Rha, MD, PhD, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose
Sung Joon Hong, Seoul, Korea, Republic Of (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To analyze whether quantitative analysis of apparent diffusion coefficient (ADC) helps reliable interpretation of diffusion-weighted imaging (DWI) for peripheral zone (PZ) prostate cancer.

**METHOD AND MATERIALS**

Consecutive 76 patients with PZ cancer who underwent 3T DWI and surgery were included. Based on the location of an index tumor from surgical specimens, two independent readers performed DWI scoring of revised Prostate Imaging Reporting and Data System (PI-RADSv2). Then, ADC ratio of benign PZ-to-cancer was also measured in consensus. The ADC ratio was compared between agreement (i.e., score ≥ 4 for both readers) and disagreement groups (i.e., score ≥ 4 only for one reader). The cutoff and area under the curve (AUC) of ADC ratio were analyzed for DWI score ≥ 4.

**RESULTS**

The rate of inter-reader disagreement regarding DWI score ≥ 4 or not was 11.8% (9/76). The ADC ratio of benign PZ-to-cancer was significantly higher in agreement group than in disagreement group (median, 1.7 versus 1.3; p<0.001). For DWI score ≥ 4, the cutoff and AUC of ADC ratio were more than 1.2 and 0.921 with reader 1, and more than 1.3 and 0.949 with reader 2, respectively. For patients with ADC ratio > 1.3, the rate of inter-reader disagreement was 6% (3/50). The application of ADC ratio > 1.3 allowed 100% (50/50) positive predictive value for clinically significant cancer that met Epstein criteria.

**CONCLUSION**

The quantitative analysis of ADC ratio between benign PZ and PZ cancer may be useful for reliable interpretation of DWI score ≥ 4 in PI-RADSv2.

**CLINICAL RELEVANCE/APPLICATION**

In PI-RADSv2, DWI score is determined by visual analysis, which may be associated with inter-reader disagreement. The quantitative analysis of ADC may help reliable interpretation for the detection of CSC.

**SSG05-09**  **Rapid Biparametric MRI and Targeted Biopsy in Patients with Elevated PSA Before Their First Biopsy: Initial Finding of a Multi-Institutional Prospective Registered Clinical Trial**

Tuesday, Nov. 29 11:50AM - 12:00PM Room: N229

Participants
Ivan Jambor, MD, Turku, Finland (Presenter) Nothing to Disclose
Aida K. Kiviniemi, MD, Turku, Finland (Abstract Co-Author) Nothing to Disclose
PURPOSE
To evaluate negative predictive value of biparametric MRI (bpMRI) and bpMRI targeted TRUS-guided biopsy in patients with elevated PSA before their first biopsy in a multi-institutional prospective registered clinical trial.

METHOD AND MATERIALS
Between February 2015 and March 2016, 184 patients with elevated PSA (2.5 - 20.0 ng/ml) and/or abnormal digital rectal examination underwent bpMRI examination performed using surface array coils prior to a systematic 12 core biopsy (SB) at four centers. bpMRI was performed using surface array coils at 3 Testa (3 centers) or 1.5 Tesla (1 center) and consisted of T2-weighted imaging (T2w) and three separate diffusion weighted imaging (DWI) acquisitions (5 b values 0-500 s/mm², 2 b values 0-1500 s/mm², 2 b values 0-2000 s/mm²). All bpMRI were reported centrally and approved by one reader before biopsy. If a suspicious lesion was present (Likert score 3-5), two cores of targeted biopsy (TB) were taken prior to the SB. A maximum of two lesions per patient were targeted. Clinically significant (SPCa) was defined as Gleason score 3+4 or higher.

RESULTS
Prostate cancer and SPCa were diagnosed in 108 (59%, 108/184) and 70 (43%, 70/184) patients, respectively. Fourteen (8%, 14/184), 22 (12%, 22/184), 36 (20%, 36/184), 34 (19%, 34/184), and 78 (43%, 78/184) patients presented with Likert score 1, 2, 3, 4, and 5, respectively. Performing biopsy only in patients with Likert score 3-5 or 4-5 would have resulted in a 20% (36/184) or 39% (72/184) reduction in the number of patients undergoing biopsy while missing only 0% or 2% (4/184) patients with SPCa, respectively. The corresponding negative predictive values are 100% and 94%. In patients with Likert score 3-5 (n=148), the addition of SB to TB resulted in the detection of SPCa in 7 (4%, 7/184) patients while SPCa was diagnosed only in the cores of TB in 8 (4%, 8/184) patients.

CONCLUSION
Biparametric MRI, consisting of T2w and DWI acquired using “low” and “high” b values, has high negative predictive value for SPCa and could be used to identify patients who would benefit from biopsy while limiting unnecessary biopsy procedures.

CLINICAL RELEVANCE/APPLICATION
Biparametric MRI, consisting of T2-weighted imaging and diffusion weighted imaging acquired using “low” and “high” b values, limits the number of unnecessary biopsy procedures.
**Marginal-Positive (M+) Radical Prostatectomy (RP): Differential Risk of PSA Relapse by Extent of Margin Involvement**

**Participants**
Martin Colman, MD, Houston, TX (Moderator) Nothing to Disclose
Abhishek A. Solanki, MD, Maywood, IL (Moderator) Nothing to Disclose

**Purpose**
M+ is an established risk factor for PSA failure following RP; however, often this is identified in the context of other high-risk feature(s). The objective of the current study was to expand upon our previous single-institution findings in the multi-institutional setting, with longer follow-up, in order to optimally delineate the margin extent (ME) for stratification by Gleason score (GS).

**Method and Materials**
Retrospective analysis of patient- and tumor-specific factor association with PSA relapse-free survival (bRFS). Eligible patients underwent RP at the study institutions for biopsy-proven prostate adenocarcinoma, without adjuvant radiotherapy (RT) or hormone therapy (HT). Patients with evidence of metastatic disease or PSA >30 at diagnosis, or pathologic involvement of seminal vesicles or lymph nodes at RP were excluded. RP specimen slides were reviewed by pathology, and M+ details (foci, ME) were recorded.

**Results**
Between 2002 and 2010, 644 patients underwent RP at the study institutions, of whom 429 were eligible for the present analysis. The median age at diagnosis was 61 years (range 43-76), and pre-RP PSA was 5.6 (0.9-26). Of 154 patients with confirmed M+, 146 had slides available for review. At a median follow-up of 80 months (range 16-155), 100 patients had experienced PSA relapse at a median of 22 months post-RP (1-124), of whom 64 had involved surgical margins. On multivariate analysis, pre-RP PSA, pathologic GS, and margin status were significantly associated with bRFS. Subset evaluation by GS and ME identified a group at lower risk of failure: GS=7 with any extent M+ have poor early bRFS.

**Conclusion**
Within the present study, GS=7 with any extent M+ have poor early bRFS.

**Clinical Relevance/Application**
Reporting of ME in RP pathology reports should be considered, as this may influence consideration of adjuvant therapy versus surveillance.

**Stereotactic Body Radiotherapy (SBRT) for Primary Renal Cell Carcinoma (RCC): Intrafraction Target Movement and Patient Outcomes**

**Purpose/Objective(s):** Renal cell carcinoma (RCC) is traditionally considered to be radioresistant. The current standard treatment for clinically localized disease is partial or radical nephrectomy; in patients unfit for surgery, cryotherapy or HIFU are recommended. Little has been published on the use of SBRT for primary RCC. Materials/Methods: This is an IRB-approved retrospective study. All patients were treated using a robotic-arm stereotactic system with fiducial tracking; target motion during treatment was extracted from motion models from actual treatment sessions. Patient records were reviewed for toxicity and cancer control outcomes. Results: Between the years 2010 and 2016, 6 patients who were non-surgical candidates were treated with SBRT for primary RCC with curative intent, all were treated to 39 Gy in 3 fractions given daily. Median age was 68.5 years (range: 61-77). All patients had two kidneys, with one kidney involved with primary localized RCC with a mean size of 5 cm (range: 4.2-6.5) and a mean PTV 124 cc (range: 72-210). Mean intrafraction tumor motion available for 4 patients was: superior/inferior 4.2 mm, left/right
Low dose rate (LDR) brachytherapy is a highly effective modality for the treatment of prostate cancer. However, incorrect placement of seeds can lead to suboptimal outcomes and treatment related sequelae such as urethral and rectal toxicities. Even secondary lung cancers due to seed migration have been reported in the literature. The purpose of this study is to evaluate the incidence of seed migration and resultant dosimetric impact using coated vs. uncoated seeds with a Mick applicator implant technique.

**METHOD AND MATERIALS**

Twenty patients with prostate cancer treated at a high-volume single institution status post LDR brachytherapy were retrospectively analyzed and compared for seed slippage when using coated vs. uncoated seeds with a Mick applicator implant technique. All patients were planned with pre-treatment multi-parametric MRI and evaluated with intraoperative ultrasound, real-time intraoperative dosimetry, and a Day 0 CT-based dosimetric analysis. All dosimetric calculations were based on TG-43 formulation. The incidence of seed slippage was compared between patients treated with coated vs. uncoated seeds.

**RESULTS**

Eight patients were treated with coated seeds and twelve patients with uncoated seeds, representing 699 and 1099 total seeds placed respectively. The total migration rate was 3.2% vs. 10.2% for coated vs. uncoated seeds. Intra-prostatic migration was 1.2% for coated seeds, and 5.1% for uncoated seeds. Importantly, the seed non-visualization rate from intraoperative monitoring with ultrasound and Day 0 CT was 2.0% and 5.1% respectively, likely representing extra-prostatic seed migration. Dosimetric consequences were also evaluated but data not shown due to space limitations.

**CONCLUSION**

The use of coated seeds with a Mick applicator implant technique reduces seed migration by nearly ½ rd, including extra-prostatic slippage not identified on real-time intraoperative ultrasound or post-implant CT. Further sector based analyses including regional dosimetric impact relative to gross disease identified on multi-parametric MRI and adjacent organs-at-risk are warranted.

**CLINICAL RELEVANCE/APPLICATION**

Prostate seed migration following LDR brachytherapy can compromise local tumor control in addition to unintended consequences.
such as extra-prostatic seed migration to the lungs and abdomen-pelvis.

**SSG15-08** Comparison of Intraoperative MRI/US Fusion in Relation to Standard CT/US Based Planning for LDR Prostate Brachytherapy

Tuesday, Nov. 29 11:40AM - 11:50AM Room: S104A

Awards
Student Travel Stipend Award

Participants
Paul Renz, DO, Pittsburgh, PA (Presenter) Nothing to Disclose
Stephen Abel, BS, Pittsburgh, PA (Abstract Co-Author) Nothing to Disclose
Mark G. Trombetta, MD, Pittsburgh, PA (Abstract Co-Author) Nothing to Disclose
Olivier Gayou, PhD, Pittsburgh, PA (Abstract Co-Author) Nothing to Disclose
Jie Tang, MSc, Steubenville, OH (Abstract Co-Author) Nothing to Disclose
E. Day Werts, PhD, Pittsburgh, PA (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

Intraoperative planning with transrectal ultrasound (US) is used for accurate seed placement and optimal dosimetry in prostate brachytherapy. However, prostate MRI has shown superiority in delineation of prostate anatomy. Accordingly, MRI/US fusion may be useful for accurate intraoperative planning. We analyzed planning with MRI/US fusion to compare differences in dosimetry to that derived from postoperative CT.

**METHOD AND MATERIALS**

Twenty patients underwent preoperative prostate MRI which was fused intraoperatively with US during prostate brachytherapy using a MIM Symphony treatment planning system (MIM Software; Cleveland, OH, USA). Following implantation, dose comparisons were made between data derived from MRI/US and that from post-operative CT scans. Plan parameters analyzed included the D90 (dose to 90% of the prostate), rectal D30, and the rectal V30 (volume of the rectum receiving 30 percent of dose), and the prostate V100.

**RESULTS**

The median number of seeds implanted per patient was 76 with mean activity of 0.381mCi per seed. The MRI measured prostate volume was on average 4.47cc smaller than the CT measured prostate volume. In 9 patients, the apex of the prostate was better identified under MRI and an average of 4 fewer seeds were required to be placed in the apex/urinary sphincter region. Both MRI and US individually showed reduced intraoperative prostate D90 in comparison to postoperative CT-based prostate D90 with a larger mean difference for MRI in comparison with US (9.71 vs. 4.31Gy, p=0.007). This was also true for the prostate V100 (5.18 vs. 2.73cc, p=0.009). Post-operative CT underestimated rectal D30 and V30 in comparison to both MRI and US with MRI showing a larger mean difference than US for D30 (40.64 vs. 35.92Gy, p=0.04) and V30 (50.20 vs. 44.38cc, p=0.009).

**CONCLUSION**

The MRI/US fusion demonstrated lower prostate volume compared with standard CT/US based planning likely due to the better resolution of the prostate apex. Furthermore, rectal dose was underestimated with CT vs. MRI based planning. Additional study is required to assess long term clinical implications of disease control and effects on the rectum and urinary sphincter.

**CLINICAL RELEVANCE/APPLICATION**

MRI/US intraoperative fusion may improve prostate dosimetry and sparing of the rectum, potentially impacting disease control and late toxicity.

**SSG15-09** Impact Factors on Acute Hematologic Toxicity in Prostate Cancer Patients Treated with Radiation Therapy

Tuesday, Nov. 29 11:50AM - 12:00PM Room: S104A

Participants
Xiaoying Li, Beijing, China (Abstract Co-Author) Nothing to Disclose
Ke Wang, MD, Beijing, China (Presenter) Nothing to Disclose

**ABSTRACT**

Purpose/Objective(s): To determine factors predictive for hematologic toxicity (HT) in patients with prostate cancer treated with radiotherapy. Materials/Methods: The medical records of 47 men receiving radiation therapy for prostate cancer were reviewed. Hematologic toxicity was defined by use of Common Terminology Criteria for Adverse Events (version 4.0). Pelvic bone marrow (PBM) was contoured for each patient and divided into three subsites: lumbosacral spine (LSS), ilium (IBM), and lower pelvis (LP). The volume of each region receiving 5, 10, 15, 20, 25, 30, 35 and >40 Gy (V10, V15, V20, V25, V30, V35, and V40, respectively) was calculated. Endpoints included any grade hematologic event (HE), Logistic regression was used to test associations between HT and dosimetric/clinical parameters. Results: 24 (51.1%) patients experienced leukopenia, 20 (42.6%) were Grade I, 4 (8.5%) were Grade II. Pelvic radiation was associated with an increased worse leukopenia. No association was found with age, ADT therapy, radiation dose and other clinical factors. Multivariate logistic regression analysis shows PBM V5 (OR, 1.046; 95% CI, 1.006–1.088; p = 0.024), IBM V10 (OR, 1.032; 95% CI, 1.006–1.059; p = 0.023), ALS V25 (OR, 6.967; 95% CI, 1.336–36.338; p = 0.015) was associated with an increased worse leukopenia. ROC curve analysis shows LS V25 is the best predictor of leukopenia (AUC 0.718 vs 0.01). Patients with LS V25 > 71.38% had significantly more severe leukopenia (odds ratio of 6.967; 95% CI, 1.336–36.338; p = 0.015). ADT therapy increases by a factor (odds ratio) of 6.967. No association was found with ADT time, bone radiation dose and other clinical factors. No patient experienced thrombocytopenia. Conclusion: Leukopenia and anemia are the most common hematologic toxicity (HT) events happened during radiation therapy of prostate cancer patients. Pelvic radiation was associated with an increased worse leukopenia. LS V25 is the best predictor of leukopenia. When Patients’ LS V25 is greater than 71.38%, leukopenia significantly increased. ADT therapy is the only factor associated with anemia during radiation therapy.
<table>
<thead>
<tr>
<th>bound</th>
<th>LS250</th>
<th>0.718</th>
<th>0.076</th>
<th>0.868</th>
<th>IBM100</th>
<th>0.674</th>
<th>0.08</th>
<th>0.041</th>
<th>0.517</th>
<th>0.831</th>
<th>PBM50</th>
<th>0.665</th>
<th>0.08</th>
<th>0.053</th>
<th>0.508</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.01</td>
<td>0.569</td>
<td></td>
<td>0.868</td>
<td>IBM100</td>
<td>0.674</td>
<td>0.08</td>
<td>0.041</td>
<td>0.517</td>
<td>0.831</td>
<td>PBM50</td>
<td>0.665</td>
<td>0.08</td>
<td>0.053</td>
<td>0.508</td>
</tr>
<tr>
<td></td>
<td>0.821</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSION
the arterial phase (ASM, ENT, DIS, IDM, HOM and SE). No significant difference was seen between study groups in the nephrographic phase.

RESULTS
GLCM Calculations were technically successful for all cases. Chromophobe and Oncocytoma 3D features (ASM, ENT, DIS, IDM, HOM, IMC1, SQV, SD, SA, and IDM) were calculated using t-test or Wilcoxon Rank Sum test, depending on data distribution and with box whisker plot were used to illustrate the difference in imaging parameter between patient categories.

METHOD AND MATERIALS
In this retrospective cohort study, Computerized Tomography (CT) images of tumors for 14 patients with Chromophobe RCC and 20 patients with Oncocytoma were evaluated if texture metrics such as  Gray Level Co-occurrence Matrix (GLCM) texture features could differentiate between Chromophobe RCC and Oncocytoma.

PURPOSE
To evaluate correlation of Prostate Cancer (CaP) tumor volume (TV) of regions of interest (ROI) on prostate multiparametric (MP) magnetic resonance imaging MRI (TVm) with concordant foci TV on whole mount histopathology (WMHP) (TVh), and assess accuracy of MRI in estimating CaP TV stratified by Gleason score (GS) and MP-MRI overall suspicion assessment (OA).

METHODOLOGY/APLICATION
A HIPAA-compliant, IRB-approved study of 114 men who underwent 3T prostate MP-MRI before robotic radical prostatectomy from August 2013 to November 2015 was performed. Prostate and suspicious regions of interest (ROIs) were segmented on MRI and OA was determined using standardized criteria on a 1-5 scale. TVm was calculated by radiologist delineation of ROIs. A 3D patient-specific mold was printed to precisely fit the excised prostate based on MRI prostate segmentation. A pathologist contoured each tumor on all WMHP slides. Custom software automatically imported the annotated contoured WMHP slides, reconstructed the tumors in 3D, and calculated the TVh. A radiologist and pathologist reviewed each case to match each ROI to the concordant focus on WMHP. Pearson correlation coefficients (ρ) were calculated to determine strength of association between volumes of concordant lesion foci on MRI and WMHP. Accuracy (A) of MRI in estimating CaP tumor volume (A=TVm/TVh) was calculated. Analyses were conducted using Stata 14.1. P-values<.05 were considered significant.

RESULTS
114 patients had 118 CaP foci (94 index tumors) on WMHP matched with MRI ROIs concordantly. Of 118 CaP foci GS was ≤6(3+3) in 26 (22%) , 7(3+4) in 59 (50%), ≥7(4+3) in 33 (28%). OA was 2 in 3 (3%), 3 in 37 (31%), 4 in 45 (38%), and 5 in 33 (28%). The median TVh and TVm were 1.12cc and 0.41cc respectively. The ρ between TVh and TVm was 0.55 overall (p<0.001), 0.27 in GS=6 (p=0.18), 0.52 in GS=3+4 (p<0.001) and 0.57 in GS=4+3 (p<0.001) tumors. The ρ was 0.55,0.48 and 0.65 for OA of 3,4 and 5 respectively. The A was 0.28, 0.43 and 0.55 for OA 3,4 and 5 respectively (p<0.001).

CONCLUSION
On 3T MP-MRI, TVm has overall moderate correlation with TVh and true volume is consistently underestimated on MR. The best correlation is achieved for higher grade lesions and lesions with higher overall assessments.

CLINICAL RELEVANCE/APPLICATION
3T MP-MRI consistently underestimates tumor size estimation, and its accuracy is important for targeted biopsy or focal therapy.

GU223-SD-TUA2
Image Texture Analysis as an Image-Based Discriminator between Chromophobe Renal Cell Carcinoma and Oncocytoma

Station #2

Participants
Chuddebm U. Ugweuze, MS, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Megha N. Gupta, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Mike Kwon, BS, MS, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Felix Y. Yap, MD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Darryl Hwang, PhD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Steven Chen, PhD, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Bhushan Desai, MBBS, MS, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Vinay A. Dudalkwars, MD, FRCS, Los Angeles, CA (Presenter) Nothing to Disclose
Sino Varghese, Los Angeles, CA (Abstract Co-Author) Nothing to Disclose
Mittul Galati, MD, La Canada Flintridge, CA (Abstract Co-Author) Nothing to Disclose

PURPOSE
It is difficult on imaging and even biopsy to differentiate between benign (oncocytomas) and malignant (chromophobe renal cell carcinomas) oncocytic tumors. We evaluated if texture metrics such as Gray Level Co-occurrence Matrix (GLCM) texture features could differentiate between Chromophobe RCC and Oncocytoma.

METHODOLOGY/APLICATION
In this retrospective cohort study, Computerized Tomography (CT) images of tumors for 14 patients with Chromophobe RCC and 20 patients with Oncocytoma were extracted using semi-automated segmentation on Synapse 3D (Fujiﬁlm, Stamford, CT). Two and three dimensional GLCM calculations were performed on each tumor. These calculations, 2D and 3D respectively, extracted thirteen GLCM features: mean gray value (MGV), standard deviation (SD), inverse difference moment (IDM), angular second moment (ASM), Correlation (COR), information measures of correlation1 (IMC1), and IMC2. Descriptive analyses based on t-test or Wilcoxon Rank Sum test, depending on data distribution and with box whisker plot were used to illustrate the difference in imaging parameter between patient categories.

RESULTS
GLCM Calculations were technically successful for all cases. Chromophobe and Oncocytoma 3D features (ASM, ENT, DIS, IDM, HOM, IMC1, SQV, SD, SA, and Uniformity) were signiﬁcantly different, p <0.1, in all four phases (see figure for ASM boxplot). 2D features were signiﬁcantly different, p <0.1, mainly in the arterial phase (ASM, ENT, DIS, IDM, HOM and SE). No significant difference was seen between study groups in the nephrographic phase.

CONCLUSION
Ten 3D texture features may help distinguish between Oncocytoma and chRCCs in all phases. 2D features may also play a role with the corticomedullary phase being of high importance for the discrimination.

CLINICAL RELEVANCE/APPLICATION
Quantitative texture metrics can distinguish between oncocytic tumors with different biologic behavior with potential to allow for image-based patients’ risk stratification.

GU230-SD-TUA3 Photon Counting CT versus Dual-energy CT for Measurement of Urinary Stone Size and Composition

Purpose
To assess the accuracy with which the size and composition of small urinary stones could be measured using photon counting computed tomography (PCCT) and to compare to dual-energy CT (DECT).

METHOD AND MATERIALS
Seventy stone fragments (from 35 patients) of different size and composition were included in the study. Composition was determined using infrared spectrosopy and only stones with >90% of a single material were used. Size was determined using digital calipers and only stones <5mm were used. Stones were embedded in gelatin and placed in a 35-cm-wide torso-shaped water phantom. Dose-matched acquisitions were performed using a 2nd generation DECT (Definition Flash, Siemens Healthcare) at 80kV/140kV and a research whole body PCCT (Somatom Count, Siemens) at 140 kV (25 and 75 keV energy thresholds). Images were reconstructed using a medium-soft kernel (D30), 15 cm field of view, 1.0 mm slice thickness and 0.8 mm increment. Stone detection and segmentation were performed on the 100 kV DECT and 25-75 keV PCCT images and CT number ratio (CTR) and size calculations were performed for each stone using in-house Matlab-based software. The bias and precision of size measurement was assessed using Bland-Altman analysis and CTR data were summarized using box and whisker plots. ROC analysis was used to determine the accuracy of stone composition.

RESULTS
16 uric acid (UA), 12 cystine (CYS), 24 calcium oxalate monohydrate (COM), 8 brushite (BRU) and 10 apatite (APA) stones were included. Mean (± SD) stone size was 2.3±0.92 mm for all stones (range 1.34–5.02 mm). Four stones (1 COM and 3 UA) were not detected in DECT and 2 stones (UA) were not detected in PCCT. Mean differences in stone size measurements (CT vs caliper) were -0.02±0.61 mm and -0.18±0.51 mm for DECT and PCCT, respectively. Area under the ROC curve (AUC) was higher for the detection of small UA stones using PCCT, however the increased spectral separation of DECT allowed better classification of non-UA stones.

CONCLUSION
PCCT allows similar accuracy and higher precision for the measurement of small stones. Improved detection and classification of small UA stones was observed using PCCT compared to DECT.

CLINICAL RELEVANCE/APPLICATION
PCCT demonstrated superior performance for small stone detection and similar stone composition characterization compared to DECT. PCCT might allow the diagnosis of stone precursor lesions.

GU225-SD-TUA4 Utility of Multi-parametric MRI to Predict Pathological Stage and Surgical Margins in Anterior Prostate Cancers

Purpose
Clinical staging of anterior prostate cancer (APC) is limited and studies evaluating MRI for staging of APC are lacking. Moreover, there are higher rates of positive surgical margins (PSM) after radical prostatectomy (RP) in APC. This study evaluates subjective and quantitative MRI, to predict extraprostatic extension (EPE) and PSM in APC.

METHOD AND MATERIALS
With IRB approval, 25 patients underwent RP with APC (>2/3 of tumor anterior to urethra; 21 transition zone, 4 anterior peripheral zone tumors) and MRI between 2012-2015. Two blinded radiologists assessed MRI for: tumor size (mm), invasion of anterior fibromuscular stroma (AFMS), whether tumor crosses midline and EPE. Radiologists measured leading edge of tumor (relative to prostate capsule) on ≥1000 mm2/sec EPI fused onto T2W. Comparisons were performed using chi-square, 2x2 tables, and only stones with >90% of a single material were used. Size was determined using digital calipers and only stones <5mm were used. Stones were embedded in gelatin and placed in a 35-cm-wide torso-shaped water phantom. Dose-matched acquisitions were performed using a 2nd generation DECT (Definition Flash, Siemens Healthcare) at 80kV/140kV and a research whole body PCCT (Somatom Count, Siemens) at 140 kV (25 and 75 keV energy thresholds). Images were reconstructed using a medium-soft kernel (D30), 15 cm field of view, 1.0 mm slice thickness and 0.8 mm increment. Stone detection and segmentation were performed on the 100 kV DECT and 25-75 keV PCCT images and CT number ratio (CTR) and size calculations were performed for each stone using in-house Matlab-based software. The bias and precision of size measurement was assessed using Bland-Altman analysis and CTR data were summarized using box and whisker plots. ROC analysis was used to determine the accuracy of stone composition.

RESULTS
16 uric acid (UA), 12 cystine (CYS), 24 calcium oxalate monohydrate (COM), 8 brushite (BRU) and 10 apatite (APA) stones were included. Mean (± SD) stone size was 2.3±0.92 mm for all stones (range 1.34–5.02 mm). Four stones (1 COM and 3 UA) were not detected in DECT and 2 stones (UA) were not detected in PCCT. Mean differences in stone size measurements (CT vs caliper) were -0.02±0.61 mm and -0.18±0.51 mm for DECT and PCCT, respectively. Area under the ROC curve (AUC) was higher for the detection of small UA stones using PCCT, however the increased spectral separation of DECT allowed better classification of non-UA stones.

CONCLUSION
PCCT allows similar accuracy and higher precision for the measurement of small stones. Improved detection and classification of small UA stones was observed using PCCT compared to DECT.

Photon Counting CT versus Dual-energy CT for Measurement of Urinary Stone Size and Composition
To evaluate the predictive value of diffusion weighted (DW) MR imaging in therapeutic outcome of uterine fibroids following HIFU. Both 2D and volumetric ADC measurements

CLINICAL RELEVANCE/APPLICATION

DW MR imaging has potential to be surrogate biomarkers in prediction of therapeutic outcome of uterine fibroids following HIFU.

GU227-S0-TUA6 How Low Can We Go? Dose Saving Through Low-dose Examination for Urolithiasis via Modern Computer Tomography with Tin-Filter

PURPOSE

Modem high-performance computer tomography (CT) devices provide high resolution images with lower radiation exposure. Such CT scanners offer more and yet better diagnostic possibilities. Radiation dose saving is particularly important in young patients since the cumulative dose during lifetime can increase the risk of cancer. Examinations are often performed in order to diagnose kidney stones. The aim of this study was to compare radiation exposure doses and image quality of two older CT devices to a tin-filter CT in patients with suspected urolithiasis.

METHOD AND MATERIALS

We compared low-dose CT examinations of 139 patients on two standard CTs (Siemens AS+, Siemens Flash) to a tin-filter CT (Siemens Force) regarding dose-length product (DLP) and Computed Tomography Dose Index volume (CTDIvol). Furthermore, image quality of each CT scan was assessed using a five-point Likert scale (0= major blurring, 4= excellent depiction). All imaging datasets were independently analyzed by two radiologists. Bonferroni-corrected Mann-Whitney U tests for post-hoc comparisons after Kruskal-Wallis analysis of variance were performed to test for significant subgroup differences in DLP, CTDIvol and image quality. Inter-rater agreement was evaluated in terms of image quality using Cohen's kappa.

RESULTS

Volumetric ADC value significantly correlated with 2D ADC value (r = 0.83, P < .0001). 2D analysis revealed a significantly lower pre- treatment ADC value (1.14 ± 0.19 v 1.23 ± 0.17 x10 -3 mm2/s, P = .027) and higher post- treatment ADC value (1.45 ± 0.21 v 1.32 ± 0.27 x10 -3 mm2/s, P = .012) in responder group, as compared with non- responder group. Pre- and post- treatment ADC values predicted the successful treatment for fibroids (P = .025 and P = .009 respectively). Post- treatment volumetric ADC value was significantly increased in responder group (1.46 ± 0.21 v 1.35 ± 0.27 x10 -3 mm2/s, P = .004), which could predict the successful HIFU treatment (P = .035). Pre- treatment volumetric ADC value was lower in responder group (1.17 ± 0.24 v 1.23 ± 0.69 x10 -3 mm2/s), albeit not statistically significant (P = .084).

CONCLUSION

DW MR imaging has potential to be surrogate biomarkers in prediction of therapeutic outcome of uterine fibroids following HIFU.

Participants

Yousef Erfanian, MD, Essen, Germany (Presenter) Nothing to Disclose
Nika Guberina, MD, Essen, Germany (Abstract Co-Author) Nothing to Disclose
Lino Sawicki, MD, Dusseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Sarasvabavain Suntharalingam, Essen, Germany (Abstract Co-Author) Nothing to Disclose
Axel Wetter, Essen, Germany (Abstract Co-Author) Nothing to Disclose
Jens M. Theysohn, MD, Essen, Germany (Abstract Co-Author) Nothing to Disclose

PURPOSE

CT Cystography: When to Do It, How to Do It, and What to Look for When Traumatic Urinary Bladder Injury is Suspected

TEACHING POINTS

Discuss the indications for CT cystogram. Review proper technique for CT cystogram. Illustrate the spectrum of urinary bladder injury patterns as seen on CT cystography and briefly review commonly associated respective pelvic fracture patterns. Demonstrate diagnostic pitfalls in evaluation of suspected urinary bladder injury.

TABLE OF CONTENTS/OUTLINE
This exhibit will review the indications and proper technique for CT cystography in the acute traumatic setting. The commonly used classification schemes of urinary bladder injury based on degree and location of injury will be discussed. Examples of each injury type will be illustrated by CT cystogram with fluoroscopic, radiographic, MRI, and operative correlates, using a case-based approach. Companion cases demonstrating pitfalls in diagnosis will accompany these core cases. Associated traumatic imaging findings, such as pelvic fracture patterns and trajectory of penetrating pelvic injuries, which have a high association with bladder injury will be reviewed. An understanding of the indications, appropriate technique, and spectrum of imaging findings is critical in the evaluation of suspected traumatic urinary bladder injury.

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
A Rapid MRI Protocol for Detection of Prostate Cancer

**PURPOSE**

To evaluate a short, non-contrast, pelvic MRI protocol for detection of prostate cancer

**METHOD AND MATERIALS**

In this IRB approved study, 68 men (age 40-75y) without prior biopsy and with elevated PSA or abnormal digital rectal exam were prospectively enrolled. The non-contrast rapid protocol was: Siemens 3T Verio/Skyra, 3 plane single shot T2w (0.8x0.8x4mm resolution, TR/TE 2000/92ms), axial high resolution T2w TSE (0.6x0.6x3mm, TR/TE 7200/96ms), and DWI (1.2x1.2x3mm, TR7900ms, b= 50, 600, 1000 s/mm²). Lesions were categorized according to PIRADS 2.0 system of classification by an attending radiologist with 16 years' experience in prostate imaging. Lesions diagnosed as PIRADS 3, 4 or 5 were recommended for targeted biopsy. MR was followed by a standard 12 core TRUS biopsy with the urologist initially blind to the MR read. After biopsy, MR data were revealed and suspicious lesions targeted with 2 cores per lesion.

**RESULTS**

Average table time was 15.2 min, and total scan time was 11min9s. 95 lesions were identified in 68 patients (age range: 40-78 yr). On MRI, 14 lesions were identified as PIRADS 5, 18 as PIRADS 4, 21 as PIRADS 3, 33 as PIRADS 2, and 9 lesions were identified as PIRADS 1. Multiple lesions were seen in 19 patients. On pathology, cancer was detected in 32 patients. On MRI-pathology correlation, MRI was found to have a sensitivity of 94%, specificity of 78%, negative predictive value of 93% and positive predictive value of 79% for detection of cancer. Two patients were false negative on MRI – one was a Gleason 3+3 tumor, and the other was a Gleason 3+4 tumor in 5% of the core. MRI was false positive in 8 patients: all were read as PIRADS 3; on pathology, 6 of these were chronic prostatitis and 2 were (HGPIN).

**CONCLUSION**

A fast non-contrast pelvic MRI protocol can detect cancer with a high accuracy in patients with a clinical suspicion of prostate cancer.

**CLINICAL RELEVANCE/APPLICATION**

A fast, low cost, non-contrast screening MRI protocol with targeted biopsies, could be used as a secondary screening tool for detection of prostate cancer and improve risk stratification.

Diffusion Weighted and Magnetization Transfer Imaging in Testicular Spermatogenic Function Evaluation: Preliminary Results

**PURPOSE**

To assess the value of MR functional imaging applied in testicular spermatogenic function evaluation in young males.

**METHOD AND MATERIALS**

To assess the value of MR functional imaging applied in testicular spermatogenic function evaluation in young males.
Subjects ranging 20 to 40 years old males were recruited. Two main groups were classified as followed. (1) Group A: Subjects with normal semen analysis additionally were classified as two subgroups as Ay (younger group) and Ao (older group) respectively. In subgroup Ay, 15 males ranging 20-30 years with a mean age of (25.4±3.1) years were contained. And in subgroup Ao, 16 males ranging 31-40 years with a mean age of (35.4±3.3) years were contained. (2) Group B: Subjects were featured as 16 males with a mean age of (28.1±3.7) years and testicular spermatogenesis hypofunction confirmed by percutaneous testis biopsy. All subjects in group A and B underwent a 3.0T MR examination including routine and functional sequences [diffusion weighted imaging (DWI) and magnetization transfer (MT)]. DWI were scanned using EPI sequence (b=0, 900, 4000 s/mm2). ADC map were generated automatically. MT imaging were performed using a three-dimensional gradient-echo MT sequence, scanning slice and slice gap were consistent with DWI. ADC and MTR value were manually measured by a same radiologist according to place region of interest on Matlab software. Testicular ADC and MTR value in group B were compared with group A, subgroup Ay and Ao, respectively (independent- sample t test).

RESULTS
A total of 62 testes (31 males) were included in group A. Testicular ADC value in group A, subgroup Ay and Ao were (459.9±31.2)×10−3, (453.4±17.9)×10−3 and (460.8±34.3)×10−3 mm2/s, respectively. Totally 32 testes (16 males) were included in group B, with a testicular ADC value of (496.7±37.2)×10−3 mm2/s, which was significantly higher than those in group A, subgroup Ay and Ao, respectively (P<0.001). Testicular MTR value in group A, subgroup Ay and Ao were 16.14±4.20, 17.88±2.00 and 15.09±4.28, respectively, each of which was significantly higher than those in group B (14.84±2.84) (P<0.001).

CONCLUSION
Testicular ADC values of young males with testicular spermatogenesis hypofunction were much higher than normal subjects, and MTR values of them were lower. DWI combined with MT imaging can be a new meaningful method for testicular spermatogenic function evaluation.

CLINICAL RELEVANCE/APPLICATION
MR functional imaging can provide us a new selection for noninvasive evaluation of testicular spermatogenic function.

GU224-SD- TUB3
Role of Late Enhancement in Magnetic Resonance Imaging of the Prostate: Is There an Added Value in the Reclassification of Intermediate Risk Lesions (PI-RADS 3)?

Station #3

Awards
Student Travel Stipend Award

Participants
Giulia Cristel, MD, Milan, Italy (Presenter) Nothing to Disclose
Giorgio Brembilla, Milano, Italy (Abstract Co-Author) Nothing to Disclose
Alessandro Ambrosi, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Antonio Esposito, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Alessandro Del Maschio, MT, Milan, Italy (Abstract Co-Author) Nothing to Disclose
Francesco A. De Cobelli, MD, Milan, Italy (Abstract Co-Author) Nothing to Disclose

PURPOSE
Late-gadolinium enhancement (LGE) is the retention of gadolinium-contrast agent in tissues in delayed magnetic resonance imaging (MRI) sequences and is routinely used in cardiac MRI to reveal areas of increased extracellular space with small cellularity, such as fibrosis. The aim of our study was to assess whether the presence of LGE could improve the characterization of intermediate-risk lesions (PI-RADS 3) in the setting of prostate cancer.

METHOD AND MATERIALS
Among a total of 687 patients who underwent prostatic MRI (1.5T), we selected 58 intermediate risk lesions classified as PI-RADS 3 with available corresponding histological specimen, obtained through prostatectomy or core needle biopsies. The imaging protocol consisted of multiplanar T2W, diffusion weighted imaging (with different b values: 50, 800, 1400 s/mm2), DCE and delayed axial T1W images. For each lesion the presence or absence of LGE in delayed axial T1W images was retrospectively qualitatively evaluated by the consensus of 2 different radiologists, blinded to the histological report. The association between the presence/absence of LGE and the histological result was then evaluated dividing the patients both basing on the presence/absence of insignificant prostate cancer as for Epstein criteria and basing on Gleason score ≥6.

RESULTS
The histological results of the 58 lesions (15 prostatectomies, 43 biopsies) were as follows: 24 negative (that included no abnormalities, acute or chronic inflammation), 5 prostatic intraepithelial neoplasia, 16 Gleason 6 lesions, 13 Gleason ≥7 lesions. Significant prostate cancer (SPC) was found in 19 (33%) cases overall. 17/19 (89%) patients in which LGE was found presented insignificant prostate cancer and 2 (11%) patients with LGE had SPC, p=0.03. Moreover, 14/19 (74%) patients with LGE had Gleason score ≤6 and 6/19 (26%) showed Gleason ≥6, p=0.02. The presence of LGE determined a risk reduction of having SPC (logOR= -1.77, p=0.02) or Gleason ≥6 lesions (logOR= -1.49, p=0.01).

CONCLUSION
LGE presence in patients with PI-RADS 3 lesions is associated with low probability of SPC. LGE evaluation could enable a down-grading of these intermediate risk lesions.

CLINICAL RELEVANCE/APPLICATION
LGE finding may allow a down-grading of lesions in which the presence of clinically significant cancer is equivocal, leading to a reduction of redundant biopsies or short term follow up.

GU231-SD- TUB4
Split-bolus CT-urography after Microwave Ablation of Renal Cell Carcinoma: Feasibility, Image Quality and Dose Reduction

Station #4
To compare image parameters and radiation dose between single-bolus 2-phase and split-bolus single-phase CT urography following microwave ablation of renal cell carcinoma.

**METHOD AND MATERIALS**

21 single-bolus and 21 split-bolus CTU examinations performed immediately following microwave ablation of RCC were retrospectively compared. Four experienced GU radiologists quantified renal enhancement, ablation zone sharpness, urinary tract distention and opacification and rated diagnostic confidence for residual tumor at the index ablation. Imparted radiation dose for the entire procedure and the CECT was recorded and converted to size specific dose estimates (SSDE) using an established formula.

**RESULTS**

Patient characteristics were similar (p>0.05). Mean RCC diameter in the split-bolus cohort was larger (3.6 vs 2.9 cm; p=0.04). Tumor complexity and number of applicators used were similar (p>0.05). Ablation zone sharpness and index ablation attenuation were similar (p>0.05). Renal enhancement and excretion, collecting system opacification and distention were superior in the split-bolus cohort (p<0.05). Split-bolus image quality was superior (p<0.003) despite a significant reduction in SSDE (p<0.001).

**CONCLUSION**

Performing split-bolus CTU after microwave ablation of RCC is an effective technique to reduce radiation exposure without compromising image quality.

**CLINICAL RELEVANCE/APPLICATION**

As the indications for thermal ablation continue to expand, utilizing novel strategies to mitigate radiation exposure while preserving image quality after microwave ablation of RCC is imperative.

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Meghan G. Lubner, MD - 2014 Honored Educator

Meghan G. Lubner, MD - 2015 Honored Educator

---

To assess the agreement between staging of prostate cancer (PCa) by multiparametric magnetic resonance imaging (mpMRI) and pathologic staging following radical prostatectomy (RP) as well as the performance of specific criteria on mpMRI in detecting/characterizing extraprostatic extension (EPE).

**METHOD AND MATERIALS**

In this retrospective, HIPAA-compliant, IRB-approved study, 157 patients underwent 3T mpMRI with endorectal coil (ERC) prior to RP; mpMRI used to assess clinical stage and presence of EPE. EPE was categorized on MRI on 0-3 scale (0 = no EPE; microscopic EPE: 1 = broad based capsular contact without discrete capsular breakthrough, 2 = capsule bulge without discrete capsular breakthrough; extensive EPE: 3 = capsular disruption). Pathologic EPE categorized on 0-2 scale (0 = no EPE, 1 = microscopic EPE, 2 = extensive EPE) based on pathologic findings after RP. Weighted Kappa coefficient was calculated using Cicchetti-Allison weights to assess agreement between mpMRI and pathologic staging. For EPE, sensitivity (SN), specificity (SP), accuracy (ACC), and positive predictive value (PPV) were calculated for mpMRI.

**RESULTS**

There is substantial agreement between mpMRI and pathologic staging of PCa (Weighted Kappa
Can Virtual Non-Contrast Images Created from Contrast-Enhanced Dual-Energy CT Scans Help to Accurately Differentiate Uric Acid from Non-Uric Acid Urinary Stones?

Participants
Juan Montoya, Rochester, MN (Presenter) Nothing to Disclose
Ahmed Halaweish, PhD, Rochester, MN (Abstract Co-Author) Employee, Siemens AG
Shuai Leng, PhD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Cynthia H. McCollough, PhD, Rochester, MN (Abstract Co-Author) Research Grant, Siemens AG

PURPOSE
Studies have shown that for stone detection, the unenhanced phase of CT urography could potentially be replaced with virtual non-contrast (VNC) images created from contrast-enhanced dual-energy CT (CE-DECT) scans. The purpose of this study was to evaluate whether VNC images created from a CE-DECT dataset could be used to assist in differentiating uric acid (UA) and non-UA stones using the low- and high-energy CE-DECT images.

METHOD AND MATERIALS
This study included 32 UA and 32 non-UA urinary stones, each from a different patient. Initially, stones were embedded in gelatin to acquire true unenhanced images. Subsequently, the gelatin was replaced with contrast-enhanced gelatin having an iodine concentration consistent with a clinical CT urogram (20 mgI/mL). For each type of gelatin, stones were submerged in 35- and 40-cm wide water phantoms and scanned with multiple tube potential combinations using a 3rd generation dual-source CT system (Somatom FORCE, Siemens) operated in dual-energy mode. VNC images were created using commercial software (Virtual Unenhanced, Syngo VIA, Siemens) and used for stone detection and segmentation. The ratios of CT numbers between the low- and high-energy images, which are a surrogate for stone composition, were then measured in segmented stones using the unenhanced- and CE-DECT images. CT number ratios were compared between UA and NUA stones, and receiver operating characteristic (ROC) curves were constructed. Sensitivity, specificity and area under the ROC curve (AUC) were calculated and used to assess the accuracy of stone type differentiation in CE-DECT using VNC images as masks.

RESULTS
For both phantom sizes and all tube potential combinations, CT number ratios derived from CE-DECT images using VNC images for stone detection and segmentation were similar to those derived from true unenhanced scans. 100% sensitivity and specificity were achieved in the detection of UA stones using the CE-DECT images, except when 100-Sn150 kV was used in the 40-cm wide phantom, where one UA stone was misclassified and the AUC fell to 0.99.

CONCLUSION
Differentiation of UA from non-UA stones can be accurately performed in CE-DECT using VNC images to detect and segment urinary stones.

CLINICAL RELEVANCE/APPLICATION
For modest iodine concentrations, VNC CE-DECT images can be used to detect and segment urinary stones, allowing characterization of stone composition in contrast enhanced exams.

Uncommon Malignant Renal Tumors and Atypical Presentation of Common Ones: A Guide to Radiologists

Participants
Cassia T. Guimaraes, MD, San Francisco, CA (Presenter) Nothing to Disclose
Zhen J. Wang, MD, Hillsborough, CA (Abstract Co-Author) Stockholder, Nextrad, Inc
Ronald J. Zagona, MD, San Francisco, CA (Abstract Co-Author) Nothing to Disclose
Jeffry P. Simko, MD, PhD, San Francisco, CA (Abstract Co-Author) Consultant, Genomic Health, Inc; Consultant, GenomeDX Biosciences Inc; Consultant, 3Scan; Consultant, 3DBiopsy, Inc; Research support, Genomic Health, Inc; Research support, Myriad Genetics, Inc
Karen Lopez, San Francisco, CA (Abstract Co-Author) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA (Abstract Co-Author) Scientific Advisory Board, 3DBiopsy LLC; Research Grant, Verily Life Sciences LLC
TEACHING POINTS

The purpose of this exhibit is: 1) To describe the imaging features of uncommon malignant neoplasms of the kidney and atypical presentation of common renal cancers. 2) To describe a pattern-based approach to the diagnosis of malignant neoplasms of the kidney. 3) To describe the role of imaging in management of malignant neoplasms of the kidney.

TABLE OF CONTENTS/OUTLINE

The prevalence of renal malignant tumors is described. The more common types of renal cancers are briefly reviewed, with emphasis given to the atypical presentations of these neoplasms. In this part we describe imaging and clinical features of uncommon renal malignancies, for example collecting duct carcinoma, renal medullary carcinoma, carcinoma with Xp11 translocation, as well as nephroblastic, neuroendocrine, mesenchymal, hematologic, and metastatic renal tumors. We emphasize the pattern-based interpretation of uncommon renal cancers that aids the radiologist in narrowing the differential diagnoses.
Participants
Janis P. O'Malley, MD, Birmingham, AL (Moderator) Nothing to Disclose
Katherine A. Zukotynski, MD, Hamilton, ON (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Recognize the role of PET/CT in the evaluation of abdominopelvic malignancies. 2) Describe how differences in tumor biology impact tumor assessment with PET. 3) Provide imaging examples specific to different abdominopelvic malignancies.
SSJ10

Genitourinary (Imaging Renal Stones)

Tuesday, Nov. 29 3:00PM - 4:00PM Room: E351

Participants

Daniele Marin, MD, Durham, NC (Moderator) Research support, Siemens AG
Hilton M. Leao Filho, MD, Sao Paulo, Brazil (Moderator) Nothing to Disclose

Sub-Events

SSJ10-01 Detecting Urinary Stones by Using Low-Dose Non-Enhanced Abdominopelvic CT with Tin Filtration Technique

Tuesday, Nov. 29 3:00PM - 3:10PM Room: E351

Participants

Gu Mu Yang Zhang, MD, Beijing, China (Presenter) Nothing to Disclose
Bing Shi, Beijing, China (Abstract Co-Author) Nothing to Disclose
Hao Sun, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Huadan Xue, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Zheng Yu Jin, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

To evaluate stone detection, radiation exposure and image quality by utilizing non-enhanced abdominopelvic CT with a novel tin filter

METHOD AND MATERIALS

This IRB-approved prospective study enrolled 80 consecutive patients with suspected urolithiasis. Consenting subjects underwent both regular-(120kV) and low-dose (150kV Sn) abdominopelvic examinations on a third-generation dual-source CT. Low-dose CT (LDCT) scans were read by radiologists blinded to regular-dose interpretations. Scans were interpreted for stone characteristics, image noise (SD) and signal-to-noise-ratio (SNR). Volume based CT weighted Dose Index (CTDIvol) and Dose-Length-Product (DLP) were recorded, effective dose (ED) was calculated. Stone detection, dose and image quality measurements were compared between regular-dose CT (RDCT) and LDCT

RESULTS

Seventeen patients had no urinary stones. A total of 157 stones from the rest of 63 patients were detected by RDCT. LDCT correctly identified 154 of 157 stones with an overall detection rate of 98.1%. Average stone size had no difference between RDCT and LDCT (5.37±4.45 vs. 5.22±4.39mm, P>0.05). Detection rates of LDCT for stones ≥ 2mm and < 2mm were, respectively, 100.0% (138/138) and 84.2% (16/19). CTDIvol and ED of LDCT were significantly lower in comparison to RDCT by 56.6% and 55.6% (3.12 vs. 7.19 mGy, P<0.001; 2.33 vs. 5.25 mSv, P<0.001). There was no significant difference in SD or SNR between LDCT and RDCT (P<0.05)

CONCLUSION

Non-enhanced abdominopelvic CT with 150kV Sn substantially reduces radiation exposure of patients while maintaining image quality and an excellent detection of urinary stones

CLINICAL RELEVANCE/APPLICATION

Non-enhanced abdominopelvic CT with 150kV Sn lowers radiation exposure while maintaining stone detection. It should be considered as the standard examination for detecting urinary stones in clinical practice

SSJ10-02 Detection and Characterization of Urinary Stones using Photon-Counting-Detector CT in a Clinical Setting

Tuesday, Nov. 29 3:10PM - 3:20PM Room: E351

Participants

Roy Marcus, MD, Rochester, MN (Presenter) Institutional research agreement, Siemens AG; Research support, Siemens AG
Joel G. Fletcher, MD, Rochester, MN (Abstract Co-Author) Grant, Siemens AG
Terri J. Vrtiska, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Michael L. Wells, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Andrea Ferrero, PhD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Juan Montoya, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Alice Huang, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Ahmed Halaweish, PhD, Rochester, MN (Abstract Co-Author) Employee, Siemens AG
Felicity Enders, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Shuai Leng, PhD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Cynthia H. McCollough, PhD, Rochester, MN (Abstract Co-Author) Research Grant, Siemens AG

PURPOSE

To compare in patients the detection and characterization of urinary stones between dual-source, dual-energy CT (DECT) and...
Thirty patients underwent a clinical non-contrast-enhanced DECT stone characterization exam using a 2nd generation dual-source CT system (SOMATOM Flash, Siemens) using 80/140kVp or 100/140kVp, depending on patient size. Patients subsequently underwent an identical exam on a preclinical PCCT system, with images acquired at 140 kV in macro-mode with energy thresholds set at 25 and 75 keV. CTDIvol values were matched between exams. 1 and 5 mm images were reconstructed using filtered backprojection and a D30 kernel. Two radiologists in consensus examined DECT mixed and low kV images, and PCCT threshold images (25 - 140 keV) and bin 1 (25-75 keV) images, in a blinded fashion to determine confidence in stone presence (1= definitely present, 2 = probably present, 3 = questionable if present, 4 = not seen) and identify artifacts affecting diagnostic confidence in the region of each stone. Stone type was determined using commercial software (Syngo DE, Siemens) based on low and high kV, or bin 1 and bin 2 images (25-75 and 75-140 keV).

RESULTS
There were 161 stones (5.4±9.3 mm), with 72 stones ≤ 3mm. There was no difference in confidence for stone presence between 1 mm configurations for both modalities (p = 0.38 to 0.81), even for small stones (≤ 3mm). There were few artifacts affecting confidence with PCCT (2 for threshold 1 and 3 for bin 1 out of 161 readings). Stones were much more likely to be considered definitely present with 1 mm slices compared to 5 mm slices (p < .0001). Automatic stone characterization was more successful in PCCT than DECT (113 vs. 88 stones), and especially for small stones (37 vs. 19). Agreement in stone composition between scanners (κ = .65) was substantial, with all uric acid stones detected in DECT classified similarly with PCCT.

CONCLUSION
Detection confidence for small stones was identical between PCCT and DECT. The primary advantage was the improved automatic characterization for small (≤ 3 mm) stones.

CLINICAL RELEVANCE/APPLICATION
PCCT's can display small stones as well as DECT, but allows more robust automated stone classification. Further, 1 mm images are far superior than 5 mm images for stone detection.

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Terri J. Vrtiska, MD - 2016 Honored Educator

SSJ10-03  Assessment of Radiation Dose of Renal Colic CT Protocol with Dose Management Software: Comparison of an Academic Center with the ACR Dose Index Registry

Participants
Markus M. Obmann, Basel, Switzerland (Presenter) Nothing to Disclose
Anushri Parakh, MBBS, MD, Basel, Switzerland (Abstract Co-Author) Consultant, Bayer AG
André Euler, MD, Basel, Switzerland (Abstract Co-Author) Nothing to Disclose
Sebastian T. Schindera, MD, Basel, Switzerland (Abstract Co-Author) Research Grant, Siemens AG; Research Grant, Ulrich GmbH & Co KG; Research Grant, Bayer AG; Speakers Bureau, Bayer AG

PURPOSE
To report the radiation dose for a renal colic CT protocol of an academic institution over a four year period and to compare those data with the published data from the ACR Dose Index Registry.

METHOD AND MATERIALS
The radiation dose of adult patients who underwent a renal colic CT protocol at an academic institution was tracked over a 4-year period (January 1st, 2012 to December 31st, 2015) with a radiation dose management software (Radimetrics, Bayer Healthcare). A total of 2760 CT scans were acquired with four CT scanners (one dual-source and three single-source CT scanners (16 to 128 slices)). The 25th, 50th and 75th percentile for the size-specific dose estimate (SSDE) and dose-length product (DLP) was recorded. The 50th percentile for the SSDE and DLP was used for comparison with the recent published ACR data (July to December 2015).

RESULTS
The 25th, 50th and 75th percentile for the SSDE of the academic center measured 5.8/7.1/8.7 mGy for 2012, 4.1/5.1/6.1 mGy for 2013, 4.1/5.1/6.3 mGy for 2014 and 4.5/5.3/6.2 mGy for 2015. The 25th, 50th and 75th percentile for the DLP of the academic center measured 167/289/474 mGy*cm for 2012, 143/177/236 mGy*cm for 2013, 142/170/217 mGy*cm for 2014 and 141/172/221 mGy*cm for 2015. The published ACR data was 145% higher for the 50th percentile of the SSDE (5.3 vs 13 mGy, respectively) and 256% higher for the 50th percentile of the DLP (172 vs 612 mGy*cm, respectively) compared with the academic center.

CONCLUSION
Over a 4-year period, a continuous radiation dose reduction was achieved by an academic institution (25% reduction for the 50th percentile SSDE and 41% reduction for the 50th percentile DLP). Dose-optimized renal colic CT protocols are not generally used in the institutions participating in the ACR dose registry.

CLINICAL RELEVANCE/APPLICATION
Substantial effort is required to increase the awareness and acceptance of dose-optimized CT protocols for urolithiasis in US radiology practices in order to increase patient safety.
A multivariable linear regression model was developed to predict time to comminution based on the measured morphology were computed using the co-occurrence matrix of each stone. Subsequent to stone imaging, stone fragility was both with the clinical 30 cm field of view (FOV) and with a smaller FOV (12 cm) centered on the stones using a quantitative kernel.

**METHOD AND MATERIALS**

In this retrospective study, we included patients with large body habitus (>90 kg) who underwent DECT (single-source and dual-source DECT) scans for evaluation of urolithiasis between February 2015 to February 2016. Qualitative and quantitative evaluation of the post processed DECT data sets was performed by independent reviewers for determination of stone composition (uric acid vs non-uric acid) and assessment of image quality based on European Quality Criteria for CT (image quality: score 1-4, artifact: score 1-4).

**RESULTS**

A total of 116 urinary tract calculi (mean size-4.7mm, range 1.8-19mm) were detected in 76 patients (ssDECT, n=36 and dsDECT, n=40). The mean patient body weight was 103.9 ± 13.5 kg (range 91-163 kg). Stone detection rate on standard blended(140/80kVp), quality control 140kVp and virtual monochromatic images was 100%. Image quality score of standard image data sets was acceptable (score:3.9). Characterization of stone composition into uric acid/non-uric acid stones was achieved in 74% (86/116) of calculi (mean size 5.1mm, range 2-19mm) while 20/116 stones could not be characterized (mean size: 3mm, range 1.8-6 mm)(p<0.001). Most common reason for non-characterization was image quality deterioration of the material specific iodine images due to severe photon starvation artifacts. Determination of stone composition was particularly limited in patients weighing >106kg and in stones <5mm. Effective DE field of view limitation did not hamper characterization of stone composition.

**CONCLUSION**

In patients with large body habitus, single source and dual-source DECT allow accurate characterization of urine stones composition in 74% of calculi with limited role in characterization of small stones (<5mm) and in patients weighing >106 kg.

**CLINICAL RELEVANCE/APPLICATION**

DECT allows accurate differentiation of stone composition in patients with body habitus however characterization of small stones is limited and therefore careful patient selection is imperative.

**HONORED EDUCATORS**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Dushyant V. Sahani, MD - 2016 Honored Educator
Dushyant V. Sahani, MD - 2015 Honored Educator
Dushyant V. Sahani, MD - 2012 Honored Educator

**SS10-05 Textural Features of Kidney Stone Fragility from Routine Single and Dual Energy CT**

**PURPOSE**

Computed tomography (CT) is the recommended method for non-invasively imaging symptomatic urinary stones as it provides accurate sub-mm details of the size and location of stones within the urinary system. Previous studies have demonstrated a qualitative relationship between stone fragility and internal stone morphology. The goal of this study was to quantify morphological features from single and dual energy CT (SECT and DECT, respectively) images and assess their relationship to stone fragility.

**METHOD AND MATERIALS**

Thirty-three urinary stones of known composition (primarily calcium oxalate and calcium phosphate) were scanned with the routine DECT stone protocol in use at our institution (90/Sn150, 350/219 quality reference mAs, pitch = 0.6). Data were reconstructed both with the clinical 30 cm field of view (FOV) and with a smaller FOV (12 cm) centered on the stones using a quantitative kemeL, 1 mm slice thickness and 0.8 mm slice interval. In addition to volume and surface morphology, 12 metrics describing internal morphology were computed using the co-occurrence matrix of each stone. Subsequent to stone imaging, stone fragility was measured by disintegrating each stone in a controlled ex vivo experiment using an ultrasonic lithotripter and recording the comminution time. A multivariable linear regression model was developed to predict time to comminution based on the measured
morphology and DECT metrics. A second model, which excluded DECT information, was developed to predict comminution time for SECT.

RESULTS

Using the routine scan protocol from our clinical practice, the DECT-derived metrics of volume, CT number ratio and surface shape index were found to have the best combined predictive ability to estimate comminution time (adjusted $R^2 = 0.58$). Similarly, a model that used only variables available with SECT data resulted in a predictive estimation of comminution time with $R^2 = 0.54$.

CONCLUSION

Volumetric and morphological metrics derived from routine SECT or DECT in vivo images can be used to estimate time to comminution during lithotripsy performed ex vivo. 58% and 54% of all variation observed in stone comminution time was explained by our DECT and SECT models, respectively.

CLINICAL RELEVANCE/APPLICATION

If validated in vivo, the predictive models for stone fragility developed in this study would provide valuable information for the urologic surgeon and the patient to better evaluate treatment options.

SSJ10-06 Characterization of Urinary Calculi by Dark-field X-ray Radiography

Tuesday, Nov. 29 3:50PM - 4:00PM Room: E351

Participants

Iwan Jerjen, Villigen PSI, Switzerland (Presenter) Departmental Research Grant, Koninklijke Philips NV
Tilo Niemann, MD, Lille, France (Abstract Co-Author) Nothing to Disclose
Lukas Hefemehl, MD, Baden, Switzerland (Abstract Co-Author) Nothing to Disclose
Zhentian Wang, PhD, Villigen, Switzerland (Abstract Co-Author) Nothing to Disclose
Rahel A. Kubik-Huch, MD, Baden, Switzerland (Abstract Co-Author) Nothing to Disclose
Marco Stampanoni, PhD, Zurich, Switzerland (Abstract Co-Author) Nothing to Disclose

PURPOSE

The objective of our study was to evaluate the feasibility of in vitro characterization of stone composition of urinary calculi using grating-based x-ray interferometry.

METHOD AND MATERIALS

We prospectively evaluate sensitivity and specificity of a combination of attenuation and dark field contrast for stone characterization compared to dual energy computed tomography measurements. According to power analysis, a total of 100 stones is analysed with regard to material specific attenuation and scattering ratios. We use the combination of x-ray interferometric signals to estimate composition-related differences for different stone types. Results are compared with laboratory based infrared spectroscopy as reference standard.

RESULTS

For each calculus, the material specific attenuation to scattering ratio is determined. First results for the mean and sigma values are 0.13/0.04 for Uricite, 0.26/0.03 for Weddellite, 0.38/0.11 for Whewellite and 0.45/0.05 for Apatite stones. Depending on the heterogeneity of stone material composition there is a moderate to high correlation with laboratory characterization. Dense but compact calculi (e.g. Whewellite and Apatite) generally exhibit a higher attenuation to scattering ratio than light and structured calculi (e.g. Uricite) which have a lot of scattering centres and attenuate X-rays less. The variations between samples of the same type are huge and a lot of stones have mixed composition which may impede a clear classification of the calculi, but the same is true for dual energy X-ray imaging.

CONCLUSION

In vitro characterization of urinary stone composition is feasible using dark-field imaging. The variations between samples of the same type are huge and a lot of stones have mixed composition which may impede a clear classification of the calculi. Still there is high correlation with standard laboratory work-up.

CLINICAL RELEVANCE/APPLICATION

Today CT allows for diagnosis of urinary calculi as well as for determination of composition using dual energy acquisitions. Grating-based x-ray interferometry may have the potential to assess stone disease at lower doses than CT.
PURPOSE

To identify patient and tumor characteristics predictive of early procedure related complications in patients undergoing thermal ablation of localized renal cell carcinoma.

METHOD AND MATERIALS

Retrospective review of 235 consecutive patients who underwent percutaneous thermal ablation for localized RCC from 2001-2015. Patient demographics, comorbidities, pathology, tumor size, RENAL score, procedure and hospital course details, and 30 day complications were recorded. We used an inclusive retrospective assessment to determine which patients benefited from overnight hospitalization. This included patients experiencing a complication, those who stayed >24 hours and those readmitted within 72 hours from discharge. Fischer's exact, Wilcoxon rank sum, and univariate logistic regression tests were used as appropriate.

RESULTS

High-grade complications (3.4%) were rare. Six patients (2.5%) had a bleeding complication. These patients had a higher BMI (39.4 vs 31.3, p=0.047), larger tumors (median 4.0 vs 2.6cm, p=0.04), higher RENAL score (9 vs 7, p=0.056) and were more likely to have a hematoma on immediate post-procedure CT (67% vs 12%, p=0.004). Patients with a hematoma were 14.3x more likely to have a bleeding complication (p=0.0028). The use of ≥3 ablation applicators was associated with an 18.9x risk of bleeding (p=0.008). In retrospect, 14 patients (6%) were judged to benefit from hospital admission. Factors associated with this include tumor ≥3cm (OR 4.4, p=0.152), RENAL score >8 (OR 7.2, p=0.0012), post-procedure hematoma (OR 5.6, p=0.0029), and using ≥3 ablation applicators (OR 7.2, p=0.0007).

CONCLUSION

High-grade complications, including significant bleeding, are rare following thermal ablation of localized RCC. Larger tumors, higher tumor complexity, post-procedure hematoma, and higher BMI increase the risk for complications. These patients may benefit from overnight hospital admission.

CLINICAL RELEVANCE/APPLICATION

The majority of patients who undergo percutaneous thermal ablation of renal cell carcinoma can be safely discharged on the day of the procedure and avoid the cost and inconvenience of hospitalization.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
Richard E. Greenberg, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Rosalie Viterbo, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Marc Smaldone, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Robert Uzzo, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

The purpose of this study was to review our 15 yr institutional experience with renal mass biopsy

**METHOD AND MATERIALS**

Using our prospectively maintained database we identified patients who underwent renal mass biopsy and reviewed our institutional experience and assessed pathologic and histologic features and concordance rates.

**RESULTS**

A total of 374 renal biopsies were performed from 1999-2015. Core (+/- FNA) was performed in 65.2% of the cases and 41% underwent surgical resection. Core was nondiagnostic in 9% of surgical cases and subsequently diagnosed with RCC. 11% of biopsies were benign and no surgery was performed. Of the benign lesions 69% were oncocytoma and 2.5% angiomyolipoma. RCC diagnosed on core sampling that underwent resection demonstrated histological/grade concordance of 94.3% /62.5%. All discordant grades were upgraded at surgery. FNA was performed on 22.7% of cases and at final pathology histologic concordance was 72.5% and 5% were upgraded from benign to malignant.

**CONCLUSION**

Renal lesion biopsy is effective in the evaluation of renal masses and our data is consistent with previously published data. This underscores that although biopsy harbors clinical uncertainties diagnostic accuracy may assist in clinical management. Pathways incorporating renal biopsy may decrease over treatment but may also risk under treatment based on poor grade concordance.

**CLINICAL RELEVANCE/APPLICATION**

Renal mass biopsy is becoming increasingly important in the patient management and as radiologists we should anticipate that requests for biopsy of renal masses will continue.

---

Richard E. Greenberg, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Rosalie Viterbo, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Marc Smaldone, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Robert Uzzo, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

To determine the prevalence and type of complications that occur during ultrasound-guided transplant kidney biopsies in order to discern whether routine pre-procedure intravenous (IV) access is necessary for potential resuscitation efforts.

**METHOD AND MATERIALS**

A retrospective review of medical records was performed in patients who underwent an ultrasound-guided kidney biopsy performed between 7/2/2013 and 6/30/2015. Procedures performed on inpatients, native kidneys, renal lesions, and those performed by services other than Radiology were excluded. Biopsy information was recorded and analyzed, including the following: any intervention or treatment (other than pain control), unexpected complications, and hospital admissions or return visits to the emergency department (ED) within 7 days of the biopsy.

**RESULTS**

After exclusion criteria were applied, there were 1318 transplant kidney biopsies in 601 patients. There were five (0.38%) serious complications/unexpected adverse events requiring treatment. These complications included bleeding/hematuria, hypotension, hypertensive urgency, syncope, and pain. Only 1 (0.07%) of the cases was taken to angiography to evaluate for active bleeding, which did not occur until several hours after the biopsy, and no bleeding was found thus no intervention was performed. There were 8 (0.62%) minor complications requiring hospital admission for observation and/or a return visit to the ED for additional evaluation. These included perinephric hematoma (0.38%), hematuria (0.15%), and pain (0.07%).

**CONCLUSION**

The prevalence of renal transplant biopsy complications at our institution is low (1.0%), with only 0.38% of biopsies requiring IV access for treatment, which suggests that IV access is not routinely required prior to renal transplant biopsy.

**CLINICAL RELEVANCE/APPLICATION**

Routine pre-procedure IV placement may be safely discontinued without negatively affecting patient outcomes, and this should improve both departmental efficiency and patient satisfaction.

---

Richard E. Greenberg, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Rosalie Viterbo, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Marc Smaldone, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Robert Uzzo, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

MRgFUS as Mininvasive Alternative Therapy in the Treatment of Submucosal Fibroids: Effectiveness and Safety

**METHOD AND MATERIALS**

A retrospective review of medical records was performed in patients who underwent an ultrasound-guided kidney biopsy performed between 7/2/2013 and 6/30/2015. Procedures performed on inpatients, native kidneys, renal lesions, and those performed by services other than Radiology were excluded. Biopsy information was recorded and analyzed, including the following: any intervention or treatment (other than pain control), unexpected complications, and hospital admissions or return visits to the emergency department (ED) within 7 days of the biopsy.

**RESULTS**

After exclusion criteria were applied, there were 1318 transplant kidney biopsies in 601 patients. There were five (0.38%) serious complications/unexpected adverse events requiring treatment. These complications included bleeding/hematuria, hypotension, hypertensive urgency, syncope, and pain. Only 1 (0.07%) of the cases was taken to angiography to evaluate for active bleeding, which did not occur until several hours after the biopsy, and no bleeding was found thus no intervention was performed. There were 8 (0.62%) minor complications requiring hospital admission for observation and/or a return visit to the ED for additional evaluation. These included perinephric hematoma (0.38%), hematuria (0.15%), and pain (0.07%).

**CONCLUSION**

The prevalence of renal transplant biopsy complications at our institution is low (1.0%), with only 0.38% of biopsies requiring IV access for treatment, which suggests that IV access is not routinely required prior to renal transplant biopsy.

**CLINICAL RELEVANCE/APPLICATION**

Routine pre-procedure IV placement may be safely discontinued without negatively affecting patient outcomes, and this should improve both departmental efficiency and patient satisfaction.
PURPOSE
To evaluate the effectiveness of MRgFUS as mini-invasive alternative therapy in the treatment of submucosal fibroids and to discuss about its safety and feasibility.

METHOD AND MATERIALS
From July 2012 to June 2014, 13 patients (mean age 48 years), affected by submucosal uterine fibroids, were treated using MRgFUS. The patients were submitted to preliminary MRI to classify the sub-mucosal fibroids (FIGO classification) and to measure the pre-treatment fibroid volumes. Sub-mucosal fibroids of type 0, 1 and 2 (measuring between 1.5 and 4 cm) were treated using MRgFUS. Five out of 13 patients presented only a single submucosal fibroid (2 of type 1, 2 of type 2 and 1 of type 0). Eight out of 13 patients were simultaneously affected by sub-mucosal fibroids (6 of type 2, 3 of type 1 and 2 of type 0) and other fibroids (type 3-6). The patients were submitted to one treatment alone. Immediately after treatment, the patients were submitted to c.e. MRI to evaluate the Non Perfused Volume (NPV) on the c.e. T1–weighed sequences and measure the radicalization of the treatment in comparison to the pre-treatment volume and after 2-4 years from the treatment.

RESULTS
All treated patients presented a mean extension of the NPV of 90% with a significant radicalization of the treatment without complications or side effects. After 2-4 years from the treatment, 7/13 (54%) showed progressive reduction of the volume with a regularization of the uterine wall. Five out of 13 patients (38%) showed significant reduction of fibroid volume (about 80%). In one patient (8%), the fibroids of type 0 were partially eliminated from inside the uterine cavity. In this case, the patient was submitted to close MRI follow-up, which showed progressive elimination of the necrotic product. A poor vaginal bleeding lasted 15 days without necessity of hysterectomy.

CONCLUSION
MRgFUS represent a valid mininvasive and radical approach in the treatment of submucosal fibroids. It allows treatment of the intramural part of the fibroid that cannot be completely treated with hysterectomy.

CLINICAL RELEVANCE/APPLICATION
MRgFUS is promising technique in submucosal fibroids without significant risks and complications.

SSJ11-05 Uterine Fibroids treated with MR guided High Intensity Focused Ultrasound (MRgFUS): Clinical Outcome in Comparison to Current Therapeutic Strategies

Tuesday, Nov. 29 3:40PM - 3:50PM Room: E353B

Participants
Fabrizio Andrani, Roma, Italy (Presenter) Nothing to Disclose
Carola Palla, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Federica Ciolina, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Michele Anzidei, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose
Alessandro Napoli, MD, Rome, Italy (Abstract Co-Author) Nothing to Disclose

METHOD AND MATERIALS
570 women affected by symptomatic uterine leiomyoma referred our department for treatment of uterine fibroids with MRgFUS. Pre-treatment evaluation assessed fibroids MR characteristics and MRgFUS eligibility. 166 of 182 eligible patients (group A) were treated with MRgFUS, while 388 women resulted ineligible. 33/388 patients underwent UAE (group B), 140/388 myomectomy (group C) and 58/388 hysterectomy (group D). Clinical efficacy for each treatment was determined by Symptoms Severity Score (SSS). Treatment and at 3- and 12-month follow-up intervals. Further data concerning number and type of complications, days of hospitalization and days of convalescence were also collected and compared.

RESULTS
MRgFUS group showed a mean decrease in SSS of 24,6% at 3 months and 55,8% at 12 months. SSS drop in UAE group was 51,2% and 57,4%, respectively. SSS reduction in myomectomy was 71,5% and 66,0%. After hysterectomy SSS decrease was 96,6% and 94,5%. MRgFUS group demonstrated the least number of adverse events (3 patients, 1,8 %), while the major adverse events rate was experienced in UAE group (37 patients, 26,4 %). MRgFUS patients were treated in outpatient setting, while mean days for hospitalisation and convalescence for other groups were respectively 3,1±2 and 12,4±9 days for group B; 4,5±2 and 17,2±12 days for group C; 4±1 and 26,3±14 days for group D.

CONCLUSION
MRgFUS clinical efficacy for uterine fibroids treatment is comparable to UAE and only slightly lower than myomectomy. However, MRgFUS is feasible in an outpatient setting and complications rate is significantly lower than other therapeutic strategies.

CLINICAL RELEVANCE/APPLICATION
MRgFUS added a new therapeutic strategy for uterine fibroids, being validated as a non-invasive, safe and effective option for selected patients.
PURPOSE

PATSS is a debilitating condition, an under-recognized complication of combined endometrial ablation and surgical sterilization. The aim is to determine imaging features of PATSS in symptomatic women.

METHOD AND MATERIALS

Retrospective chart review revealed 104 women who had endometrial ablation (EA) and surgical sterilization (SS). Inclusion criteria consisted of symptomatic women with imaging studies. 38 patients with total of 55 studies were included. Two radiologists independently reviewed randomized studies in a blinded fashion for presence or absence of: cornual hematometra, central hematometra, hematosalpinx or fluid filled fallopian tube, adhesions, endometriosis, and adenomyosis. Discordances were resolved by a third radiologist. Interobserver agreement was assessed by kappa statistics for the imaging features and diagnosis of PATSS (fluid filled fallopian tube and either central or cornual hematometra).

RESULTS

18 CT, 34 ultrasound, and 3 MRI studies were performed. Kappa values for CT and US were: cornual hematometra (0.77 vs 0.59), central hematometra (0.43 vs 0.15), fluid filled fallopian tube (0.63 vs 0.69), PATSS (0.68 vs 0.64), adhesions (0.15 vs 0.42), adenomyosis (0.55 vs 0.39), and endometriosis (1.0 vs 0.65). Interobserver analysis on MRI was excluded due to the small number. PATSS was diagnosed in 6/34 (18%) US, 5/18 (28%) CT, and 3/3 (100%) MRI. Concorance rates for PATSS with final radiology reports were: 4/6 (67%) US, 2/5 (40%) CT, and 3/3 (100%) MRI. 4 out of 11 (36%) women diagnosed with PATSS underwent hysterectomies, often without salpingectomies, with pathology report demonstrating changes consistent with only endometrial ablation.

CONCLUSION

PATSS is under-diagnosed in symptomatic women with history of endometrial ablation and surgical sterilization, with fair to good agreement by US and CT. Limited hysterectomy pathologies are not diagnostic for PATSS. Rather, given the data above, radiologic studies should be considered diagnostic in evaluation of this new entity given management considerations.

CLINICAL RELEVANCE/APPLICATION

Radiologists need to recognize imaging features related to complications of EA and SS procedure with increasing awareness of PATSS.
Participants
Lincoln L. Berland, MD, Birmingham, AL, (lberland@gmail.com) (Coordinator) Consultant, Nuance Communications, Inc;
Stuart G. Silverman, MD, Brookline, MA, (sgsilverman@partners.org) (Presenter) Author, Wolters Kluwer nv
Elaine M. Caoili, MD, MS, Ann Arbor, MI (Presenter) Nothing to Disclose
Susan M. Ascher, MD, Washington, DC, (aschers@gunet.georgetown.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Appreciate the need for and value of recommendations for managing incidental findings. The participants should also be able to choose from a variety of methods to bring these recommendations to the point of interpretation. 2) Identify incidental adnexal cystic lesions that require further evaluation to include the type and timing of follow up examinations. 3) Apply appropriate imaging criteria and thresholds to better distinguish benign adrenal adenomas from more clinically important lesions. 4) Manage incidental renal masses, even when they are incompletely characterized, such as when they are too small to characterize or detected on an examination that is not designed to evaluate them fully. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

ABSTRACT
Emerging Technologies: Prostate Cancer Imaging & Management
Tuesday, Nov. 29 4:30PM - 6:00PM Room: S505AB

Participants
Peter L. Choyke, MD, Rockville, MD, (pchoyke@nih.gov) (Moderator) Researcher, Koninklijke Philips NV; Researcher, General Electric Company; Researcher, Siemens AG; Researcher, iCAD, Inc; Researcher, Aspyrian Therapeutics, Inc; Researcher, ImaginAb, Inc; Researcher, Aura Biosciences, Inc

LEARNING OBJECTIVES
1) Understand current issues in prostate cancer relevant to imaging. 2) Understand the role of emerging technologies in the imaging and management of prostate cancer.

ABSTRACT
Prostate cancer is a major health issue. Imaging has made great strides in the last decade including the use of multiparametric MRI, MR-ultrasound fusion biopsies and most recently PET scanning. This refresher course explores emerging technologies in prostate cancer imaging and management.

Sub-Events

RC417A Introduction to Imaging in Prostate Cancer

Participants
Peter L. Choyke, MD, Rockville, MD, (pchoyke@nih.gov) (Presenter) Researcher, Koninklijke Philips NV; Researcher, General Electric Company; Researcher, Siemens AG; Researcher, iCAD, Inc; Researcher, Aspyrian Therapeutics, Inc; Researcher, ImaginAb, Inc; Researcher, Aura Biosciences, Inc

LEARNING OBJECTIVES
1) Understand the impact of new screening guidelines on imaging of prostate cancer. 2) Understand the issues facing clinicians treating prostate cancer.

ABSTRACT
This talk will review the current status of screening for prostate cancer and how stage migration is beginning to be seen. The problems of early detection, early recurrence and early metastases will be discussed. This talk will serve as a starting off point for the subsequent talks on new technologies.

RC417B Next Generation Prostate MRI

Participants
Baris Turkbey, MD, Bethesda, MD, (turkbeyi@mail.nih.gov) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Understand current status and uses of multi-parametric MRI. 2) Understand role of MRI in assessment of prostate cancer aggressiveness and tumor heterogeneity. 3) Understand role of computer aided diagnosis systems in evaluation of prostate cancer aggressiveness and tumor heterogeneity.

ABSTRACT

RC417C Molecular Prostate Imaging: Chemistry to Clinic

Participants
Martin G. Pomper, MD, PhD, Baltimore, MD (Presenter) Shareholder, CTS, Inc; Board Member, CTS, Inc; Research Grant, CTS, Inc; Advisor, CTS, Inc; Institutional license agreement, Progenics Pharmaceuticals, Inc; Institutional license agreement, Advanced Accelerator Applications SA; Institutional license agreement, LI-COR, Inc; Institutional license agreement, BIND Therapeutics, Inc

LEARNING OBJECTIVES
View learning objectives under the main course title.

RC417D PET/MRI: Is Prostate Cancer a Perfect Fit?

Participants
Peter L. Choyke, MD, Rockville, MD, (pchoyke@nih.gov) (Presenter) Researcher, Koninklijke Philips NV; Researcher, General Electric Company; Researcher, Siemens AG; Researcher, iCAD, Inc; Researcher, Aspyrian Therapeutics, Inc; Researcher, ImaginAb, Inc; Researcher, Aura Biosciences, Inc

LEARNING OBJECTIVES
1) Understand the potential value of PET/MRI in prostate cancer.
ABSTRACT

PET/MRI offers the sensitivity and specificity of PET with the high contrast resolution of MRI. In the prostate this can be very useful in identifying prostate cancers and recurrent disease after treatment. This talk will review the various features of PET/MRI that make prostate cancer a "perfect fit" for it.

RC417E  Hyperpolarized C-13 MR Molecular Imaging of Prostate Cancer

Participants
Daniel B. Vigneron, PhD, San Francisco, CA (Presenter) Research Grant, General Electric Company; Research Grant, GlaxoSmithKline

LEARNING OBJECTIVES

View learning objectives under the main course title.
Imaging Evaluation of Post-Radiation Therapy Normal Tissue Effects

Tuesday, Nov. 29 4:30PM - 6:00PM Room: S104A

Participants
Christina I. Tsien, MD, Saint Louis, MO (Moderator) Speaker, Merck & Co, Inc

Sub-Events
RC420A  Post-radiation Therapy CNS Imaging

Participants
Michael D. Chan, MD, Winston-Salem, NC (Presenter) Advisory Board, NovoCure Ltd
Tamme S. Benzinger, MD, PhD, Saint Louis, MO, (benzingert@wustl.edu) (Presenter) Research Grant, Eli Lilly and Company Investigator, Eli Lilly and Company Investigator, F. Hoffmann-La Roche Ltd

RC420B  Post-radiation Therapy Head and Neck Imaging

Participants
Allen M. Chen, MD, Los Angeles, CA (Presenter) Nothing to Disclose
Rajan Jain, MD, Hartsdale, NY (Presenter) Consultant, Cancer Panels; Royalties, Thieme Medical Publishers, Inc

LEARNING OBJECTIVES
1) Discuss the role of surveillance imaging in identification of radiation induced changes in normal tissue, so that these changes are not misinterpreted as evidence of persistent or recurrent tumor. 2) Describe imaging characteristics of radiation injury to various tissues including visceral mucosal space, salivary glands, bones and vascular structures in the neck as well as surrounding organs such as brain, skull base and lungs. 3) Discuss the advantage of early identification of these using case-based approach.

ABSTRACT
Radiation therapy for head and neck cancers can cause adverse effects and toxicity to the normal tissues in the irradiated regions. This does not only lead to a variety of comorbidities, but also present a challenging and complex appearance on surveillance imaging studies. Timely identification of some of these adverse effects can improve patient survival and quality of life.

RC420C  Post-radiation Therapy Gynecologic Imaging

Participants
Akila N. Viswanathan, MD, Baltimore, MD (Presenter) Nothing to Disclose
Kathryn J. Fowler, MD, Chesterfield, MO (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Review and demonstrate the imaging findings of gynecologic malignancies following radiation therapy. 2) Review the imaging modalities used to assess response.

ABSTRACT
Genitourinary Wednesday Case of the Day

Wednesday, Nov. 30 7:00AM - 11:59PM Room: Case of Day, Learning Center

Participants
Theodora A. Potretzke, MD, Madison, WI (Presenter) Nothing to Disclose
Adam Froemming, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Michael L. Wells, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Naoki Takahashi, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (Abstract Co-Author) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Meghan G. Lubner, MD, Madison, WI (Abstract Co-Author) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Anup S. Shetty, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Richard Tsai, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Monica R. Drylewicz, MD, PhD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Matthew S. Davenport, MD, Cincinnati, OH (Abstract Co-Author) Royalties, Wolters Kluwer nv;
Benjamin Mervak, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Brian T. Welch, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Veena R. Iyer, MD, Minneapolis, MN (Abstract Co-Author) Nothing to Disclose
Seema Mukerjee, MD, White Plains, NY (Abstract Co-Author) Nothing to Disclose
Shannon P. Sheedy, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) Recognize imaging findings seen in disorders of the genitourinary systems. 2) Develop differential diagnosis based on the clinical information and imaging findings. 3) Recognize the clinical importance of diagnosis.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Naoki Takahashi, MD - 2012 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
**Prostate MRI (Hands-on)**

Wednesday, Nov. 30 8:00AM - 10:00AM Room: S401AB

**Participants**
Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands (*Presenter*) Research Consultant, SPL Medical
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands, (jurgen.futterer@radboudumc.nl) (*Presenter*) Research Grant, Medtronic, Inc; Research Grant, Siemens AG
Roel D. Mus, MD, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Geert M. Villeirs, MD, PhD, Ghent, Belgium (*Presenter*) Nothing to Disclose
Baris Turkbey, MD, Bethesda, MD (*Presenter*) Nothing to Disclose
Jeffrey C. Weinreb, MD, New Haven, CT (*Presenter*) Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA, (antonio.westphalen@ucsf.edu) (*Presenter*) Scientific Advisory Board, 3DBiopsy LLC; Research Grant, Verily Life Sciences LLC
Rianne R. Engels, Cuijk, Netherlands (*Presenter*) Nothing to Disclose
Jooye G. Bomers, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Renske L. Van Delft, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Laura I. Stoilescu, Nijmegen, Netherlands (*Presenter*) Nothing to Disclose
Daniel J. Margolis, MD, Los Angeles, CA (*Presenter*) Nothing to Disclose
Patrik Zamecnik, MD, Heidelberg, Germany (*Presenter*) Officer, SPL Medical BV
Sadhna Verma, MD, Cincinnati, OH (*Presenter*) Nothing to Disclose

**LEARNING OBJECTIVES**
1) Understand the Pi-RADS v2 Category assessment to detect and localize significant cancer for both peripheral zone and transitional zone lesions. 2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

**ABSTRACT**
In this Hands-On Workshop, the participants will be able to review up to 40 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of PI-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their PI-RADS v2 scoring. There will be 50 workstations available. Participants will be able to use their own laptops through a secure WiFi connection.

**Active Handout:** Renske Lian Van Delft

Case-Based Review of Pediatric Radiology (An Interactive Session)

Wednesday, Nov. 30 8:30AM - 10:00AM Room: S406A

**MSCP41A**  
**Pediatric Brain and Spine Disorders**

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

LEARNING OBJECTIVES

1) Correlate imaging findings with clinical symptoms and age/gender demographics to narrow down differential diagnosis of pediatric neurological diseases. 2) Use a pattern recognition approach for identifying various metabolic disorders and its differentials. 3) Apply conventional and advanced neuroimaging for differentiation between tumors and tumor mimickers.

ABSTRACT

Based on a series of common and rare pediatric neurological cases various tools will be discussed how to narrow down differential diagnosis in children with neurological diseases. By combining the clinical symptoms as well as the age and gender of a patient many diseases can be excluded. Furthermore a detailed analysis of the distribution and quality of imaging findings as noted on conventional and advanced neuroimaging may further facilitate final diagnosis. In the current session various illustrative cases will be shown.

**MSCP41B**  
**Pediatric Head and Neck Disorders**

Participants  
Thierry Huisman, MD, Baltimore, MD (thuisma1@jhmi.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the major types of congenital lesions, inflammatory and infectious processes, and tumors in the head and neck region in the pediatric population. 2) Recognize the clinical presentations and imaging features of these lesions. 3) Provide differential diagnoses based on imaging appearance and location.

ABSTRACT

**MSCP41C**  
**Pediatric Genitourinary Disorders**

Participants  
Harriet J. Paltiel, MD, Boston, MA (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) Identify the most appropriate radiological examinations to evaluate children with a variety of genitourinary symptoms. 2) Describe the diagnostic imaging features of important pediatric genitourinary abnormalities. 3) Discuss the application of new techniques of potential benefit in pediatric genitourinary imaging, including ultrasound contrast and dual source CT.

ABSTRACT
LEARNING OBJECTIVES

1) The participant will be introduced to a series of Genitourinary case studies via an interactive team game approach designed to encourage "active" consumption of educational content. 2) The participant will 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) The attendee will receive a personalized self-assessment report via email that will review the case material presented during the session, along with individual and team performance. Please bring your charged mobile wireless device (phone, tablet or laptop) to participate.

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 during the session, along with individual and team performance.
RSNA/ESR Hybrid Imaging Symposium: Hybrid Imaging in the Female (An Interactive Session)

Wednesday, Nov. 30 10:30AM - 12:00PM Room: S402AB

BR  GU  MR  NM

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Alexander Drzezga, MD, Cologne, Germany (Moderator) Consultant, Siemens AG; Consultant, Bayer AG; Consultant, General Electric Company; Consultant, Eli Lilly and Company; Consultant, The Piramal Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, General Electric Company; Speakers Bureau, Eli Lilly and Company; Speakers Bureau, The Piramal Group
Katrine Riklund, MD,PhD, Umea, Sweden, (katrine.ahlstrom.riklund@umu.se ) (Moderator) Nothing to Disclose

LEARNING OBJECTIVES
Sub-Events

MSSR42A  Pelvic Tumors

Participants
Farrokh Dehdashti, MD, Saint Louis, MO (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Learn about different tracers. 2) Understand how to interpret hybrid imaging examinations of the pelvis. 3) Learn about the role of hybrid imaging in staging, treatment evaluation and follow-up.

MSSR42B  Breast Cancer

Participants
Osman Ratib, MD, PhD, Geneva, Switzerland (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Learn about pathophysiology and relation to different tracers. 2) Understand how to interpret hybrid imaging examinations of the breast. 3) Learn about the role of hybrid imaging in staging, treatment evaluation and follow-up.

ABSTRACT

MSSR42C  Interactive Case Discussion

Participants
Farrokh Dehdashti, MD, Saint Louis, MO (Presenter) Nothing to Disclose
Osman Ratib, MD, PhD, Geneva, Switzerland (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Understand how to interpret hybrid imaging in female pelvic tumours. 2) Understand how to interpret hybrid imaging in breast cancer. 3) Learn how to avoid common pitfalls.
**PURPOSE**

Determine the iodine content threshold to discriminate papillary renal cell carcinomas (pRCC) from complex cysts (CC) using rapid kV-switching dual energy CT (rsDECT).

**METHOD AND MATERIALS**

IRB approved retrospective study of consecutive patients with pathologic diagnosis of renal cell carcinoma that underwent rsDECT from 2011-2015 at a tertiary care center. Control group included patients with complex cysts on DECT. Iodine content (IC) and other rsDECT variables for each papillary renal cell carcinoma (pRCC, n=27) were recorded on rsDECT workstation for arterial (n=15) and nephrographic phase (n=12), then compared to IC for clear cell renal cell carcinomas (ccRCC, n=46) and complex cysts (CC, n=54). An optimal iodine content threshold was estimated using logistic regressions and Youden's J based on maximum specificity and sensitivity. ROC curves were generated for each of the measurements.

**RESULTS**

Tumor IC threshold of 1.28 mg/cc was the optimal cutoff value to discriminate between pRCCs and CCs for nephrographic phase (sens 1.0, spec 0.96, PPV 0.92, and NPV 1.0; AUC 0.997, acc 0.97, p<0.0001). Statistically significant difference in mean IC for pRCC and CC was present for nephrographic phase (1.90 mg/cc and 0.82 mg/cc, respectively, p<0.0001). Tumor IC threshold of 1.22 mg/cc was the optimal cutoff value to discriminate between pRCCs and CCs in the arterial phase (sens 0.67, spec 0.97, PPV 0.87, NPV 0.85, AUC 0.96, p<0.0001). The optimal threshold to discriminate between ccRCCs and pRCCs was 1.85 mg/cc in the arterial phase (sens 0.87, spec 0.92, PPV 0.87, NPV 0.92, p<0.0001) and 2.71 mg/cc in the nephrographic phase (sens 1.0, spec 1.0, PPV 1.0, NPV 1.0, p<0.0001).

**CONCLUSION**

rsDECT accurately discriminates between papillary RCC and complex cysts in a post contrast acquisition. Iodine content threshold has higher sens, spec, PPV, NPV and accuracy when measured in the nephrographic phase. Our thresholds differ from previously published work primarily observed with dual source DECT.

**CLINICAL RELEVANCE/APPLICATION**

A reliable iodine content threshold for renal lesions evaluated by rsDECT in a single post contrast acquisition has direct implications for patient care as it can eliminate the need for additional studies and guide management for these patients.

**SSK08-02 A Preliminary Study of Spectral CT Imaging in Gastrointestinal Stromal Tumor Risk Classification**

**PURPOSE**

To evaluate the value of spectral CT imaging in gastrointestinal stromal tumor (GIST) risk classification.

**METHOD AND MATERIALS**

41 patients with GIST were retrospectively reviewed, of which 13 were high risk, 12 were medium, 11 were low and 5 were very...
low risk (low and very low risk were divided into low-risk group), all the patients underwent plain and triple phases contrast enhanced CT with spectral CT imaging mode. Quantitative parameters including CT value of 70keV monochromatic images, the slope of spectral curve and normalized iodine concentration(NIC) were measured and calculated. Data were compared with one-way ANOVA and rank sum test when it is heterogeneity of variance.

RESULTS
1, the CT value of 70 keV monochromatic images was negatively correlated with GIST risk (high to low) in arterial phase (r = -0.173), positively correlated with GIST risk (r = 0.552) in delay phase and no correlation with the GIST risk in venous phase. 2, the slope of spectral curve had significant difference in delay phase(2.94±0.33,2.50±0.29,3.41±1.33, c2 = 6.641, P= 0.036), no significant difference in arterial phase and venous phase. 3, the NIC values for different risk of GIST were significant different in triple phases(F=3.646, c2=6.046, F=57.233, P=0.035, P=0.049, P<0.001), and correlated with GIST risk (from high to low) (r = -0.564)in delay phase.

CONCLUSION
Spectral CT imaging has distinct image findings of gastrointestinal stromal tumor (GIST) risk classification and can be used as a preoperative reference.

CLINICAL RELEVANCE/APPLICATION
CT spectral imaging has distinct imaging finding of gastric stromal tumors of different risk classifications, and may help the differential diagnosis and the preoperative therapy selection.

SSK08-03 Quantitative Spectral CT in Differentiation of Clear Cell Renal Cell Carcinoma and Fat Poor Renal Angiomyolipoma

Wednesday, Nov. 30 10:50AM - 11:00AM Room: E450B

Participants
Xiaotong Yang, Shenyang, China (Abstract Co-Author) Nothing to Disclose
Yi Liu, MD, PhD, Shenyang, China (Presenter) Nothing to Disclose

PURPOSE
To explore the value of CT spectral imaging in differentiation of clear cell renal carcinoma (ccRCC) and fat poor renal angiomyolipoma (RAML) in the cortex phase (CP) and nephographic phase (NP).

METHOD AND MATERIALS
In this institutional review board-approved study, we retrospectively analysed the data of spectral CT in 38 cases of ccRCCs and 9 cases of RAMLs. The monochromatic images and spectral curve were measured to get the iodine concentration (IC), normalized iodine concentration (NIC) and slope of spectral curve in the CP and NP. The independent sample t-test was used to compare the slope of spectral curve, ICs and NICs of the two kinds of lesions. The prediction parameters and diagnostic threshold were compared by drawing receiver operating characteristic curve (ROC). P<0.05 was considered to indicate a significant difference.

RESULTS
The ICs and NICs of RAML were lower than those of ccRCC in the CP and NP (p<0.05), and the slope of spectral curve of ccRCC was significant higher than RAML in the CP and NP (8.66±2.53 versus 4.87±2.50 in CP, 4.86±1.17 versus 3.32±1.30 in the NP, p<0.05). The areas under ROC curve of NIC in CP and NP was the largest: 0.901 and 0.893, respectively. ROC curves indicated that NIC< 0.389 in CP and NIC< 0.694 in NP could differentiate ccRCC from fat poor RAML, Sensitivity: 73.5% and 91.2%, Specificity: 100% and 75%, respectively.

CONCLUSION
CT spectral imaging with multiple parameter quantitative analysis may help to increase the accuracy of differentiating ccRCC from fat poor RAML.

CLINICAL RELEVANCE/APPLICATION
Quantitative spectral CT could be a valuable method to enhancement the differential diagnosis ability of ccRCC from fat poor RAML. It is important for the planning of therapeutic.

SSK08-04 Photon-counting CT Assessment of Complex Renal Lesions: First Clinical Experience

Wednesday, Nov. 30 11:00AM - 11:10AM Room: E450B

Participants
Ashkan A. Malayeri, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Rolf Symons, MD, Washington, DC (Presenter) Nothing to Disclose
Amir Pourmorteza, PhD, Bethesda, MD (Abstract Co-Author) Researcher, Siemens AG
Mohammad Hadi Bagheri, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Rabindra Gautam, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
W. Marston Linehan, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
David A. Bluemke, MD, PhD, Bethesda, MD (Abstract Co-Author) Research support, Siemens AG

PURPOSE
Renal cell carcinoma (RCC) is may be multifocal and identification of neoplasm often relies on determining changes in size of complex lesions. Accurate assessment of renal lesions in VHL patients is critical to determine lesion growth and possible indication for surgical intervention. The aim of this study was to determine the performance of a photon-counting detector (PCD) CT compared with an energy-integrating detector (EID) CT in assessment of renal lesions in VHL patients.

METHOD AND MATERIALS
This study used a hybrid (dual-source) whole-body prototype CT system (Siemens Healthcare, Germany), which consists of an EID
and a PCD. Seven VHL patients (mean age ± standard deviation: 58.9±6.6 years) were prospectively enrolled between 11/2015 and 01/2016. Radiation dose-matched three-phase spiral EID and PCD scans were acquired at vendor recommended guidelines (tube voltage/current 120 kVp/20 mAs for average 75 kg patient). Images were reconstructed with sinogram-affirmed iterative reconstruction (SAFIRE strength 2), 2 mm slice thickness, and 1 mm increment. The maximum diameter of renal lesions was assessed by an independent radiologist blinded to the detector. Correlation between EID and PCD renal lesion measurements was assessed with the intra-class correlation coefficient (ICC) and Bland-Altman analysis.

RESULTS
In total, 200 renal lesions were measured (157 simple cysts, 31 complex cysts, and 12 solid masses). Reproducibility of measurements between EID and PCD was excellent (ICC = 0.97, 95% confidence interval 0.96-0.98, P<0.001). Bland-Altman analysis showed narrow limits of agreement without significant bias (mean difference: 0.4 mm, 95% limits of agreement: [-2.7,3.7 mm]).

CONCLUSION
Photon-counting CT provides excellent reproducibility of renal lesion measurements in VHL patients compared with conventional EID CT.

CLINICAL RELEVANCE/APPLICATION
Photon-counting CT can be used to accurately measure renal lesions in VHL patients. The spectral information of PCD can be used for additional virtual-non contrast images and iodine concentration maps.

SSK08-05 Iodine Concentration and Normalized Iodine Concentration in Diagnosis of the Inflammatory and Metastatic Lymph Nodes in Colorectal Cancer

Wednesday, Nov. 30 11:10AM - 11:20AM Room: E450B

Participants
Xuejun Yang, kunming, China (Abstract Co-Author) Nothing to Disclose
Wei Zhao, Kunming, China (Abstract Co-Author) Nothing to Disclose
Yaying Yang, Kunming, China (Presenter) Nothing to Disclose
Lin Xu, Shiyian, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
To explore the value of iodine concentration and normalized iodine concentration in dual-energy CT in the differential diagnosis of the inflammatory and metastatic lymph nodes in colorectal cancer.

METHOD AND MATERIALS
35 patients had pathologically confirmed colorectal cancer underwent arterial and venous phase contrast-enhanced dual energy CT scan. Iodine concentration, normalized iodine concentration and enhanced CT value of the inflammatory and metastatic lymph nodes were measured in Liver VNC software And compared by using independent sample t-test. Sensitivity, specificity and receiver operating characteristic curve (ROC) was performed for diagnosing metastatic lymph nodes in colorectal cancer.

RESULTS
35 patients had105 local lymph nodes, including 56 metastatic lymph nodes, 49 reactive hyperplasia lymph nodes. Contrast enhanced CT value of metastastic and of reactive hyperplasia lymph nodes in the arterial and venous phase were 32.67±11.99 HU, 38.30±14.65 HU and 35.48±13.55 HU, 37.08±15.57 HU, respectively. The responding iodine concentration were 1.58±0.81 mg/ml, 3.17±1.07 mg/ml and 1.85±0.90 mg/ml, 3.56±1.38 mg/ml; and normalized iodine concentration were 0.12±0.06, 0.24±0.75 and 0.33±0.20, 0.62±0.24; respectively. The arterial and venous phase iodine content and normalized iodine concentration and arterial phase enhanced CT value had statistical differences(p<0.000) in the two kinds of lymph nodes. There were no statistical differences (p>0.05) for the venous phase enhanced CT value. Normalized iodine concentration was the most valuable in the diagnosis of metastatic lymph nodes with sensitivity, specificity and AUC of 88.9%, 73.2%, 0.895 and 80.6%, 82.1%, 0.877.

CONCLUSION
Iodine concentration and normalized iodine concentration can be used in the differential diagnosis of the inflammatory and metastatic lymph nodes in colorectal cancer. The diagnostic value of the normalized iodine concentration was superior to enhanced CT value and iodine concentration to differentiate inflammatory from metastatic lymph nodes.

CLINICAL RELEVANCE/APPLICATION
Iodine concentration and normalized iodine concentration can be used in the differential diagnosis of the inflammatory and metastatic lymph nodes in colorectal cancer.

SSK08-06 Choi Criteria and Iodine Quantification with Single Source Dual Energy CT (ssDECT) in the Evaluation of Treatment Response of Neuroendocrine Tumor Liver Metastases

Wednesday, Nov. 30 11:20AM - 11:30AM Room: E450B

Awards
Student Travel Stipend Award

Participants
Andrea Agostini, MD, Fermo, Italy (Presenter) Nothing to Disclose
Alessandra Borgheresi, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Usman Mahmood, MS, New York, NY (Abstract Co-Author) Nothing to Disclose
Andrea Giovagnoni, MD, Ancona, Italy (Abstract Co-Author) Nothing to Disclose
Lorenzo Mannelli, MD, PhD, New York, NY (Abstract Co-Author) Speaker, Bracco Group; Speaker, General Electric Company

PURPOSE
To correlate the iodine quantification with single source dual energy CT (ssDECT) and Choi Criteria, for the evaluation of treatment response in liver metastases of neuroendocrine tumors.

**METHOD AND MATERIALS**

The present study was approved by the local IRB. Patients treated for liver metastatic neuroendocrine tumors (NET) with at least two ssDECT exams between March 2015 and March 2016 were included. ssDECT images were acquired in the arterial phase after administration of iodinated contrast material (IoxoHex 300mg/mL) and bolus-tracking. Scanning parameters: 80/140 kVp fast switching; fixed mA; pitch 0.984:1; kernel standard; matrix 512x512; slice thickness/spacing: 5/5mm. A radiologist segmented hypervascular liver lesions >10mm using the GSI MD analysis on Advantage Workstation VolumeShare 7 (GE Healthcare) and measured maximum diameter, volume, and iodine concentration in the first and last ssDECT exams in two consecutive exams. Lesion density was measured on monochromatic 70 keV images. Iodine quantity (iodine concentration x volume), and differences among diameters, volumes, iodine concentrations, iodine quantities, and lesion densities were calculated for each lesion. Choi response was calculated for each lesion. Non parametric statistical tests were used and p<0.05 were considered significant.

**RESULTS**

We included 9 patients (M/F=2/1, mean age 62 years), for a total of 33 lesions. Patients were treated with systemic therapy (n=5) or combined systemic and locoregional therapy (n=4), 8 lesions had Choi partial response (PR), 13 lesions had stable disease (SD) while 12 lesions had progressive disease (PD). Choi response significantly stratified the absolute and percentage differences in iodine quantity for each lesion (Kruskal-Wallis p=0.003). We found significant correlation between percentage differences in iodine quantity maximum diameters (Spearman's Rho 0.580, p=0.0004), while the Spearman's Rho among percentage differences of iodine quantities and volumes was of 0.759 (p<0.0001).

**CONCLUSION**

Changes in iodine quantity of liver NET metastases correlate with Choi response, and changes in lesion diameters and volumes.

**CLINICAL RELEVANCE/APPLICATION**

Iodine quantification can be used as a marker of response in neuroendocrine tumor liver metastases

**SSK08-07 Comparison of Single Source-dual Energy CT (SS-DECT) Imaging with 140 kVp Conventional MDCT in Hypervascular Liver Lesions in Cirrhosis**

*Wednesday, Nov. 30 11:30AM - 11:40AM Room: E450B*

**Participants**

Ritu M. Kakkar, MBBS, DMRD, Mumbai, India (Abstract Co-Author) Nothing to Disclose
Shriniwas B. Desai, MD, Mumbai, India (Presenter) Nothing to Disclose
Sameer S. Soneji, DMRD, Mumbai, India (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

Compare Single source-dual energy CT (SS-DECT) imaging with 140 kVp conventional MDCT in hypervascular liver lesions in cirrhotic patients.
Determine whether there is improved detection of hypervascular liver lesions using SS-DECT

**METHOD AND MATERIALS**

30 cirrhotic patients (21:9 = M:F) with known or suspected liver lesions underwent SS-DECT during the late hepatic arterial phase using fast kV switching dual energy acquisition technology of GE. Conventional polychromatic images at 140 kVp and monochromatic images at 70 keV were reconstructed in the late hepatic arterial phase from the single spectral CT acquisition and evaluated. Virtual Monochromatic Spectral (VMS) image sets were created at 70 keV. ROIs were placed on tumor and the background liver. AD (Relative Attenuation Difference), CNR (contrast-to-noise ratio), SNR (signal-to-noise ratio), image noise and quality were also graded on a 5 point system by two experienced radiologists Averaged values of the image noise and image quality were calculated and compared. Statistical analysis was carried out using Mann-Whitney Rank Sum Test and paired t-test wherever applicable

**RESULTS**

Total of 45 lesions were detected on 70 keV image sets when 140 kVp image sets detected only 38 lesions. The mean attenuation difference at 140 kVp and at 70 keV was 69.5±11 and 91.7±9.1 HU. The difference in mean signal-to-noise ratio at 140 kVp and at 70 keV was 5.7±1.3 and 7.0±1.3 HU respectively. The difference in mean contrast-to-noise ratio at 140 kVp and at 70 keV was 3.0±0.6 and 4.5±0.9 HU respectively. The difference in mean image quality at 140 kVp and at 70 keV was 3.4±0.7 HU rated as good while 2.2±0.4 HU rated as poor respectively. The difference in mean image noise at 140 kVp and at 70 keV was 69.5±11 and 91.7±9.1 HU. The difference in mean signal-to-noise ratio at 140 kVp and at 70 keV was 2.0±0.2 HU rated as moderate respectively. All the parameters used for evaluation were found to be statistically significant (p < 0.01).

**CONCLUSION**

Single source-dual energy MDCT offers improved detection and diagnosis of hypervascular liver lesions by increasing the image contrast and conspicuity at an acceptable level of increase in image noise and decreased image quality.

**CLINICAL RELEVANCE/APPLICATION**

Higher detection rates of hypervascular liver lesions can be achieved at low keV images (70 keV) images in comparison to 140 kVp conventional MDCT

**SSK08-08 Dual Energy CT Workflow: Multicenter Consensus on Standardization of GU Exams**

*Wednesday, Nov. 30 11:40AM - 11:50AM Room: E450B*

**Participants**

Bhavik N. Patel, MD, MBA, Durham, NC (Presenter) Nothing to Disclose
Lauren F. Alexander, MD, Atlanta, GA (Abstract Co-Author) Spouse, Stockholder, AbbVie

To correlate the iodine quantification with single source dual energy CT (ssDECT) and Choi Criteria, for the evaluation of treatment response in liver metastases of neuroendocrine tumors.
Arterial and delayed phases were performed in DE volume mode in patients with HCC. 120 kV equivalent (120 Eq), 100 kV equivalent

**METHOD AND MATERIALS**

Hepatocellular carcinoma (HCC), as well as the added value of subtraction (St).

**PURPOSE**

To determine the best post-processing options in the arterial and delayed phases for dual energy (DE) CT in patients with hepatocellular carcinoma (HCC), as well as the added value of subtraction (St).

**RESULTS**

5/9 (56%) institutions exclude large patients from DECT, 2 (40%) use weight, 2 (40%) use transverse dimension, and 1 (20%) uses both. 7/9 (78%) use 2.5 mm slice thickness for interpretation in the axial plane. 7/9 (78%) use 50 keV for low and 70 keV for medium monochromatic reconstructed images. 5/6 (56%) use the same order when viewing DECT exams, while 4/9 (44%) use an exam dependent approach. DECT for RCC exams is indicated (AS 3.44; US 3.33) in the arterial phase (AS 3.33; US 2.78) but not in the venous phase (AS 2.44; US 2.22). DECT for CTU is indicated (AS 3.33; US 3.22) in the nephrographic phase (AS 3.11; US 2.89). Virtual unenhanced (VUE) reconstructed images cannot replace a true enhanced exam (AS 2.78; US 2.78). DECT for renal stone exams is indicated (AS 3.00) though most centers are not performing it (US 1.89).

**CONCLUSION**

There is strong agreement that DECT is indicated and should be performed during the arterial phase for RCC exams and nephrographic phase for CTU. There is a role for DECT for renal stone exams but most centers are not performing it. VUE cannot replace true unenhanced exams.

**CLINICAL RELEVANCE/APPLICATION**

Despite the advances in the technology, there is not widespread adoption of DECT into practice. Workflow standardization is essential to guide implementation of DECT into practice.

**HONORED EDUCATORS**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

**SSK08-09**

**Implementation of a Volume-mode Dual Energy CT Protocol for Hepatocellular Carcinoma: Prospective 4-readers Study for Selection of the Most Valuable Post-processing Options and Comparison with Subtraction**

**Wednesday, Nov. 30 11:50AM - 12:00PM Room: E450B**

**Participants**

Luis S. Guinéraes, MD, Toronto, ON (Presenter) Nothing to Disclose
Seng Thippavong, MD, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Sarah A. Johnson, MD, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Christin Farrell, Toronto, ON (Abstract Co-Author) Employee, Toshiba Corporation
Azadeh Khalatbari, MSc, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Patrik Rogalla, MD, Toronto, ON (Abstract Co-Author) Research Grant, Toshiba Corporation; Speakers Bureau, Bayer AG

**PURPOSE**

To determine the best post-processing options in the arterial and delayed phases for dual energy (DE) CT in patients with hepatocellular carcinoma (HCC), as well as the added value of subtraction (St).

**METHOD AND MATERIALS**

Arterial and delayed phases were performed in DE volume mode in patients with HCC. 120 kV equivalent (120 Eq), 100 kV equivalent
Arterial and delayed phases were performed in DE volume mode in patients with HCC. 120 kV equivalent (120 Eq), 100 kV equivalent (100 Eq), “Best CNR” (BCNR) and “Enhanced” (ENH) blending, monochromatic images (arterial phase: 55, 60, 65 keV; delayed phase: 70 keV), iodine maps (IM) and St images were reconstructed. Four abdominal radiologists blindly rated IQ (5=excellent) and ranked the 4 preferred series for IQ and LC (1=preferred). Quantitative assessment [contrast-to-noise-ratio (CNR), lesion-to-liver contrast (LLC) and lesion-to-liver CNR (LLCNR)] was performed for nodules >1 cm.

RESULTS

This ongoing study included 27 patients with 95 hypervascular and 90 hypodense lesions. All readers was rated IQ as 4/5 in >91%. Readers ranked the series with unequal preference (p ≤ 0.05). For the arterial phase IQ, for all readers, BCNR ranked 1st or 2nd in terms of percentage of ratings 1 or 2 for preference (59.3%, 48.2%, 62.7% and 70.4%, readers 1-4). For LC, IMs ranked 1st in 55.6% for readers 1 and 4. St ranked 4th (7.4%) and 2nd (51.9%), respectively. Excluding IM and St, readers 1 and 3 preferred the 80 kV or 55 keV images (together rated as best or 2nd in 88.9% and 96% respectively). Readers 2 and 4 preferred 100 Eq series (51.9% and 18.5%, respectively). For the delayed phase, series that were either the 1st or 2nd more frequently chosen as the best or 2nd best were BCNR for IQ (by 3 readers - 92.6%, 48.2%, 85.2% and 40.7%, readers 1-4) and ENH for LC (also by 3 readers – 66.7%, 25.9%, 51.9% and 48.2%, readers 1-4). Arterial phase series with the best LLC and LLCNR averages were 55 keV (LLC=88.3) and 100 Eq (LLCNR=5.2). For the delayed phase, 1st for LLCNR (2.2) was BCNR, 1st for LLC was 80 kV (31.5).

CONCLUSION

Despite the idiosyncrasy of radiologists’ preferences, BCNR provides the best overall image quality. For lesion conspicuity, the best series are IMs, 80 kV, 55 keV and 100 Eq images for the arterial phase and ENH for the delayed phase. Subtraction does not seem to add value.

CLINICAL RELEVANCE/APPLICATION

The identification of the most valuable post-processing DE options permits reduction of post-processing times, which may allow for the feasibility of widespread implementation of HCC DE protocols.
Science Session with Keynote: Genitourinary (Prostate Intervention and New Imaging Methods)

Wednesday, Nov. 30 10:30AM - 12:00PM Room: N228

SSK09-01  Genitourinary Keynote Speaker: Image-guided Prostate Intervention-Changing the Paradigm

Participants
Fergus V. Coakley, MD, Portland, OR (Moderator) Nothing to Disclose
Harriet C. Thoeny, MD, Bern, Switzerland (Moderator) Advisory Board, Guerbet SA

Sub-Events

SSK09-02  Transrectal MR Guided Focal Laser Ablation of Intermediate Grade, T1a Prostate Cancer: Phase I Clinical Trial

Participants
Steven S. Raman, MD, Santa Monica, CA (Presenter) Nothing to Disclose

PURPOSE
MR guided focal laser ablation (FLA) is a thermal ablative technique that is now being used to treat T1a prostate cancer in a region-confined manner via coagulative necrosis. This phase I trial examines the safety and feasibility of transrectal MRI-guided FLA in men with intermediate-risk prostate cancer.

METHOD AND MATERIALS
In this HIPAA compliant, IRB-approved prospective single arm trial, the study cohort included eight men with multiparametric MR (MP-MRI) detected, MR-US fusion biopsy proven, intermediate-risk, presumed stage T1a prostate cancer (Gleason 3+4 in all but one). treated with transrectal MR guided focal ablation. Secondary safety monitors (temperature probes) were inserted to assess the accuracy of MR thermometry. Follow-up MP-MRI and MR-US fusion biopsy was performed after six months.

RESULTS
MR guided focal laser ablation was technically successful in all 8 subjects. No Clavien-Dindo adverse events > Grade 3 occurred, and no changes in IPSS (p=0.37), or IIEF-5 (p=0.76) were observed during 6 months of follow-up. Ablation zones, as measured by post-treatment contrast enhanced MP-MRI, had a median volume of 3 cc or 7.7% of prostate volume. A significant drop in serum PSA level was observed in 7/8 men after six months (p<0.01). An average of 15 cores were taken during follow-up 6 month MR-US fusion bx, in which no ablation zone cancer was detected in 5/8 men (62.5%).

CONCLUSION
Transrectal MR guided focal laser ablation of the prostate is feasible and safe in men with intermediate-risk prostate cancer without serious adverse events or changes in urinary or sexual function. Comprehensive MR-US fusion biopsy follow-up indicates that larger margins than previously thought may be necessary for effective focal therapy.

SSK09-03  A Pilot Study to Evaluate Outpatient, Transrectal, Magnetic Resonance Image-guided Laser Focal Therapy of Prostate Cancer

Participants
John F. Feller, MD, Indian Wells, CA (Presenter) Consultant, Koninklijke Philips NV; Consultant, Visualase, Inc; Consultant, Hitachi, Ltd; Speaker, Hitachi, Ltd
Bernadette M. Greenwood, BS, RT, Indian Wells, CA (Abstract Co-Author) Speakers Bureau, GenomeDx Biosciences Inc
Stuart T. May Sr, MD, Indian Wells, CA (Abstract Co-Author) Nothing to Disclose
Wes Jones, Indian Wells, CA (Abstract Co-Author) Nothing to Disclose
In the United States alone, new prostate cancer cases for 2014 were estimated at 233,000 and deaths at 29,480. Focal therapies for low-risk and intermediate-risk localized prostate cancer are increasingly being explored. Additionally, new treatments for patients with biochemical recurrence of prostate cancer are also under investigation. Our objective is to investigate the safety and feasibility of using outpatient MR-guided laser focal therapy for MR visible prostate cancer utilizing a transrectal approach for laser applicator placement and therapy delivery in an outpatient setting.

METHOD AND MATERIALS

All MRI-guided therapy was delivered using a 1.5 Tesla Philips Achieva XR system (Philips Healthcare, Best, The Netherlands) for both image acquisition and real-time thermometry. DynaCAD and DynaLOC (Invivo, Orlando, FL, USA) software were used for image analysis and interventional planning. Laser therapy was delivered using a Visualase (Medtronic, Minneapolis, MN, USA) 15W, 980 nm diode laser applicator introduced transrectally using the DynaTRIM (Invivo, Orlando, FL, USA).

RESULTS

64 men were treated. 91 cancer foci were treated. Total procedure time was between 1.5 and 4 hours. MRI volume of coagulation necrosis ranged from 0.57 to 22.93 cc. No serious adverse events or morbidity were reported. 17 treatment regions were positive at 6 months biopsy, consistent with residual or recurrent cancer 26% of subjects 18% of treated regions. We observed a 35% decrease in mean PSA at 1 year post therapy and no statistically significant change in IPSS and SHIM scores at 6 months post-treatment.

CONCLUSION

Our data indicate that outpatient, transrectally delivered MRI-guided laser focal therapy for prostate cancer is both safe and feasible.

CLINICAL RELEVANCE/APPLICATION

In the current climate of cost-reduction and emphasis on minimally-invasive treatment of cancer, focal treatment of prostate cancer may be an attractive option. The precise energy delivery under MRI-guidance may have favorable results for cost control and quality of life without eliminating the possibility of whole-gland treatment in the patient’s future.
PURPOSE

Multiparametric Magnetic Resonance Imaging (mpMRI) and subsequent targeted biopsy of suspicious lesions has improved prostate cancer (PCa) detection. Currently, the literature is mainly focusing on Transrectal Ultrasound (TRUS)-MRI fusion biopsy to detect PCa. However, the value of direct in-bore MRI targeted biopsy (MRGB) is not extensively described. Therefore, the aim of our study is to give insights in the yield of MRGB in daily clinical practice in men with PI-RADS ≥3 lesions on mpMRI.

METHOD AND MATERIALS

We retrospectively included men who underwent both mpMRI and subsequent MRGB in our institution between January 2014 and December 2015. Patients were excluded if they 1) participated in another trial; 2) had prior targeted biopsy; or 3) had biopsy-proven PCa. We determined the overall detection rate for PCa and for clinically significant (cs)PCa, respectively in patients with and without prior negative TRUS biopsy (TRUSgb). A Gleason score of ≥3+4 was considered to be csPCa. Detection rates were determined for lesions which were scored, by radiologists with a variable experience with prostate MRI, as equivocal, likely or highly likely to be csPCa (PI-RADS 3, 4 or 5). Chi-square statistics were used to calculate any differences between the biopsy naïve and prior negative TRUSgb group.

RESULTS

After exclusion, 209 of 536 men who underwent MRGB, were eligible for our study; 163 (77.9%) with prior negative TRUSgb and 46 (22.1%) biopsy naïve, respectively. 129 (62%) were scored according to PI-RADS version 1 and 80 (38%) according to version 2. Overall PCa detection rate was 65.1% (136/209). csPCa was detected in 44.5% (93/209). No significant difference was found in the detection of PCa between men with and without prior negative TRUSgb (63.2% and 71.7%, p=0.28) and no significant difference was found for csPCa between both groups (44.8% and 43.5%, p=0.87). The overall detection rate of csPCa for PI-RADS 3, 4 and 5 lesions were 19.4%, 36.9% and 61.8%, respectively.

CONCLUSION

Our study demonstrates the yield of mpMRI and subsequent MRGB. Despite the retrospective nature of this study, the results indicate that MRI and MRGB is highly effective to detect and localize csPCa in daily clinical practice.

CLINICAL RELEVANCE/APPLICATION

This study revealed the results of the biggest cohort of men with suspicious lesions on mpMRI and subsequent MRGB.

SSK09-06 24 Months Follow-Up Results of MRI-Guided Transurethral Ultrasound Ablation for Localized Prostate Cancer

Participants

David Bonekamp, MD, PhD, Heidelberg, Germany (Presenter) Nothing to Disclose
Maya B. Wolf, MD, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose
Sascha Panemik, MD, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose
Boris Hasadchik, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose
Timur Kuru, MD, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose
Ionel V. Popenevicu, MD, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose
Gencay Hatiboglu, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose
Joseph Chin, MD, London, ON (Abstract Co-Author) Nothing to Disclose
Michele Billia, MD, London, ON (Abstract Co-Author) Nothing to Disclose
James D. Relle, MD, West Bloomfield, MI (Abstract Co-Author) Nothing to Disclose
Jason M. Hafron, MD, West Bloomfield, MI (Abstract Co-Author) Nothing to Disclose
Kiran R. Nandalur, MD, Bloomfield Hills, MI (Abstract Co-Author) Nothing to Disclose
Mathieu Burtynyk, DIPLPHYS, Toronto, ON (Abstract Co-Author) Employee, Profound Medical Inc
Matthias Roethke, MD, Heidelberg, Germany (Abstract Co-Author) Speaker, Siemens AG
Heinz-Peter W. Schlemmer, MD, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose

PURPOSE

MRI-guided transurethral ultrasound ablation (TULSA) is a novel minimally-invasive technology for prostate tissue ablation, both malignant and benign, aiming to provide localized prostate cancer (PCA) control with low morbidity. Directional plane-wave high-intensity ultrasound generates a continuous and precise volume of thermal coagulation shaped to conform to the prostate using real-time MR-thermometry feedback control. A prospective, multi-institutional Phase I clinical study investigated safety and feasibility of TULSA.

METHOD AND MATERIALS

Thirty patients with biopsy-proven organ-confined PCa were enrolled: age≥65y, T1c/T2a, PSA≤10ng/ml, Gleason≤3+3 (3+4 in Canada only). Under general anaesthesia, the ultrasound device (TULSA-PRO, Profound Medical Inc.) was positioned in the prostatic urethra with 3T MRI guidance (Siemens, Germany). Treatment planning was performed under MRI prostate visualization, with therapeutic intent of whole-gland ablation, including 3mm safety margins at the gland periphery, and 10% residual viable
prostate expected around the capsule. Treatment was delivered under continuous MRI thermometry feedback control.

RESULTS

Median (IQR) age was 69 (67-71) years and PSA 5.8 (3.8-8.0) ng/ml, with 24 (80%) low-risk and 6 (20%) intermediate-risk cancers (D'Amico). Treatment time was 36 (26-44) min and prostate volume 44 (38-48) cc. Spatial control of ablation was ±1.3mm on MRI thermometry, and correlated well with the non-perfused volume confirmed on CE-MRI. Successful treatment was further indicated by a median PSA decrease of 87% at 1 month, stable to 0.8 (0.6-1.1) ng/ml at 12 months (n=30), and to 0.7 (0.4-1.5) ng/ml at 24 months (n=18). MRI at 12 months shows diminutive prostates with median volume reduction of 88% (83-95%), consistent with the near whole-gland treatment plan. Positive biopsies at 12 months show 61% reduction in total cancer length, clinically significant disease in 9/29 patients (31%), and any disease in 16/29 patients (55%).

CONCLUSION

MRI-guidance enables accurate treatment planning, real-time dosimetry and control of the thermal ablation volume. Phase 1 data demonstrate safety and tissue ablation performance of TULSA. A larger TULSA trial with reduced safety margins is scheduled to begin in 2016.

CLINICAL RELEVANCE/APPLICATION

Whole-gland ablation can be safely and accurately achieved using MRI-guided TULSA, which represents a minimally-invasive treatment option for organ-confined prostate cancer.

SSK09-07  **Radiomic Features on Pre-Treatment Multi-Parametric Magnetic Resonance Imaging Predict which Prostate Cancer Patients will Develop Biochemical Recurrence**

**Participants**

Rakesh Shridakar, PhD, Cleveland, OH (Presenter) Nothing to Disclose
Soumya Ghose, PhD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Andrei S. Purysko, MD, Cleveland, OH (Abstract Co-Author) Nothing to Disclose
Anant Madabhushi, PhD, Piscataway, NJ (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

A number (~30%) of prostate cancer (PCA) patients who undergo radiation therapy (RT) or radical prostatectomy (RP) develop biochemical recurrence (BCR) post-treatment. These patients are at higher risk of mortality from PCa progression. If identified early, they could be treated more aggressively and undergo adjuvant therapy. In this study, we aim to explore if radiomic or computer-extracted texture features on pre-treatment mp-MRI are able to predict BCR in patients following therapy.

**METHOD AND MATERIALS**

In this single center retrospective study, 115 patients with PCa who underwent a 3T mp-MRI scan prior to RT or RP and then followed for >= 3 years, were identified in an IRB approved database. Of these, 38 patients had incomplete imaging datasets and were excluded. The regions of interest (ROIs) for the dominant cancer lesions were delineated by expert radiologist in the remaining 77 patients. The imaging data was corrected for intensity drift and signal bias, and a set of 126 radiomic features including first, second order statistics on image intensities, co-occurrence of local anisotropic gradient orientations, Gabor and Haralick features were extracted on T2-weighted (T2w) and apparent diffusion coefficient (ADC) sequences on a per-voxel basis. A set of different statistical metrics were computed on features within the ROIs to obtain a feature vector per-patient.

**RESULTS**

The set of 77 patients was randomly divided into a learning (N = 50) and an independent validation set (N = 27). The skewness (deviation from the normal distribution of a signal) of 12 radiomic features (primarily Haralick, Gabor) on the learning set showed statistically significant differences (p<0.05) between patients who developed BCR and those who didn't, indicating that distribution of these features within the cancer ROIs are different for BCR patients. A linear regression classifier was trained using the top 4 discriminating features from the learning set in a 3-fold cross validation over 50 runs. This classifier gave an AUC of 0.83 on the independent validation set.

**CONCLUSION**

Radiomic features on pre-treatment mp-MRI for prostate cancer patients developing BCR are statistically significantly different from those that do not develop BCR.

**SSK09-08  Detection and Characterization of Primary Prostate Cancer using 18F-FACBC PET/CT, PET/MRI and Multiparametric MRI: Preoperative Evaluation**

**Participants**

Ivan Jambor, MD, Turku, Finland (Presenter) Nothing to Disclose
Anna Kuisma, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Jukka Kemppainen, MD, PhD, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Esa Kahkonen, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Mai Mkim, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Susan Ramadan, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Harri Merissari, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Olli Eskola, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Jarmo Teuho, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Markku Kallajo, Turku, Finland (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

A number (~30%) of prostate cancer (PCa) patients who undergo radiation therapy (RT) or radical prostatectomy (RP) develop biochemical recurrence (BCR) post-treatment. These patients are at higher risk of mortality from PCa progression. If identified early, they could be treated more aggressively and undergo adjuvant therapy. In this study, we aim to explore if radiomic or computer-extracted texture features on pre-treatment mp-MRI are able to predict BCR in patients following therapy.

**METHOD AND MATERIALS**

In this single center retrospective study, 115 patients with PCa who underwent a 3T mp-MRI scan prior to RT or RP and then followed for >= 3 years, were identified in an IRB approved database. Of these, 38 patients had incomplete imaging datasets and were excluded. The regions of interest (ROIs) for the dominant cancer lesions were delineated by expert radiologist in the remaining 77 patients. The imaging data was corrected for intensity drift and signal bias, and a set of 126 radiomic features including first, second order statistics on image intensities, co-occurrence of local anisotropic gradient orientations, Gabor and Haralick features were extracted on T2-weighted (T2w) and apparent diffusion coefficient (ADC) sequences on a per-voxel basis. A set of different statistical metrics were computed on features within the ROIs to obtain a feature vector per-patient.

**RESULTS**

The set of 77 patients was randomly divided into a learning (N = 50) and an independent validation set (N = 27). The skewness (deviation from the normal distribution of a signal) of 12 radiomic features (primarily Haralick, Gabor) on the learning set showed statistically significant differences (p<0.05) between patients who developed BCR and those who didn't, indicating that distribution of these features within the cancer ROIs are different for BCR patients. A linear regression classifier was trained using the top 4 discriminating features from the learning set in a 3-fold cross validation over 50 runs. This classifier gave an AUC of 0.83 on the independent validation set.

**CONCLUSION**

Radiomic features on pre-treatment mp-MRI for prostate cancer patients developing BCR are statistically significantly different from those that do not develop BCR.

**CLINICAL RELEVANCE/APPLICATION**

Radiomic features may help in predicting prostate cancer patients who are likely to develop biochemical recurrence post treatment, allowing for better course of treatment and patient management.
Hannu J. Aronen, MD, PhD, Kuopio, Finland (Abstract Co-Author) Nothing to Disclose
Peter Bostrom, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Pekka Taimen, Turku, Finland (Abstract Co-Author) Nothing to Disclose
Heikki R. Minn, MD, PhD, Turku, Finland (Abstract Co-Author) Nothing to Disclose

PURPOSE
To evaluate diagnostic accuracy of 18F-FACBC PET/CT, PET/MRI and multiparametric MRI (mpMRI) for detection of primary prostate cancer (PCa) and prediction of its aggressiveness.

METHOD AND MATERIALS
Twenty six patients with histologically confirmed PCa underwent PET/CT performed immediately after injection of 369±10 MBq 18F-FACBC (fuciclovine) followed by PET/MRI starting 55±7 min from injection. MRI part of PET/MRI consisted of T2-weighted imaging (T2-WI), diffusion weighted imaging (DWI), second order rotating frame (RAFF) imaging, and T2 mapping. DWI was performed using 14 (0-500 s/mm²) and 12 (0-2000 s/mm²) b values. T2-WI, DWI (four separate acquisitions), proton magnetic resonance spectroscopy (1H-MRS) and dynamic contrast enhanced (DCE) MRI were acquired as part of a separate mpMRI within a week of PET/CT. DWI was post-processed using kurtosis, mono-, and biexponential functions. Presence of PCa was estimated in 12 regions with radical prostatectomy findings as “ground true”. For each imaging modality area under the curve (AUC) values for PCs detection and Spearman correlation coefficient (r) between the quantitative parameters and Gleason score groups (3+3, 3+4, >3+4) to predict aggressiveness were determined.

RESULTS
In the region based analysis, 164 (53%, 164/312) regions contained PCs and 41 tumor foci larger than 0.5 cm3 were identified. PET/CT demonstrated the highest sensitivity of 87% while the lowest specificity of 56%. AUC of both PET/MRI and mpMRI significantly (p<0.01) outperformed that of PET/CT while no significant differences were present between PET/MRI and mpMRI. Correlation (r) between Gleason score and tumors’ maximum standardized uptake value of PET/CT and PET/MRI was 0.42 (p=0.01) and 0.12 (p>0.05), respectively. The best DWI derived parameters had r in the range of 0.32 (p<0.05) to 0.68 (p<0.01) and RAFF - 0.49 (p<0.01). T2 mapping, 1H-MRS, and DCE-MRI parameter values were not useful in prediction of PCa aggressiveness.

CONCLUSION
Quantitative 18F-FACBC PET/CT significantly correlated with Gleason score but failed to outperform DWI derived parameters in predicting PCa aggressiveness.

CLINICAL RELEVANCE/APPLICATION
18F-FACBC PET/CT and PET/MRI provide limited added value to mpMRI in detection and characterization of primary PCa

SSK09-09 Intravoxel Incoherent Motion (IVIM) MRI for the Interpretation of Pelvic Lymph Nodes in Prostate Cancer: Can We Discriminate Benign from Malignant Nodes?

Wednesday, Nov. 30 11:50AM - 12:00PM Room: N228

Participants
Marc Regier, Hamburg, Germany (Presenter) Nothing to Disclose
Christiane Schmitt, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Christian Seiwerts, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Cyrus Behzadi, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Michael G. Kaul, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Frank Oliver G. Henes, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Gerhard B. Adam, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose
Dirk Beyersdorff, MD, Hamburg, Germany (Abstract Co-Author) Nothing to Disclose

PURPOSE
To determine the accuracy of intravoxel incoherent motion (IVIM) MRI for pelvic lymph node staging in prostate cancer using a multi-criteria approach and to compare these to the results of histopathology.

METHOD AND MATERIALS
43 consecutive patients classified as high-risk following D’Amico underwent pelvic MRI one day prior to radical prostatectomy. The imaging protocol consisted of an axial T2w STIR, a DWI (b-values: 0, 25, 100, 200, 500 and 900) and contrast enhanced T1w 3D-GRE sequence. Reading the T1w and T2w images the short and long axis diameters of all pelvic lymph nodes were assessed. The Imagej based software IVIMit© was applied to generate IVIM maps from the DWI data and to perform a non-linear regression fit. By placing a Region-of-interest encompassing the entire lymph node the parameters Dmean, Dmin, ADC and the perfusion fraction f were recorded. At radical prostatectomy, 924 lymph nodes were removed and referred to histopathologic workup. Sensitivity, specificity, positive and negative predictive values for the discrimination of benign and malignant nodes were calculated using Wilcoxon and chi-square test.

RESULTS
Histopathology identified malignancy in 25 nodes. The mean short and long axis diameter of these lymph nodes was 8.1mm (range, 3-16mm) and 11.8mm (range, 5-25mm), respectively. Applying diameter measurements as the exclusive discriminator resulted in a false negative rate of >60%. In contrast, the calculation of the diffusion fraction Dmean allowed for the discrimination of benign and malignant nodes with high accuracy. The Dmean was 1.10x10⁻³mm²/sec in benign and 0.54x10⁻³mm²/sec in malignant nodes (p<0.001). Further, Dmin (0.27x10⁻³mm²/sec vs. 0.81x10⁻³mm²/sec; p<0.001) and ADC (0.88x10⁻³mm²/sec vs. 1.67x10⁻³mm²/sec; p<0.02) were significantly lower in malignant nodes. A higher perfusion fraction f was found in malignant lymph nodes (33.43% vs. 27.13%), although this difference was not statistically significant (p=0.07).

CONCLUSION
In a high-risk collective, IVIM MRI can be used to assess lymph node metastases prior to prostatectomy. Dmean and Dmin values of 0.54x10⁻³mm²/sec and 0.27x10⁻³mm²/sec allow for the discrimination of benign and malignant lymph nodes with high accuracy.
CLINICAL RELEVANCE/APPLICATION

The application of IVIM MRI can help to detect nodal metastases in prostate cancer prior to prostatectomy and might serve as a complementary tool in the preoperative diagnostic workup.

**Participants**
Dean A. Nakamoto, MD, Beachwood, OH (Moderator) Research agreement, Toshiba Medical Systems Corporation

**Sub-Events**

**GU235-SD-WEA2**

**Purpose**
To evaluate the ability of dynamic contrast-enhanced magnetic imaging (DCE-MRI) and diffusion-weighted imaging (DWI) to predict pathological complete response (CR) after preoperative radio-chemotherapy for cervical carcinoma and to predict local recurrence

**Method and Materials**
Institutional ethics committee approved this retrospective study. The study population comprised 52 patients with locally advanced carcinoma treated first by chemoradiation and who underwent MR imaging between June 2011 and July 2015 before final surgery. Three radiologists, who were blinded to the pathological results and to each other's, retrospectively evaluated conventional, DW-imaging and quantitative and semi-quantitative DCE-MRI to identify a complete response. The reference standard was surgical pathologic findings.

**Results**
On DCE-MRI, an initial rise in the signal of cervical lesion that was steeper than that of myometrium was described as time intensity curve (TIC) type B and was significantly associated with a non CR (p=0.0004). DCE-MRI parameters (i.e MS: Max slope enhancement, IAUGC90: initial area under the gadolinium concentration –time curve during the first 90 sec after gadolinium injection and KTRANS) and a low signal on visual ADC were significantly associated with a non CR (respectively, p=0.027, p= 0.041, p=0.037, p=0.032). Patient with ADCMOY ≤ 0.0014 m²/s (HR=8,3), low ADC signal (HR=7,3), high DW signal intensity (HR=7,1) and TIC type B (HR = 4,3) were associated with earlier recurrence (p<0.05). There was perfect agreement (κ >0.80) for each parameter between the readers.

**Conclusion**
DCE-MRI is a feasible and accurate technique to differentiate CR and non-CR and could potentially help oncologists with management decisions. Moreover, DCE-MRI with the help of DWI could help the oncologists to accentuate the follow-up for patients with high risk of local recurrence and therefore to detect more previously these recurrences.

**Clinical Relevance/Application**
In some centers, cervical carcinoma after neo-adjuvant therapy did not be operated. Thus, MR with the help of Perfusion and Diffusion imaging could separate patients needed a surgery than patients without surgery. Moreover, with the use of time intensity curve, diffusion and ADC, MRI could predict local recurrence.

**GU236-SD-WEA3**

**PI-RADS Score 3: Do This Patient Collective Really Need Prompt Biopsy?**

**Participants**
Lars Schimmoller, MD, Duesseldorf, Germany (Presenter) Nothing to Disclose
Frederic Dietzel, Dusseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Tim Ullrich, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Michael Quentin, MD, Dusseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Dirk Böndin, MD, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Gerald Antoch, MD, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Christian Arsow, MD, Dusseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Robert Rabenalt, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose
Peter Albers, MD, PhD, Duesseldorf, Germany (Abstract Co-Author) Nothing to Disclose

**Purpose**
This study evaluates diagnostic accuracy in patients with multi-parametric prostate MRI and an overall PI-RADS score of 3.

**Method and Materials**
One hundred and twenty consecutive patients with a PI-RADS (Version 2) overall score of 3 in the multi-parametric MRI (T2WI, DWI, DCE-MRI) at 3T and subsequent targeted MR-guided biopsy (group A: MRI-guided in-bore biopsy; group B: MR/US fusion-guided plus transrectal ultrasound-guided biopsy) were retrospectively included in this study. Data were analyzed regarding PCa
and clinical significant PCa detection. Furthermore several parameters (prostate volume, PSA value, number of previous negative TRUS-GB) were correlated to biopsy positive patients to find a potential predictor of these patients.

RESULTS
In group A in 35 of 39 (90%) and in group B in 73 of 81 patients (90%) prostate biopsy was negative. Overall in 12 patients biopsy detected PCa (10%), whereas significant PCa was detected in none patient in group A and only in two patients (both Gleason score 4+3=7) in group B (1.6%). PCa in these patients were mostly detected by the additional systematic cores. Prostate volume was tendentially lower, but regarding PSA value, and number of previous negative TRUS-GB there were no significant differences in the biopsy positive compared to the biopsy negative patients.

CONCLUSION
In patients with a PIRADS overall score of 3 detection of significant PCa is very uncommon, but low-risk PCa can occur. Therefore these patients need follow-up monitoring, but not necessarily prompt biopsy, so far quality of mp-MRI protocol and MRI diagnostic was confirmed.

CLINICAL RELEVANCE/APPLICATION
In patients with a PI-RADS score 3, diagnosis of significant PCa is very uncommon in a high volume center with experienced uro-radiologists. Therefore, these patients should be primary radiologically and clinical-urologically followed.


gu237-sd-wea4

The Effect of Prostate-specific Antigen Density on Positive and Negative Predictive Values of Multiparametric Magnetic Resonance Imaging to Detect Gleason Score 7-10 Prostate Cancer in a Repeat Biopsy Setting

Station 4

Participants
Nienke L. Hansen, MD, Aachen, Germany (Abstract Co-Author) Nothing to Disclose
Tristan Barrett, MBBS, BSc, Guildford, United Kingdom (Presenter) Nothing to Disclose
Brendan C. Koo, MBChB, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Anne Warren, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Christof Kastner, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose
Ola Bratt, Cambridge, United Kingdom (Abstract Co-Author) Nothing to Disclose

PURPOSE
The interaction between prostate-specific antigen density (PSA-D) and multiparametric prostate magnetic resonance imaging (mpMRI) on Gleason score (GS) 7-10 prostate cancer detection is unclear. Purpose of the study was to evaluate the effect of PSA-D on the positive (PPV) and negative (NPV) predictive values of mpMRI to detect GS 7-10 cancer in a repeat biopsy setting.

METHOD AND MATERIALS
Retrospective study of 514 men with previous prostate biopsy showing no or GS 6 cancer. All had mpMRI, graded 1-5 on a Likert scale for cancer suspicion, and subsequent targeted and systematic 24-core image-fusion guided transperineal biopsy in 2013-2015. NPVs of Likert 1-2 and PPVs of Likert 3-5 mpMRIs for detecting GS 7-10 cancer were calculated (±95% confidence intervals) for PSA-D <0.1, 0.1-0.2, ≤0.2 and >0.2 ng/ml/cm³, and compared by Chi square test for linear trend.

RESULTS
GS 7-10 cancer was detected in 31% of the men. NPV of Likert 1-2 mpMRI was 0.91 (±0.04) with PSA-D ≤0.2 and 0.71 (±0.16) with >0.2 (p=0.003). For Likert 3 mpMRI, PPV was 0.09 (±0.06) with PSA-D ≤0.2 and 0.44 (±0.19) with >0.2 (p=0.002). PSA-D also significantly affected the PPV of Likert 4-5 mpMRI lesions: the PPV was 0.47 (±0.08) with PSA-D ≤0.2 and 0.66 (±0.10) with >0.2 (p=0.0001).

CONCLUSION
In a repeat biopsy setting, PSA-D ≤0.2 is associated with low detection of GS 7-10 prostate cancer, not only in men with negative mpMRI, but also in men with equivocal imaging. Surveillance, rather than repeat biopsy, may be appropriate for these men. Conversely, biopsies are indicated in men with high PSA-D, even if an mpMRI shows no suspicious lesion, and in men with an mpMRI suspicious for cancer, even if PSA-D is low.

CLINICAL RELEVANCE/APPLICATION
Men with previous biopsies showing no or Gleason 6 cancer, low PSA density, and negative or equivocal MRI have low risk of aggressive prostate cancer and may not require a repeated biopsy.

gu239-sd-wea6

Assessment of Mixed Stone Chemical Composition using Dual-energy Computed Tomography

Station 6

Participants
Alice Huang, Rochester, MN (Presenter) Nothing to Disclose
Shuai Leng, PhD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Juan Montoya, Rochester, MN (Abstract Co-Author) Nothing to Disclose
James C. Williams, PhD, Indianapolis, IN (Abstract Co-Author) Nothing to Disclose
Cynthia H. McCollough, PhD, Rochester, MN (Abstract Co-Author) Research Grant, Siemens AG

PURPOSE
We have demonstrated that the high spatial resolution of 3rd-generation dual-source, dual-energy CT (DECT) allowed accurate estimation of % uric acid (UA) and % non-uric acid (NUA) of mixed stones. A study investigating performance of a range of KV pairs as a function of phantom size found the accuracy of %UA quantification to be optimal across phantom sizes at 90/Sn150 and 100/Sn150 kV. The purpose of this study was to validate our prediction model at 90/150Sn kV with a new stone collection on which the model was not trained.
METHOD AND MATERIALS

Training data consisted of 22 mixed UA/NUA stones and 2 pure stones, scanned with micro-CT (Skyscan 1172, Bruker) to produce reference values for the percentage of UA and NUA in each stone. Stones were placed in water phantoms and scanned with DECT (Somatom Force, Siemens). Images were processed using in-house software. For each stone, each pixel was classified as UA or NUA by comparing its CT number ratio (CTR) to a size- and kV-specific threshold. Classification thresholds were chosen based on the lowest root-mean-square error (RMSE) at a given size and kV. The test data for this study consisted of 25 mixed UA/NUA stones and 4 pure stones. 35 and 45 cm phantoms were scanned with DECT at 90/Sn150 kV. Micro-CT and image processing was performed as above. Pixel-by-pixel analysis of stone composition was performed with the optimal thresholds identified from the training data. DECT quantification of percent UA was compared to micro-CT percentages using paired t-tests.

RESULTS

The absolute RMSE across all stones was 15% and 14% UA for the 35 and 45 cm phantoms, respectively. RMSE ranged from -33% to +32% UA across stones and phantom sizes. A small but statistically significant difference was found between the percent UA composition estimated by micro-CT and DECT for both phantom sizes (mean difference in %UA = -8% and -7%, p = 0.01 and 0.01). There was insignificant correlation between stone volume and RMSE in DECT quantification of %UA (p = 0.49).

CONCLUSION

This validation study demonstrated that DECT at a single kV pair setting across phantom sizes is capable of accurately quantifying the composition of mixed UA/NUA stones reliably across different stone samples.

CLINICAL RELEVANCE/APPLICATION

Accurate and consistent quantification of renal stones, which mostly have mixed composition, is necessary for disease management and treatment selection. DECT can reliably provide this information.

Adrenal Cortical Hyperplasia: Diagnostic Workup, Subtypes, Imaging Features and Mimics

Station #7

Awards
Certificate of Merit

Participants
Michelle M. Agrons, MD, DVM, Houston, TX (Abstract Co-Author) Nothing to Disclose
Corey T. Jensen, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Akram M. Shaaban, MBBC, Salt Lake City, UT (Abstract Co-Author) Nothing to Disclose
Christine O. Menias, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Nicolaus A. Wagner-Bartak, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Alicia M. Roman-Colon, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Prakash M. Masand, MD, Houston, TX (Abstract Co-Author) Nothing to Disclose
Khaled M. Elsayes, MD, Ann Arbor, MI (Presenter) Nothing to Disclose

TEACHING POINTS

- Describe the diagnostic workup of adrenal cortical hyperplasia- Discuss the pathological subtypes, pathogenesis, associations and presentation of adrenal cortical hyperplasia- Review the spectrum of imaging features of adrenal cortical hyperplasia- Illustrate most commonly encountered mimics of adrenal cortical hyperplasia-

TABLE OF CONTENTS/OUTLINE

- Pathology and laboratory workup of adrenal cortical hyperplasia- Subtypes: -ACTH dependent adrenal cortical hyperplasia - ACTH independent macronodular adrenal hyperplasia -Congenital adrenal hyperplasia (CAH) [Classical:Salt losing form of CAH - Simple virilizing form of CAH - Nonclassic or Late-Onset from of CAH]- Imaging workup and utility of various imaging modalities.- Typical Imaging features of adrenal cortical hyperplasia and its associations- Correlation of imaging features with laboratory findings and impact on management- Mimics of adrenal cortical hyperplasia, for example:- Adrenal lipomatous metaplasia - Metastases - Lymphoma

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at:

https://www.rsna.org/Honored-Educator-Award/

Khaled M. Elsayes, MD - 2014 Honored Educator
Akram M. Shaaban, MBBC - 2015 Honored Educator
Akram M. Shaaban, MBBC - 2016 Honored Educator
Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Validation of PI-RADS v2 for Detection of Prostate Cancer Using US/MRI Fusion Guided Prostate Biopsy as Reference Standard

Purpose: To evaluate the diagnostic performance and inter-reader reliability of the Prostate Imaging Reporting and Data System (PI-RADS) version 2 at multi-parametric MRI (mp-MRI) for the diagnosis of prostate cancer using US/MRI fusion guided prostate biopsy as the reference standard.

Method and Materials: From August 2014 to April 2016, a total of 117 consecutive men with elevated PSA and regions classified as PI-RADS ≥ 3 at mp-MRI based on PI-RADS v2 by a single experienced reader underwent confirmatory US/MRI fusion guided biopsies of the regions. The results of the histopathologic analyses, including Gleason scores from the target biopsies, were recorded and used as the reference standard. All lesions were retrospectively evaluated according to PI-RADS v2 by an experienced reader blinded to the biopsy results. The weighted kappa method was used to calculate inter-reader reliability between the original reader (pre biopsy) and the second reader (post biopsy).

Results: US/MRI fusion guided prostate biopsies of 149 lesions in 117 patients were performed and revealed 126 malignant lesions (85% tumor detection rate). In PI-RADS 5 (n=72), 4 (n=49) and 3 (n=28) lesions, the detection rates of prostate cancer were 100%, 82% and 50%, respectively. Prostate cancer Gleason score ≥7 was noted in 93%, 92% and 78% of PI-RADS 5, 4 and 3 lesions, respectively. Inter-reader agreement on PI-RADS v2 between the original reader and the second reader was moderate (K = 0.67).

Conclusion: A tumor detection rate of 85% amongst prostate lesions deemed suspicious for malignancy at mp-MRI using PI-RADS v2 was demonstrated. Among them, 100% of PI-RADS 5 lesions were proven to be prostate cancer. Our results support PI-RADS v2 as a reliable and replicable system for detection of prostate cancer.

Clinical Relevance/Application: PI-RADS v2 is a reliable and replicable system that simplifies and enhances the characterization of prostate lesions at mp-MRI, thus optimizing the MR detection of prostate cancer.
patients, this study evaluated the impact of race upon PCa detection with CE-TRUS.

METHOD AND MATERIALS

A retrospective review was performed of demographics, ultrasound imaging and pathology results from 272 consecutive participants in an NIH funded clinical trial who underwent conventional 12-core systematic prostate biopsy as well as CE-TRUS-guided biopsy with up to 6 additional targeted biopsy cores using the microbubble agent Definity™ (Lantheus Medical Imaging).

RESULTS

The study population consisted of 210 Caucasian, 54 African American, 2 Asian and 4 Hispanic males. PCa was detected in 87 (41%) of Caucasian and 29 (54%) of African American males. Among patients with a positive biopsy, PCa was present in multiple 12-core biopsy cores (7/54 vs. 27/210, both 13%). The overall frequency of PCa detection with CE-TRUS was similar in Caucasian (87/210 = 41%) and African American males (14/54 = 26%). However, the frequency of high grade PCa detected by targeted biopsy with CEUS was greater among African American patients (9/54 = 17%) as compared with Caucasian patients (21/210 = 10%), p=0.06.

CONCLUSION

Although the frequency of detection for high grade (Gleason score ≥ 7) PCa with a systematic 12-core biopsy was similar in Caucasian and African American subjects at 13%, and the overall frequency of PCa detection with a targeted CE-TRUS biopsy approach was similar in Caucasian and African American subjects (26-27%), high grade PCa was detected more frequently in our African American study subjects (17% vs 10%) using a limited targeted CE-TRUS biopsy approach.

CLINICAL RELEVANCE/APPLICATION

CEUS targeted biopsy improves the detection of high grade PCa with fewer biopsy cores as compared with systematic biopsy, especially among the high risk African American population. A targeted CE-TRUS approach may be more specifically selective for higher grade "clinically significant disease" in the African American population.

GU242-SD-WEB3 Reduced Contrast Media Volume and Radiation Dose Employing a Patient-tailored Approach during Renal CTA: Effects on Image Quality and Reader Confidence

PURPOSE

The aim of our study was to investigate the opacification of renal vasculature, by a patient-tailored contrast administration protocol during renal CTA.

METHOD AND MATERIALS

This hybrid retrospective (protocol A) and continuous prospective (protocol B) study was institutional review board approved. In 201 consecutive patients, renal CTA was performed with one of two protocols: protocol A, 100 mL of contrast material injected intravenously; and protocol B, employing the patient-tailored contrast media protocol. Each protocol employed a contrast material and saline flow rate of 4.5 mL/sec. Attenuation profiles and contrast-to-noise ratio (CNR) of the renal arteries and veins was measured. Effective dose was calculated. Data were compared with the independent sample t test. Receiver operating characteristic (ROC) and visual grading characteristic analyses were performed.

RESULTS

Arterial opacification in the abdominal aorta (mean ± standard deviation: protocol A = 290.35 ± 105.82 Protocol B= 269.47 ± 58.74), main proximal and distal renal arteries in both kidneys and protocols demonstrated no statistical significance (p>0.05) except for the left kidney in the distal segments in protocol B (p<0.046). In the venous circulation, the IVC demonstrated significant reduction in protocol B (59.39 HU ± 19.39) compared to A (87.74 HU ± 34.06) (p<0.001). The mean CNR for protocol B (14.75 HU ± 5.76) was significantly higher than that for protocol A (22.68 HU ± 13.72; P<.0001). Effective dose was significantly reduced in protocol B (2.46 ± 0.74 mSv) compared to A (3.07 ± 0.68 mSv) (p<0.001). ROC analysis demonstrated significantly higher area under the ROC curve for protocol B (P < .0001), with interreader agreement increasing from moderate to excellent in renal arterial visualization.

CONCLUSION

Significant improvement in renal vasculature is achieved with a patient-tailored contrast media injection protocol.

CLINICAL RELEVANCE/ApPLICATION

Renal CT angiography (CTA) is increasingly being used to guide management of renovascular diseases. However, little has been reported about the safety of intravenous contrast administration associated with these studies in the acute population, including the volume of contrast media and radiation dose effects.

GU243-SD-WEB4 Utility of a Novel Continuously Acquired Radial Golden-Angle Compressed Sensing Sequence for Detecting Local Recurrence of Prostate Cancer Following Radical Prostatectomy

PURPOSE

A retrospective review was performed of demographics, ultrasound imaging and pathology results from 272 consecutive participants in an NIH funded clinical trial who underwent conventional 12-core systematic prostate biopsy as well as CE-TRUS-guided biopsy with up to 6 additional targeted biopsy cores using the microbubble agent Definity™ (Lantheus Medical Imaging).

RESULTS

The study population consisted of 210 Caucasian, 54 African American, 2 Asian and 4 Hispanic males. PCa was detected in 87 (41%) of Caucasian and 29 (54%) of African American males. Among patients with a positive biopsy, PCa was present in multiple 12-core biopsy cores (7/54 vs. 27/210, both 13%). The overall frequency of PCa detection with CE-TRUS was similar in Caucasian (87/210 = 41%) and African American males (14/54 = 26%). However, the frequency of high grade PCa detected by targeted biopsy with CEUS was greater among African American patients (9/54 = 17%) as compared with Caucasian patients (21/210 = 10%), p=0.06.

CONCLUSION

Although the frequency of detection for high grade (Gleason score ≥ 7) PCa with a systematic 12-core biopsy was similar in Caucasian and African American subjects at 13%, and the overall frequency of PCa detection with a targeted CE-TRUS biopsy approach was similar in Caucasian and African American subjects (26-27%), high grade PCa was detected more frequently in our African American study subjects (17% vs 10%) using a limited targeted CE-TRUS biopsy approach.

CLINICAL RELEVANCE/APPLICATION

CEUS targeted biopsy improves the detection of high grade PCa with fewer biopsy cores as compared with systematic biopsy, especially among the high risk African American population. A targeted CE-TRUS approach may be more specifically selective for higher grade "clinically significant disease" in the African American population.

GU242-SD-WEB3 Reduced Contrast Media Volume and Radiation Dose Employing a Patient-tailored Approach during Renal CTA: Effects on Image Quality and Reader Confidence

PURPOSE

The aim of our study was to investigate the opacification of renal vasculature, by a patient-tailored contrast administration protocol during renal CTA.

METHOD AND MATERIALS

This hybrid retrospective (protocol A) and continuous prospective (protocol B) study was institutional review board approved. In 201 consecutive patients, renal CTA was performed with one of two protocols: protocol A, 100 mL of contrast material injected intravenously; and protocol B, employing the patient-tailored contrast media protocol. Each protocol employed a contrast material and saline flow rate of 4.5 mL/sec. Attenuation profiles and contrast-to-noise ratio (CNR) of the renal arteries and veins was measured. Effective dose was calculated. Data were compared with the independent sample t test. Receiver operating characteristic (ROC) and visual grading characteristic analyses were performed.

RESULTS

Arterial opacification in the abdominal aorta (mean ± standard deviation: protocol A = 290.35 ± 105.82 Protocol B= 269.47 ± 58.74), main proximal and distal renal arteries in both kidneys and protocols demonstrated no statistical significance (p>0.05) except for the left kidney in the distal segments in protocol B (p<0.046). In the venous circulation, the IVC demonstrated significant reduction in protocol B (59.39 HU ± 19.39) compared to A (87.74 HU ± 34.06) (p<0.001). The mean CNR for protocol B (14.75 HU ± 5.76) was significantly higher than that for protocol A (22.68 HU ± 13.72; P<.0001). Effective dose was significantly reduced in protocol B (2.46 ± 0.74 mSv) compared to A (3.07 ± 0.68 mSv) (p<0.001). ROC analysis demonstrated significantly higher area under the ROC curve for protocol B (P < .0001), with interreader agreement increasing from moderate to excellent in renal arterial visualization.

CONCLUSION

Significant improvement in renal vasculature is achieved with a patient-tailored contrast media injection protocol.

CLINICAL RELEVANCE/ApPLICATION

Renal CT angiography (CTA) is increasingly being used to guide management of renovascular diseases. However, little has been reported about the safety of intravenous contrast administration associated with these studies in the acute population, including the volume of contrast media and radiation dose effects.

GU243-SD-WEB4 Utility of a Novel Continuously Acquired Radial Golden-Angle Compressed Sensing Sequence for Detecting Local Recurrence of Prostate Cancer Following Radical Prostatectomy

PURPOSE

A retrospective review was performed of demographics, ultrasound imaging and pathology results from 272 consecutive participants in an NIH funded clinical trial who underwent conventional 12-core systematic prostate biopsy as well as CE-TRUS-guided biopsy with up to 6 additional targeted biopsy cores using the microbubble agent Definity™ (Lantheus Medical Imaging).

RESULTS

The study population consisted of 210 Caucasian, 54 African American, 2 Asian and 4 Hispanic males. PCa was detected in 87 (41%) of Caucasian and 29 (54%) of African American males. Among patients with a positive biopsy, PCa was present in multiple 12-core biopsy cores (7/54 vs. 27/210, both 13%). The overall frequency of PCa detection with CE-TRUS was similar in Caucasian (87/210 = 41%) and African American males (14/54 = 26%). However, the frequency of high grade PCa detected by targeted biopsy with CEUS was greater among African American patients (9/54 = 17%) as compared with Caucasian patients (21/210 = 10%), p=0.06.

CONCLUSION

Although the frequency of detection for high grade (Gleason score ≥ 7) PCa with a systematic 12-core biopsy was similar in Caucasian and African American subjects at 13%, and the overall frequency of PCa detection with a targeted CE-TRUS biopsy approach was similar in Caucasian and African American subjects (26-27%), high grade PCa was detected more frequently in our African American study subjects (17% vs 10%) using a limited targeted CE-TRUS biopsy approach.

CLINICAL RELEVANCE/APPLICATION

CEUS targeted biopsy improves the detection of high grade PCa with fewer biopsy cores as compared with systematic biopsy, especially among the high risk African American population. A targeted CE-TRUS approach may be more specifically selective for higher grade "clinically significant disease" in the African American population.
The complexity index is a promising metric to differentiate between the various types and grades of renal tumors. In combination (p < 0.01) differences were reported between grade 1 and all the other levels (Figure 1). AML, and ONCO and pRCC were significant (p < 0.01). The complexity index increased with increase in tumor grade and significant lowest complexity index was recorded for pRCC (242.62±14.37) (Figure 1). The difference in complexity indices between ONCO and

Across all groups, the spectral amplitudes decreased with the increase in spectral frequency. The highest complexity index was achieved for both readers higher sensitivity (69% vs. 46%; 77% vs. 54%), specificity (75% vs. 67%; 100% vs. 67%), and accuracy (71% vs. 50%; 82% vs. 56%).

RESULTS

GRASP achieved higher scores than standard DCE from both readers (all p≤0.02) for anatomic clarity (R1: 4.6±0.7 vs. 2.9±0.6; R2: 4.8±0.4 vs. 3.3±0.6), sharpness (3.9±0.9 vs. 2.5±0.7; 4.7±0.5 vs. 2.7±0.5), confidence in interpretation (4.0±0.9 vs. 3.1±0.8; 4.0±0.9 vs. 3.1±1.1) and conspicuity of detected lesions (4.7±0.5 vs. 3.4±1.1; 4.6±0.5 vs. 3.6±0.9). For detecting LR, GRASP also achieved for both readers higher sensitivity (69% vs. 46%; 77% vs. 54%), specificity (75% vs. 67%; 100% vs. 67%), and accuracy (71% vs. 50%; 82% vs. 56%).

CONCLUSION

Compared with standard DCE, GRASP acquisition technique achieved substantially better image quality and diagnostic performance for detecting local recurrence in patients with elevated PSA after prostatectomy.

CLINICAL RELEVANCE/APPLICATION

A novel DCE method that provides motion robustness, high spatial resolution, and high temporal resolution facilitates the role of MRI in evaluating patients with suspected local recurrence after RP.

Spectral Analysis of Renal Tumors: Evaluation of a CT Radiomic Technique

Spectral analysis has been used to quantify the shape and spatial patterns of a variety of lesions in the lung, brain, breasts, prostate etc. The aim of this study was to evaluate the feasibility of spectral analysis to differentiate malignant from benign renal tumors as well as differentiate the varying subtypes of renal cell carcinomas (RCCs) using contrast-enhanced computed tomography (CECT) images of renal masses.

METHOD AND MATERIALS

CECT images from 140 patients with renal masses were included. The dataset included, angiomylipomas (AML) n = 17; chromophobe RCC n = 10; clear RCC (cRCC) n = 68; oncocytoma (ONCO) n = 26 and papillary RCC (pRCC) n = 19. Tumor grades were also analyzed for the cRCC and pRCC datasets spanning 1(n=3), 2(n=54), 3(n=32) and 4(n=4). The lesions were manually segmented in the nephrographic phase and , the axial image that provided the largest tumor diameter, along with its 2 adjacent image was selected for further analysis. Two dimensional Fast Fourier Transform (FFT) was used to analyze the greyscale images of the segmented tumors using Matlab (Mathworks, Natick, MA) software. Here, complexity index, defined as the sum of the amplitude of all harmonics was measured . ANOVA test followed by post hoc comparisons with bonferroni correction was used to compare the complexity across tumor types and grade levels. Complexity was reported using million as the unit

RESULTS

Across all groups, the spectral amplitudes decreased with the increase in spectral frequency. The highest complexity index was recorded for ONCO (365.12 ± 12.28), followed by chromophobe and cRCC with 349.86 ± 19.8 and 349.31±7.59, respectively. The lowest complexity index was recorded for pRCC (242.62±14.37) (Figure 1). The difference in complexity indices between ONCO and AML and, ONCO and pRCC were significant (p < 0.01). The complexity index increased with increase in tumor grade and significant (p < 0.01) differences were reported between grade 1 and all the other levels (Figure 1).

CONCLUSION

The complexity index is a promising metric to differentiate between the various types and grades of renal tumors. In combination
with various other radiomics features, spectral analysis could offer another quantitative technique to help analyze renal masses

**CLINICAL RELEVANCE/APPLICATION**

Spectral analysis offers an additional radiomic technique to differentiate renal tumors types and will help improve patient-specific care-management options.
RSNA/ESR Hybrid Imaging Symposium: Hybrid Imaging in the Male (An Interactive Session)

Wednesday, Nov. 30 1:30PM - 3:00PM Room: S402AB

MSSR43A Prostate Cancer: PET, MR or Both?

Participants
Alexander Drzezga, MD, Cologne, Germany (Moderator) Consultant, Siemens AG; Consultant, Bayer AG; Consultant, General Electric Company; Consultant, Eli Lilly and Company; Consultant, The Piramal Group; Speakers Bureau, Siemens AG; Speakers Bureau, Bayer AG; Speakers Bureau, General Electric Company; Speakers Bureau, Eli Lilly and Company; Speakers Bureau, The Piramal Group
Katrine Riklund, MD, PhD, Umea, Sweden, (katrine.ahlstrom.riklund@umu.se) (Moderator) Nothing to Disclose

LEARNING OBJECTIVES
1) To learn about pathophysiology in prostate cancer. 2) To understand how to interpret hybrid imaging of prostate cancer. 3) To learn about the role of hybrid imaging in staging, treatment evaluation and follow-up.

MSSR43B Prostate Cancer: Novel Tracers

Participants
Steven P. Rowe, MD, PhD, Parkville, MD (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) To learn about novel tracer and their biochemical properties. 2) To understand the differences of information given by the use of different tracers. 3) To understand how to interpret examinations with different tracers.

MSSR43C Interactive Case Discussion

Participants
Matthias J. Eiber, MD, Muenchen, Germany (Presenter) Nothing to Disclose
Steven P. Rowe, MD, PhD, Parkville, MD (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) To learn how to interpret hybrid imaging of prostate cancer. 2) To understand the pathophysiology in relation to imaging.
**Participants**

Richard L. Baron, MD, Chicago, IL *(Presenter)* Nothing to Disclose

**Sub-Events**

**PS40A**  
**Announcement of Education Exhibit Awards**

**PS40B**  
**Announcement of Quality Storyboard Awards**

**PS40C**  
**Annual Oration in Radiation Oncology: Prostate Cancer: Improving the Flow of Research**

**Participants**

Colleen A. Lawton, MD, Milwaukee, WI *(Presenter)* Nothing to Disclose  
Edward Y. Kim, MD, Seattle, WA *(Presenter)* Research support, Eisai Co, Ltd; Research support, Novartis AG; Research support, Johnson & Johnson; Research support, Bayer AG; Research support, Threshold Pharmaceuticals, Inc; Research support, Eli Lilly and Company; Research support, MabVax Therapeutics Inc;

**Abstract**

Prostate cancer for men like breast cancer for women is the second leading cause of cancer death in the United States. This fact alone should cause nation-wide concern and result in a push for improved screening and treatment for men plagued with this disease. Yet over the past three decades we have seen screening with PSA come and go and treatment for localized disease improve, but at a relative snail's pace. Treatment for locally advanced disease has seen progress, but hereto the tempo is sluggish and adoption of the advances not universal. Recently there has been a large influx of treatment options for metastatic patients which of course is progress, but in the end these patients will likely die of their disease. The goal of this presentation will be to review what we have learned from prostate cancer research over the past three decades. This will include a review of the research on imaging for accurate staging in addition to research on screening and treatment options. We will look at where we have succeeded and where much work still needs to be done. Finally we will explore opportunities to identify what needs to be done to help increase the flow of research so as to brighten the future for prostate cancer patients.
SSM10

Genitourinary (Benign Gynecological Disease)

Wednesday, Nov. 30 3:00PM - 4:00PM Room: E351

Participants
Julia R. Fielding, MD, Dallas, TX (Moderator) Nothing to Disclose
Raj M. Paspulati, MD, Cleveland, OH (Moderator) Nothing to Disclose

Sub-Events

SSM10-01 Colorectal Endometriosis: Indication to Bowel Resection Based on Pelvic MR Findings in A Single Center

Wednesday, Nov. 30 3:00PM - 3:10PM Room: E351

Participants
Arnaldo Scardapane, Bari, Italy (Presenter) Nothing to Disclose
Filomena Lorusso, Castellana Grotte, Italy (Abstract Co-Author) Nothing to Disclose
Amato Antonio Stabile Ianora, Bari, Italy (Abstract Co-Author) Nothing to Disclose
Stefano Bettocchi, Bari, Italy (Abstract Co-Author) Nothing to Disclose
Giuseppe Angelelli, Bari, Italy (Abstract Co-Author) Nothing to Disclose

PURPOSE

to establish the role of MRI in predicting the need and the type of surgery in patients with colorectal endometriosis

METHOD AND MATERIALS

The MR Images of 195 patients operated for pelvic endometriosis were reviewed in consensus by two experienced radiologists. All MR scans were acquired with a 1.5 T scanner and a phased array coil. A standard high resolution pelvic MRI was performed in all patients consisting in a standard high resolution pelvic MRI protocol (T2w TSE sequences in the axial, sagittal and coronal plane and in T1w and THRIVE sequences in the axial plane) completed by MR- Colonography (MR-C) in all the cases. The presence of endometriotic pelvic lesions was annotated. Intestinal lesion were measured in short and long axis and the grade of stenosis was established on MR-C. A multivariate logistic regression was used to establish the predictors of intestinal resection in the laparoscopic procedure, while one way ANOVA was used to compare nodules resected with different techniques (shaving, discoid or segmental resection).

RESULTS

56/195 (29%) patients received an intestinal resection, namely 20/56 received a discoid resection and 36/56 segmental resection). Multivariate logistic regression demonstrated a predictive value of nodular short axis (OR=2.29 (1.21-4.35); p=0.011) and the degree of stenosis (OR=1.20 (1.06-1.35); p=0.03). ROC analysis demonstrated an AUC of 0.98 for the "short axis" and 0.97 for the parameter "stenosis". Using a cut off value of 11 mm of short axis and 30% of stenosis sensitivity and specificity values were respectively 93%-96% and 94%-98%. ANOVA analysis showed significantly higher values of Short axis, long Axis and Stenosis for patients receiving segmental resection vs discoid resection vs adhesiolysis and rectal shaving.

CONCLUSION

The presence of an endometriotic rectal nodule > 11 mm in short axis causing a luminal stenosis > 30% in pelvic MRI reliably predict the need of a rectal resection. Nodule size differs significantly in women receiving different type of resection.

CLINICAL RELEVANCE/APPLICATION

MRI is a non invasive method that can predict the need and the type of bowel resection in patients with colorectal endometriosis.

SSM10-02 Society of Radiologists in Ultrasound (SRU) Guidelines for Adnexal Cysts: Adherence and Practical Challenges

Wednesday, Nov. 30 3:10PM - 3:20PM Room: E351

Participants
Katherine E. Maturen, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Alexander D. Blaty, BS, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Ashish P. Wasnik, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Krupa K. Patel-Lippmann, MD, Durham, NC (Abstract Co-Author) Nothing to Disclose
Jessica B. Robbins, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Sarah L. Averill, MD, Iowa City, IA (Abstract Co-Author) Nothing to Disclose
Elizabeth B. Maddox, Madison, WI (Abstract Co-Author) Nothing to Disclose
Laura Huffman, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Lisa Barroilhet, MD, Madison, WI (Abstract Co-Author) Nothing to Disclose
Elizabeth A. Sadowski, MD, Madison, WI (Presenter) Nothing to Disclose

PURPOSE

In 2010, the Society of Radiologists in Ultrasound (SRU) published a consensus statement directing management of asymptomatic adnexal cysts. The purpose of this study is to evaluate radiologists’ subsequent adherence to the guidelines for a large group of cysts with known outcomes.
METHOD AND MATERIALS

IRB-approved retrospective multi-institutional study evaluated ultrasound (US) imaging features, dictated recommendations, and clinical outcomes of consecutive adnexal cysts from Jan-Jun 2011. Dictated reports were categorized according to specific recommendation when articulated, or via subjective assessment of the degree of concern expressed in the report language. Images were reviewed and SRU rating retrospectively assigned.

RESULTS

Images and reports were analyzed for 556 cysts. Specific recommendations were made in dictated reports for 349 (62.8%) cysts: 64 no followup (11.5%), 231 US (41.5%), 27 MRI (4.9%) and 27 surgical evaluation (4.9%). The overall correlation between dictated report and SRU approach was weak (Pearson’s R=0.34 [95% CI 0.26-0.41] p <.0001). In total, US and original dictations concurred on management in 245 (44%) cysts. Original reports underrecommended followup in 152 (27.3%) cysts and overrecommended followup in 159 (28.7%) cysts. If recommendations are binarized into “no followup” and “any followup”, Sn, Sp, PPV and NPV for neoplasm were 80.4%, 37.1%, 20.2% and 90.5% for the original reports and 96.7%, 54.7%, 29.8% and 98.8% for the SRU rating. In logistic regression, both recommendation types were predictors of neoplasm but a one unit increase in SRU rating conferred a higher odds ratio (SRU OR 2.59 [95% CI 2.06;3.27], p<.0001 vs. original dictation OR 1.59 [95% CI 1.15,2.22], p=.005).

CONCLUSION

Adherence to SRU management guidelines for adnexal cysts was 44% in originally dictated reports. Original dictations recommended followup for fewer neoplasms and more physiologic cysts, and were overall less predictive of neoplasm than the retrospectively applied SRU approach.

CLINICAL RELEVANCE/APPLICATION

The 2010 Society of Radiologists in Ultrasound (SRU) guidelines for management of adnexal cysts provide a framework for clear management recommendations and are more predictive of neoplasm than an unstructured approach.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Katherine E. Maturen, MD - 2014 Honored Educator

SSM10-03 Uterine Adenomyosis: Development of an US and MRI Based Scoring System While Comparing the Diagnostic Accuracy of Two Modalities

Wednesday, Nov. 30 3:20PM - 3:30PM Room: E351

Participants

Anil Chauhan, MD, Philadelphia, PA (Presenter) Nothing to Disclose
William A. Shaffer, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Evan S. Siegelman, MD, Philadelphia, PA (Abstract Co-Author) Consultant, Bioclinica, Inc Consultant, ICON plc Consultant, ACR Image Metrix
Lisa P. Jones, MD, PhD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Jill E. Langer, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Steven C. Hori, MD, Philadelphia, PA (Abstract Co-Author) Spouse, Employee, Cerner Corporation
Maria C. Reyes, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose
Hanna M. Zafar, MD, Philadelphia, PA (Abstract Co-Author) Nothing to Disclose

PURPOSE

Major studies defining US and MRI criteria for diagnosing uterine adenomyosis have been published more than a decade ago. Imaging technology, indications of imaging and clinical management of uterine symptomatology has overwhelmingly changed since then and this warrants a re-assessment of diagnostic accuracy of US and MRI in diagnosing adenomyosis. The purpose of this study was: 1) To compare the accuracy of US and MRI for the diagnosis of adenomyosis; and 2) To develop US and MRI based scoring systems for diagnosis of adenomyosis.

METHOD AND MATERIALS

We retrospectively identified 76 patients who have had hysterectomy along with pre-operative US and MRI exams. Cases with no transvaginal exam, and mass lesions involving more than half of the uterus were excluded. The imaging exams were interpreted blindly by experienced radiologists. Multiple imaging features were recorded along with confidence level of radiologist for interpreting these exams. Nine US and 10 MRI features were given scores of one each in pursuit of developing a scoring system.

RESULTS

Adenomyosis was present in 42 out of 76 (55%) patients on pathology. The sensitivities, specificities, positive predictive value and negative predictive value of US were 86%, 56%, 71%, and 76%, respectively. Similar values for MRI were 69%, 71%, 74%, and 65%. Maximum Junctional Zone thickness and presence of subendometrial/myometrial T2 hyperintensities on MRI demonstrated sensitivity/specificity of 50%/85% and 62%/76%, respectively. Moderate/Severe heterogeneity, linear striations, hyperechoic foci, and echogenic islands within the myometrium led to sensitivity and specificity of 88% and 56%. US score of >3 and >6 led to Sensitivity/Specificity of 67%/67% and 38%/85%, respectively. MRI score of >2 and >4 led to Sensitivity/Specificity of 57%/85% and 43%/91%, respectively. Thirty out of 76 (40%) cases had US-MRI discordance, with US being more correct (12 vs 5) in presence of disease and MRI being more correct (9 vs 4) in absence of disease.

CONCLUSION

Although both US and MRI have inherent limitations for diagnosing adenomyosis, adding scoring system can potentially improve specificity of the imaging diagnosis.
CLINICAL RELEVANCE/APPLICATION

Adenomyosis is highly prevalent in symptomatic female patient and imaging has potential limitations in its diagnosis. Therefore, a scoring system based on common imaging features may add value in improving specificity of adenomyosis diagnosis by imaging.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Evan S. Siegelman, MD - 2013 Honored Educator

PURPOSE

To investigate the potential of diffusion and perfusion indices (ADC and perfusion fraction f) from DWI at 3.0 T in monitoring treatment response to uterine artery embolization (UAE) at 6-month follow-up.

METHOD AND MATERIALS

Twelve female patients (median age, 42 years; range, 24–56 years) with symptomatic uterine fibroids who underwent pelvic MRI and DWI before and 6 months after UAE were included. 3.0-T DWI was acquired by using b-values of 0 and 1000 s/mm² for ADC calculation, and 0–1200 s/mm² for perfusion fraction f calculation. The Wilcoxon signed-rank test and Spearman rank correlation test were used for statistics.

RESULTS

All patients underwent successful UAE procedures with a relief of symptoms, reduced fibroid volume and complete infarction at follow-up MRI. A total of 17 fibroids were studied. The median ADCs showed a statistically significant increase from 1.20×10^{-3} mm²/s (range, 0.86–1.66×10^{-3} mm²/s) at baseline to 1.56×10^{-3} mm²/s (range, 1.00–1.86×10^{-3} mm²/s) at 6-month follow-up (P = 0.0003). Conversely, the median perfusion fraction f was significantly decreased after UAE (P = 0.0001), with a median pre-UAE value of 14.2% (range, 6.7%–17.6%) and a median post-UAE value of 9.2% (range, 3.2%–14.6%). Significant correlations were found between fibroid volume reduction rate and percentage changes in ADC and perfusion fraction f at 6-month follow-up relative to baseline, with ρ values of -0.50 (P = 0.04) and 0.55 (P = 0.02), respectively.

CONCLUSION

ADC and perfusion fraction f obtained from DWI at 3.0 T may help to evaluate treatment response to UAE.

CLINICAL RELEVANCE/APPLICATION

DWI-derived diffusion and perfusion indices (ADC and perfusion fraction f) may facilitate the quantitative assessment of treatment response to UAE at 6-month follow-up.

SSM10-05 The Predictive Value of Quantitative DCE Metrics for Immediate Therapeutic Response of High-Intensity Focused Ultrasound Ablation of Symptomatic Uterine Fibroids

Wednesday, Nov. 30 3:40PM - 3:50PM Room: E351

Participants
Chao Wei, Hefei, China (Presenter) Nothing to Disclose
Jiang Ning Dong, Hefei, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

To investigate the value of quantitative dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) parameters in the prediction of the immediate therapeutic response of high-intensity focused ultrasound (HIFU) therapy in the treatment of symptomatic uterine fibroids.

METHOD AND MATERIALS

A total of 78 symptomatic uterine fibroids (diameter: 3.0 cm-9.3 cm) in 65 female patients were treated with MR-HIFU therapy. All patients underwent conventional and DCE MRI scan in 3 days before and after HIFU treatment. Permeability parameters Ktrans, Kep, Ve, Vp, and T1 perfusion parameters BF, BV of Pretreatment were measured as a baseline; and immediate non-perfused volume ratio (NPVR) was used as an immediate ablation efficiency. Dates were assigned to NPVR >70 % and NPVR <70 % group. Then the differences of DCE-MRI parameters between the previous group and the correlations between the DCE-MRI parameters and NPVR were analyzed retrospectively. The ROC curve analyses were performed to study the predictive performance of different parameters for ablation efficacy.

RESULTS

(1) It was observed that the pretreatment Ktrans, Kep, Ve, Vp, and T1 perfusion parameters BF, BV of Pretreatment were measured as a baseline; and immediate non-perfused volume ratio (NPVR) was used as an immediate ablation efficiency. Dates were assigned to NPVR >70 % and NPVR <70 % group(p<0.05). (2) The immediate NPVR was negatively correlated with the Ktrans, BF, BV values before HIFU treatment (r = -0.561, -0.712 and -0.528, respectively; p<0.05 for all). (3)The AUC of pretreatment Ktrans, BF, BV values used to
predict the immediate NPVR were 0.810, 0.909, 0.795 respectively (p<0.05 for all). At the cut-off value, Ktrans, BF, BV provided the higher sensitivity (Ktrans: 96.8%, BF:90.3%, BV:71.0%) and specificity (Ktrans: 57.4%, BF:81.9%, BV:74.5%) in predicting for the ablation efficacy.

**CONCLUSION**

A higher Ktrans, BF, BV value at baseline DCE-MRI suggested a poor ablation efficacy of HIFU therapy for symptomatic uterine fibroids. The BF values showed the best predictive value, followed by Ktrans and then BV.

**CLINICAL RELEVANCE/APPLICATION**

The pretreatment DCE-MRI parameters could be useful biomarkers for prediction the ablation efficacy in selecting of suitable candidates for HIFU treatment or changing the treatment plan which most likely to yield optimum results.

**SSM10-06 Deeply Infiltrative Endometriosis (DIE) with Myometrial Invasion: ‘Mantle-shaped’ Pattern (MSP)-A Marker for Severe DIE Associated with High Prevalence of Intestinal and Bladder Lesions**

**Wednesday, Nov. 30 3:50PM - 4:00PM Room: E351**

Participants
Luciana P. Chamie, MD, PhD, Sao Paulo, Brazil (Presenter) Nothing to Disclose
Duarte M. Ribeiro, MD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Gladis R. Ribeiro, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Tatiana Bonetti, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose
Paulo C. Serafini, MD, PhD, Sao Paulo, Brazil (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

The purpose of this manuscript is to describe a form of DIE with deep myometrial invasion called "mantle-shaped" pattern (MSP) that is a marker for severe DIE with high prevalence of intestinal and bladder lesions

**METHOD AND MATERIALS**

This is prospective cross-sectional study from August 2010 to June 2015. 2737 women (mean age of 35.9 years) suspected of having DIE underwent a transvaginal sonography after bowel preparation (TVSBP) by an experienced radiologist for the diagnosis and mapping of the disease. The clinical suspicion was based on the complaining of chronic pelvic pain and infertility for more than 1 year. The imaging protocol was based on previous published data. The imaging criteria for severe DIE were also established. Among patients with positive imaging findings for DIE, the presence of the MSP was assessed along with the other sites affected.

**RESULTS**

From all 2737 women assessed, 1065 did not have endometriosis (46.4%) and 1468 of them demonstrated DIE lesions (53.6%). The MSP was identified in 151 women (5.5%) among DIE group. The group of DIE women without MSP exhibited 4 sites of DIE involvement, while the group with MSP had an average of 7.5 DIE sites affected. Women with MSP had 68.2% of intestinal lesions compared to 25% of those without MSP. Bladder lesions were identified in 15.2% of women with MSP compared to 1.7% of women without MSP. The posterior compartment of the pelvic cavity was the most common location for the MSP (70.9%) against the anterior compartment (30.5%). The retrocervical region was the most common location of DIE lesions in both groups.

**CONCLUSION**

The MSP is a form of DIE associated with deep myometrial invasion and is a marker for severe disease with high prevalence of visceral involvement, such as bladder and intestinal lesions. It is also a predictor for worse fertile prognosis and for potential residual disease after surgery. Patients with complete removal of these tissue are risky for uterine rupture during pregnancy.

**CLINICAL RELEVANCE/APPLICATION**

The MSP is a marker for severe DIE with high prevalence of intestinal and bladder lesions.
68Ga-RM2 PET/MRI in Biochemically Recurrent Prostate Cancer: A Comparison with Conventional Imaging

Wednesday, Nov. 30 3:00PM - 3:10PM Room: S504CD

Participants
Peter L. Choyke, MD, Rockville, MD (Moderator) Researcher, Koninklijke Philips NV; Researcher, General Electric Company; Researcher, Siemens AG; Researcher, ICAD, Inc; Researcher, Aspyrian Therapeutics, Inc; Researcher, ImaginAb, Inc; Researcher, Aura Biosciences, Inc
Steven P. Rowe, MD, PhD, Parkville, MD (Moderator) Nothing to Disclose

Sub-Events
SSM13-01 68Ga-RM2 PET/MRI in Biochemically Recurrent Prostate Cancer: A Comparison with Conventional Imaging

Wednesday, Nov. 30 3:00PM - 3:10PM Room: S504CD

Participants
Ida Sonni, MD, Stanford, CA (Presenter) Nothing to Disclose
Ryogo Minamimoto, MD, PhD, Tokyo, Japan (Abstract Co-Author) Nothing to Disclose
Andreas M. Loening, MD, PhD, San Francisco, CA (Abstract Co-Author) Nothing to Disclose
Shreyas S. Vasananwala, MD, PhD, Stanford, CA (Abstract Co-Author) Research collaboration, General Electric Company; Consultant, Artymis Inc; Research Grant, Bayer AG; Andrei Iagaru, MD, Stanford, CA (Abstract Co-Author) Research Grant, General Electric Company; Research Grant, Bayer AG; Research Grant, The Piramal Group

PURPOSE

68Ga-RM2 (formerly known as 68Ga-Bombesin or BAY86-7548) is a synthetic bombesin receptor antagonist that targets gastrin-releasing peptide receptors (GRPr). GRPr are highly overexpressed in prostate cancer (PC). Because of their low expression in BPH and inflammatory prostatic tissues, imaging GRPr has potential advantages over current choline- and acetate-based radiotracers. We now present data on the use of 68Ga-RM2 PET/MRI in patients with biochemically recurrent prostate cancer (BCR PC) and non-contributory conventional imaging (CI).

METHOD AND MATERIALS

We enrolled 27 men with BCR PC, 59-83 year-old (mean±SD: 68.4±6.8) in an IRB-approved prospective study. Imaging started at 40-69 minutes (mean±SD: 49.9±7.2) after injection of 3.6-4.1 mCi (mean±SD: 3.8±0.2) of 68Ga-RM2 using a TOF-enabled simultaneous PET/MRI scanner. MRI included T1-weighted, T2-weighted and DWI. SUVmax and SUVmean measurements were recorded in normal tissues and areas of uptake outside the expected physiologic biodistribution.

RESULTS

PSA ranged 0.3-36.4 ng/mL (mean±SD: 7.2±7.9). CT, MRI, 99mTc MDP bone scan were negative. 68Ga-RM2 uptake had the highest value in the pancreas and bladder, while moderate uptake was noted in the esophagus, kidneys, blood pool, stomach, small bowel and colon. High 68Ga-RM2 uptake (SUVmax: 12.7 ± 7.8 [range: 2.6 – 33.5], SUVmean: 5.7 ± 2.5 [range: 1.7 – 10.8]) corresponded to pelvic lymph nodes (7 patients), retroperitoneal lymph nodes (5 patients), prostate bed (3 patients), seminal vesicle (2 patients), supravclavicular lymph node (2 patients), mesenteric lymph nodes (1 patient), mediastinal lymph node (1 patient), liver (1 patient), lung (1 patient) and bone marrow (1 patient). 68Ga-RM2 PET findings were compatible with recurrent prostate cancer in 19 of the 27 participants. MRI identified findings compatible with recurrent prostate cancer in 8 of the 27 patients (lymph nodes in 6 patients, prostate bed in 1 patient, lung in 1 patient and bone marrow in 1 patient).

CONCLUSION

68Ga-RM2 produces high quality PET images for assessment of GRPr expression in patients with BCR PC. High uptake in multiple areas compatible with cancer lesion suggests that 68Ga-RM2 is a promising PET radiopharmaceutical for localization of disease in participants with BCR PC and non-contributory conventional imaging.

CLINICAL RELEVANCE/APPLICATION

68Ga-RM2 produces high quality PET images for assessment of GRPr expression in patients with BCR PC.

SSM13-02 18F-Fluoromethycholine Dynamic PET with Multiparametric MR Imaging in Patients with High Risk Prostate Cancer

Wednesday, Nov. 30 3:10PM - 3:20PM Room: S504CD

Participants
Ur Metser, MD, FRCP, Toronto, ON (Presenter) Consultant, AbbVie Inc
Lisa P. Lavellle, MBChB, FFR(RCSI), Toronto, ON (Abstract Co-Author) Nothing to Disclose
Douglas Hussey, BSc, RT, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Kartik S. Jhaveri, MD, Toronto, ON (Abstract Co-Author) Speaker, Bayer AG; Speaker, Siemens AG
Sangeet Ghai, MD, Toronto, ON (Abstract Co-Author) Nothing to Disclose
Jaydeep A. Halankar, MD, DMRD, Toronto, ON (Abstract Co-Author) Nothing to Disclose

PURPOSE
To investigate the qualitative and quantitative parameters of dynamic 18F-Fluoromethylcholine (FCH) PET (dPET) in patients with high risk primary prostate cancer, and correlate these with multiparametric MR (mpMR) of the prostate.

**METHOD AND MATERIALS**

Twenty patients with biopsy-proven hrPCa were included (age 50-82 yrs, median; 70; Gleason score 7-9, median 8; serum PSA 3-90 ng/ml, median, 18.5). All patients underwent FCH-dPET (10 min) of the pelvis prior to a whole body scan and 3T mpMR of the prostate including high resolution T2-weighted, diffusion weighted, and dynamic contrast enhanced imaging. All primary tumor sites on mpMR and FCH-PET were recorded separately by an experienced prostate MR and PET reader, respectively, noting lesion location and degree of certainty (definite tumor or equivocal lesion). On PET, SUV was measured on static images, and time activity curves (TAC) were generated from dPET data. Quantitative dPET analysis was based on a two-tissue compartment model with image-derived arterial input.

**RESULTS**

Twenty one tumors in 20 patients were identified on mpMR (peripheral zone, n=20). All tumors on mpMR were also identified on PET. One additional lesion considered equivocal on mpMR did not show focal FCH uptake. Ten additional foci of FCH uptake in 8 patients were identified on PET (peripheral zone, n=5), with no mpMR correlate. Median SUVmax for MR Confirmed and non-MR confirmed lesions was 7.2 ± 2.2, and 5.7 ± 2.6, respectively. Median dPET parameters for MR confirmed and non-MR confirmed lesions (1/min) were K1=0.73 ± 0.31 and 0.56 ± 0.18 (p=0.04); K3=0.24 ± 0.17 and 0.24 ± 0.14 (p=0.91); Ki=0.28 ± 0.14 and 0.27 ± 0.08 (p=0.31), respectively.

**CONCLUSION**

There is discordance in lesions identified in the prostate on mpMR and FCH-PET in patients with high-risk prostate cancer, with PET identifying >30% additional lesions. Furthermore, K1 values for MR Confirmed tumors were different from those derived from non-MR confirmed cohort of lesions. Further prospective studies with PET/MR-Ultrasound fusion biopsies of all PET and MR detected lesions are warranted.

**CLINICAL RELEVANCE/APPLICATION**

This study provides insight on the performance of FCH-PET in the detection of primary prostate cancer, as it correlates with multiparametric MR, along with quantitative dynamic FCH-PET data.

**SSM13-03 PET/CT Imaging with 68Ga-labelled Prostate Specific Membrane Antigen-ligands in Restaging of Prostate Cancer: A Meta-analysis**

**Wednesday, Nov. 30 3:20PM - 3:30PM Room: S504CD**

**Awards**

**Student Travel Stipend Award**

**Participants**

Sara Sheikbahaei, MD, MPH, Baltimore, MD (Presenter) Nothing to Disclose

Ilija B. Solnes, MD, MBA, Baltimore, MD (Abstract Co-Author) Nothing to Disclose

Ali Afsar-Oromieh, Heidelberg, Germany (Abstract Co-Author) Nothing to Disclose

Esther Mena, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose

Mehdi Taghipour, MD, BOSTON, MA (Abstract Co-Author) Nothing to Disclose

Rathan M. Subramaniam, MD, PhD, Dallas, TX (Abstract Co-Author) Nothing to Disclose

**PURPOSE**

The PSMA has emerged as a promising target for PET-imaging of patients with recurrent prostate cancer (PCa) with higher rate of tumor detection in different studies. Given the relatively small patient population in most of these studies, in this meta-analysis we aim to establish the summary estimates of the performance of 68Ga-PSMA PET/CT imaging in relation to PSA values. The lesion-based diagnostic values of 68Ga-PSMA-ligands were also evaluated where possible.

**METHOD AND MATERIALS**

Systematic search were performed in PubMed and EMBASE (last updated in Feb 2016). Studies investigating the performance of 68Ga-PSMA-ligands PET/CT in patients with recurrent PCa were eligible for inclusion. When the individual patient data on rate of lesion detection in relation to PSA level were not extractable, the study authors were contacted seeking for additional information. Studies with patient overlap were excluded. Studies with histopathology reference standard were included in the diagnostic accuracy analysis. The pooled results were reported along with its 95% CI.

**RESULTS**

A total of 8 studies including 850 patients (788 patients suspected of recurrence, 62 patients with newly diagnosed PCa to exclude metastases) who were referred to 68Ga-PSMA-ligands PET/CT in 52% (41-62%) of patients with PSA (ng/dl) of ≤0.5 ng/ml (n=89), 58% (46-69%) of patients with PSA of 0.5-1 ng/ml (n=82), 80% (71-86%) of patients with PSA of 1-2 ng/ml (n=149) and 91% (88-93%) of patients with PSA ≥2 ng/ml (n= 535). Three studies provided the lesion-based accuracy information (967 lesions). The pooled per-lesion accuracy analysis revealed the sensitivity of 0.84 (0.71-0.91), specificity of 0.98 (0.90-1.0), negative predictive value of 0.96 (0.89-0.99) and positive predictive value of 0.92 (0.64-0.98).

**CONCLUSION**

Analysis of the available studies indicates that 68Ga-PSMA-ligands PET/CT are highly specific for lesions of PCa. There is a significant trend in tumor detection, from 52% to 91%, in association with PSA level ranging from <0.5 to >2 ng/dl.

**CLINICAL RELEVANCE/APPLICATION**

68Ga-PSMA-PET/CT is a valuable imaging with substantial diagnostic performance and high tumor detection rate even in clinically important range of low PSA levels (PSA< 0.5 ng/dl) which support its use in clinical practice in restaging of PCa with suspected recurrence.
SSM13-04  **Hyperpolarized 13C-Tert-Butanol MRI Perfusion Mapping and Microvessel Density in Sunitinib-Treated Renal Cell Carcinoma Xenografts: Rad-Path Correlation in the Characterization of Intratumoral Heterogeneity and Pre- and Post-Treatment Change**

Wednesday, Nov. 30 3:30PM - 3:40PM Room: S504CD

**Student Travel Stipend Award**

Participants
Patricia Coutinho De Souza, DVM, PhD, Boston, MA (Presenter) Nothing to Disclose
Aaron K. Grant, PhD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Xiaoen Wang, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Rupal Bhattacharyya, Boston, MA (Abstract Co-Author) Nothing to Disclose
Gopal Varma, PhD, Boston, MA (Abstract Co-Author) Nothing to Disclose
David C. Alsop, PhD, Boston, MA (Abstract Co-Author) Research support, General Electric Company Royalties, General Electric Company
Leo L. Tsai, MD, PhD, Boston, MA (Abstract Co-Author) Co-founder, Agile Devices Inc; Stockholder, Agile Devices Inc; Research Consultant, Agile Devices Inc;

**PURPOSE**

Hyperpolarized 13C-tert-butanol (h13C-TB) is a freely-diffusible novel MRI tracer that provides high-SNR tissue perfusion mapping. We use h13C-TB MRI to quantify perfusion within and between untreated (UT) and sunitinib resistant (SR) renal cell carcinoma mouse xenografts. Our goal was to determine if regional perfusion measured with h13C-TB correlated with local CD34 expression and microvessel density (MVD) in these tumors.

**METHOD AND MATERIALS**

8 mice were implanted with A498 RCC tumors. 4 (SR) were treated with sunitinib daily; the other 4 were UT. SR mice were imaged at resistance (when regrowth was seen, 14–54 days). UT mice were imaged when tumors reached 20 mm in size. MRI was performed at 4.7 T using: (1) Anatomical 1H-T2-weighted images using rapid acquisition with refocused echoes, TR/TE=3000/80ms, 128x128 matrix, 2mm slice, 3.5cm FOV, (2) h13C-TB perfusion maps using 2D balanced steady state free precession, 128x128 matrix, 8.5cm FOV, 3.3mm slice, 512ms/frame, 100 frames. Tumors were sectioned along the imaging plane, stained with immunofluorescent-labeled CD34, and scanned into virtual slides. 75 ROI (0.25mm2) were selected for each MR perfusion map (Fig B and F) and the MVD of each matching location was determined in the pathologic specimen (Fig C and G).

**RESULTS**

1H images of UT and SR tumors are shown in Figures A and B, respectively (outlined in blue). Superimposed perfusion maps from h13C-TB MRI (green) is shown in example UT (Fig B) and SR (Fig F) tumors. Figures C-D and G-H show CD34 expression, showing qualitative similarity to respective MR perfusion maps. Measured perfusion was greater in UT relative to SR tumors (p < 0.05, Fig I), but the average MVD was lower (p < 0.05) (Fig. J). However, within each UT or SR tumor the local MVD correlated with local perfusion (Fig K-L).

**CONCLUSION**

h13C-TB MRI provides high-SNR perfusion mapping even in low flow areas. There is significant correlation between local perfusion and MVD within each tumor. However, resistance tumors demonstrate lower perfusion and greater MVD relative to untreated tumors, suggesting that MVD alone is not predictive of perfusion when assessing antiangiogenic response.

**CLINICAL RELEVANCE/APPLICATION**

h13C-tert-butanol provides noninvasive high-SNR quantitative perfusion mapping even in treated tumors with low flow. Improved radiologic-pathologic correlation is necessary to increase our accuracy in predicting therapeutic response and resistance.

**SSM13-05  Added Value of CT Textural Analysis Compared to PET-CT alone in Differentiating Benign from Malignant Adrenal Lesions?**

Wednesday, Nov. 30 3:40PM - 3:50PM Room: S504CD

Participants
Shaunagh McDermott, FFR(RCSI), Boston, MA (Presenter) Nothing to Disclose
Leslie K. Lee, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Rodrigo Canellas, MD, Cambridge, MA (Abstract Co-Author) Nothing to Disclose
Hei Shun Yu, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Michael S. Gee, MD, Jamaica Plain, MA (Abstract Co-Author) Nothing to Disclose
Michael A. Blake, MBBCh, Boston, MA (Abstract Co-Author) Editor with royalties, Springer Science+Business Media Deutschland GmbH

**PURPOSE**

To assess the added value of CT textural analysis to contrast-enhanced PET-CT in differentiating benign from malignant adrenal lesions.

**METHOD AND MATERIALS**

We retrospectively assessed a series of 45 consecutive patients who had undergone contrast-enhanced PET-CT scan prior to a percutaneous biopsy of an adrenal lesion over a 10 year period. Final diagnosis was based on pathology or stability on imaging for at least one year. CT textural analysis (CTTA) was assessed using a commercially available research software program (TexRAD) that applies a filtration-histogram technique for characterizing tumor heterogeneity. Filteration step selectively filters and extracts texture features at different anatomical scales varying from 2mm (fine features) to 6mm (coarse features). Receiver operating characteristics (ROC) was performed to assess sensitivity and specificity for differentiating between the benign and malignant adrenal lesions. The PET scan was considered positive if the adrenal lesion qualitatively showed greater FDG uptake than the reference hepatic uptake.
RESULTS
The final diagnosis was benign in 16 cases and malignant in 29 cases. The mean gray level intensity for medium filter (SSF 4) was significantly higher for benign compared to malignant adrenal lesions (4.7 vs. -8.6) (p < 0.005). Using a mean gray level intensity cutoff of -2 on SSF 4, the sensitivity was 75% and specificity was 69% for the detection of a malignant adrenal lesion (AUC 0.76). The sensitivity and specificity for PET was 69% and 100%, respectively. Using a combined approach, if a mean gray level signal intensity cutoff of -2 was utilized in patients with an adrenal that showed greater than hepatic FDG uptake, then the overall sensitivity was 90% and the specificity was 100%.

CONCLUSION
Performing CT textural analysis on PET positive adrenal nodules increases the sensitivity of the study.

CLINICAL RELEVANCE/APPLICATION
Many patients being worked up for malignancy now undergo a PET-CT scan and the addition of CT textural analysis may increase the study’s diagnostic accuracy and reduce the need for further imaging or tissue sampling.

SSM13-06 Accuracy of the of NO Nodal Staging of the High-risk Prostatic Carcinoma based on 18F-fluorocholine-PET/MRI, Comparison with Surgical Findings

Wednesday, Nov. 30 3:50PM - 4:00PM Room: S504CD

Participants
Jiri Ferda, MD, PhD, Plzen, Czech Republic (Presenter) Nothing to Disclose
Eva Ferdova, MD, Plzen, Czech Republic (Abstract Co-Author) Nothing to Disclose
Jan Baxa, MD, PhD, Plzen, Czech Republic (Abstract Co-Author) Nothing to Disclose
Milan Hora, MD, PhD, Plzen, Czech Republic (Abstract Co-Author) Nothing to Disclose
Ondrej Hes, MD, PhD, Plzen, Czech Republic (Abstract Co-Author) Nothing to Disclose

PURPOSE
To evaluate the possibilities of pelvic nodal-staging assessment of the high-risk prostatic carcinoma using 18F-fluorocholine-PET/MRI and to compare findings with surgery.

METHOD AND MATERIALS
25 men (mean age 66.8 years, range 59 - 78) with by biopsy confirmed prostatic carcinoma with Gleason score 8 and more were examined before surgery using 18F-fluorocholine-PET/MRI and with finding of no positive node (N0 N-stage based on PET/MRI) were recommended to radical prostatectomy. All examination were delayed 15 min after intravenous application of 18F-fluorocholine in the dose 1,25 MBq per kilogram of body weight. The imaging included T2 STIR, DWI and dynamic gadolinium enhanced GRE T1 imaging, the PET acquisition last 15 min. All examinations were completed with whole trunk PET/MRI acquisition. The TNM staging was evaluated. In all men, the radical surgery was performed including pelvic lymph node resection. The comparison of the histopathological results were compared with those obtained by PET/MRI according nodal staging and according local T-staging.

RESULTS
25 surgeries were performed. There were found 22 true negative findings, and three false negative findings including one micrometastase. The negative predictive value of pelvic lymph node metastase reached 88.0% (22/25) excluding micrometastase, NPV rised to 92.0% (23/25). One deviation between T2 or T3 size was noted after histopathological evaluation, one case was evaluated as T3B by PET/MRI, after histopathological evaluation the stage was set as T2C; in one case, the T2b based on PET/MRI was evaluated as T2C, no other deviation was noted nor between T2 or T3 subcategories, nor in T3A subcategory. It results in 92% (23/25) accuracy in local staging.

CONCLUSION
The 18F-fluorocholine PET/MRI derived pelvic lymph N-staging N0 and T-stage in prostatic carcinoma reaches sufficient results and provides sufficient information in the treatment decisions.

CLINICAL RELEVANCE/APPLICATION
In prostatic carcinoma, the negative pelvic nodal staging and T-staging using 18F-fluorocholine PET/MRI exhibits sufficient clinical value in the decisions to perform radical prostate surgery.
LEARNING OBJECTIVES

1) Explain the importance and relevance of an MRI-guided approach to prostate cancer treatment (EBRT, HDR brachytherapy). 2) Explain the rationale for GTV-tumour targeted approach versus whole gland prostate treatment. 3) Discuss the interventional program at Princess Margaret Cancer Centre, including demonstration of the innovative MRI-guided HDR brachytherapy suite.

ABSTRACT

With the evolution of advancements in image-guided technologies, radiation therapy treatment accuracies and efficiencies in delivery continue to improve as well as a reduction in associated toxicities. But despite these improvements, local recurrence of prostate cancer remains prevalent. Localized prostate cancer is not limited to the prostate gland. As such, regions of tumor-density within the prostate can serve as the gross tumour volume (GTV). Adopting a tumour-targeted radiation therapy (RT) approach to treat prostate cancer is one that may improve the therapeutic ratio by decreasing normal tissue toxicities while improving local control. This can be accomplished by adopting magnetic resonance imaging (MRI) as the image-guided modality for external beam radiation therapy (EBRT) and high dose rate (HDR) brachytherapy for prostate cancer. MRI provides excellent soft tissue contrast without exposing the patient to ionizing radiation. It also allows for more specialized delineation of anatomic structures and disease, thereby allowing more accurate visualization of the target volume. Interventional radiotherapy using MRI-guidance can increase target precision while allowing for dose escalation and normal tissue avoidance. Our institution employs MRI for interventional prostate HDR and EBRT treatment. Adopting a tumor-targeted method for prostate cancer is an innovative approach to prostate cancer RT treatment.
Participants
Douglas S. Katz, MD, Mineola, NY, (dkatz@winthrop.org) (Moderator) Nothing to Disclose
Mariam Moshiri, MD, Seattle, WA, (moshiri@uw.edu) (Moderator) Consultant, Reed Elsevier; Author, Reed Elsevier;

LEARNING OBJECTIVES

1) To overview the current role of ultrasound, CT, and MR in the imaging of non-pregnant and pregnant women with known or suspected acute pelvic conditions, with an emphasis on evidence-based information and societal guidelines, to discuss the advantages and disadvantages of ultrasound, CT, and MR for imaging the acute female pelvis in several common/relatively common scenarios to overview specific protocols for performing effective and accurate ultrasound, CT, and MR imaging examinations of the acute female pelvis, to discuss current controversies regarding the roles of ultrasound, CT, and MR in the imaging of the acute female pelvis.

ABSTRACT

In this session, we will review CT radiation dose, associated risks, and strategies to minimize patient dose. Cases will be shown to highlight the diagnostic accuracy of CT in the ED as well as to illustrate how protocols may be optimized depending upon the leading differential diagnosis.

URL

SPSC43A US

Participants
Sheila Sheth, MD, Cockeysville, MD, (ssheth@jhmi.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) To review radiation dose associated with current pelvic CT imaging. 2) To describe available strategies for minimizing radiation dose. 3) To identify CT imaging findings in a variety of diagnoses in both pregnant and non-pregnant patients presenting with acute pelvic pain.

ABSTRACT

In this session, we will review CT radiation dose, associated risks, and strategies to minimize patient dose. Cases will be shown to highlight the diagnostic accuracy of CT in the ED as well as to illustrate how protocols may be optimized depending upon the leading differential diagnosis.

URL

SPSC43B CT

Participants
Ana P. Lourenco, MD, Providence, RI, (alourenco@lifespan.org) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES

1) Review the Role of MRI in acute Pelvic conditions in the Pregnant and Nonpregnant Patient in Case-Based format. 2) Discuss the role of MRI in evaluating indeterminant lesions at US and CT in acute GYN conditions.

ABSTRACT

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at:

https://www.rsna.org/Honored-Educator-Award/

Christine O. Menias, MD - 2013 Honored Educator
Christine O. Menias, MD - 2014 Honored Educator
Christine O. Menias, MD - 2015 Honored Educator
Christine O. Menias, MD - 2016 Honored Educator
Participants
Theodora A. Potretzke, MD, Madison, WI (Presenter) Nothing to Disclose
Adam Froemming, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Michael L. Wells, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Naoki Takahashi, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Perry J. Pickhardt, MD, Madison, WI (Abstract Co-Author) Co-founder, VirtuoCTC, LLC; Stockholder, Cellectar Biosciences, Inc; Stockholder, SHINE Medical Technologies, Inc; Research Grant, Koninklijke Philips NV
Meghan G. Lubner, MD, Madison, WI (Abstract Co-Author) Grant, Koninklijke Philips NV; Grant, Johnson & Johnson;
Anup S. Shetty, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Richard Tsai, MD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Monica R. Drylewicz, MD, PhD, Saint Louis, MO (Abstract Co-Author) Nothing to Disclose
Matthew S. Davenport, MD, Cincinnati, OH (Abstract Co-Author) Royalties, Wolters Kluwer nv;
Benjamin Mervak, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
Brian T. Welch, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose
Veena R. Iyer, MD, Minneapolis, MN (Abstract Co-Author) Nothing to Disclose
Seema Mukherjee, MD, White Plains, NY (Abstract Co-Author) Nothing to Disclose
Shannon P. Sheedy, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose

TEACHING POINTS
1) Recognize imaging findings seen in disorders of the genitourinary systems. 2) Develop differential diagnosis based on the clinical information and imaging findings. 3) Recognize the clinical importance of diagnosis.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Naoki Takahashi, MD - 2012 Honored Educator
Perry J. Pickhardt, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2014 Honored Educator
Meghan G. Lubner, MD - 2015 Honored Educator
**Prostate MRI (Hands-on)**

Thursday, Dec. 1 8:00AM - 10:00AM Room: S401AB

**GU MR**

AMA PRA Category 1 Credits™: 1.50
ARRT Category A+ Credits: 1.50

---

**Participants**

Jelle O. Barentsz, MD, PhD, Nijmegen, Netherlands *(Presenter)* Research Consultant, SPL Medical
Jurgen J. Futterer, MD, PhD, Nijmegen, Netherlands, (jurgen.futterer@radboudumc.nl) *(Presenter)* Research Grant, Medtronic, Inc; Research Grant, Siemens AG
Roel D. Mus, MD, Nijmegen, Netherlands *(Presenter)* Nothing to Disclose
Geert M. Villeirs, MD, PhD, Ghent, Belgium *(Presenter)* Nothing to Disclose
Baris Turkbey, MD, Bethesda, MD *(Presenter)* Nothing to Disclose
Jeffrey C. Weinreb, MD, New Haven, CT *(Presenter)* Nothing to Disclose
Adam Froemming, MD, Rochester, MN *(Presenter)* Nothing to Disclose
Antonio C. Westphalen, MD, Mill Valley, CA, (antonio.westphalen@ucsf.edu) *(Presenter)* Scientific Advisory Board, 3DBiopsy LLC; Research Grant, Verily Life Sciences LLC
Rianne R. Engels, Cuijk, Netherlands *(Presenter)* Nothing to Disclose
Joyce G. Bomers, Nijmegen, Netherlands *(Presenter)* Nothing to Disclose
Renske L. Van Delft, Nijmegen, Netherlands *(Presenter)* Nothing to Disclose
Laura I. Stoilescu, Nijmegen, Netherlands *(Presenter)* Nothing to Disclose
Daniel J. Margolis, MD, Los Angeles, CA *(Presenter)* Nothing to Disclose
Patrik Zamecnik, MD, Heidelberg, Germany *(Presenter)* Officer, SPL Medical BV
Sadhna Verma, MD, Cincinnati, OH *(Presenter)* Nothing to Disclose

**LEARNING OBJECTIVES**

1) Understand the Pi-RADS v2 Category assessment to detect and localize significant cancer for both peripheral zone and transitional zone lesions. 2) Recognize benign pathology like inflammation and BPH and to differentiate these from significant prostate cancers.

**ABSTRACT**

In this Hands-On Workshop, the participants will be able to review up to 40 multi-parametric MRI cases with various prostatic pathology using a dedicated workstation. Focus will be on the overall assessment of Pi-RADS v2 category, which enables them to score the probability of the presence of a significant cancer in patients with elevated PSA and/or clinical suspicion. All cases are from daily non-academic practice, and have various levels of difficulty. The cases include: easy and difficult significant peripheral-transition- and central zone cancers, inflammation, BPH, and the most common pitfalls. Internationally renowned teachers will guide the participants during their Pi-RADS v2 scoring. There will be 50 workstations available. Participants will be able to use their own laptops through a secure WiFi connection.

**Active Handout:** Renske Lian Van Delft

Participants
Clare M. Tempany-Afdhal, MD, Boston, MA (Moderator) Research Grant, InSightec Ltd; Consultant, Profound Medical Inc; Advisory Board, Profound Medical Inc; Spouse, Employee, Spring Bank Pharmaceuticals, Inc; Spouse, Consultant, AbbVie Inc; Spouse, Consultant, Bristol-Myers Squibb Company; Spouse, Consultant, Gilead Sciences, Inc; Spouse, Consultant, Merck & Co, Inc; Spouse, Consultant, Vertex Pharmaceuticals Incorporated; Spouse, Consultant, Echosens SA; Spouse, Consultant, GlaxoSmithKline plc; Spouse, Consultant, Novartis AG; Spouse, Consultant, Boehringer Ingelheim GmbH; Spouse, Consultant, Ligand Pharmaceuticals, Inc; Spouse, Consultant, Medgenics Inc; Spouse, Consultant, Kadmon Corporation, LLC; Spouse, Consultant, Johnson & Johnson; Spouse, Consultant, Achillion Pharmaceuticals, Inc; Spouse, Stock options, Spring Bank Pharmaceuticals, Inc; Spouse, Stock options, Medgenics, Inc; Spouse, Editor, John Wiley & Sons, Inc

LEARNING OBJECTIVES
1) Prostate MRI in the PI-RADS era: Detection, diagnosis and MRI guided/targeted interventions Overview- Current issues in Prostate cancer care MpMRI Interpretation and Reporting using PI-RADS v2 MR assessment and reporting will be reviewed and attendees will learn how to apply PI-RADS v2 MpMRI quantitative metrics- added value to PI-RADS? 2) To understand the complementary nature of quantitative metrics MpMR and prostate biopsy: when to biopsy and how Cognitive, fusion and In boreapproaches will be outlined Impact of PI-RADS on outcomes of prostate biopsy and treatment. Meta-analytic and otherreviews of population studies will be presented

ABSTRACT

Sub-Events

RC607-01 Overview - Current Issues in Prostate Cancer Care
Thursday, Dec. 1 8:30AM - 8:55AM Room: E450B

Participants
Clare M. Tempany-Afdhal, MD, Boston, MA, (ctempany@bwh.harvard.edu) (Coordinator) Research Grant, InSightec Ltd; Consultant, Profound Medical Inc; Advisory Board, Profound Medical Inc; Spouse, Employee, Spring Bank Pharmaceuticals, Inc; Spouse, Consultant, AbbVie Inc; Spouse, Consultant, Bristol-Myers Squibb Company; Spouse, Consultant, Gilead Sciences, Inc; Spouse, Consultant, Merck & Co, Inc; Spouse, Consultant, Vertex Pharmaceuticals Incorporated; Spouse, Consultant, Echosens SA; Spouse, Consultant, GlaxoSmithKline plc; Spouse, Consultant, Novartis AG; Spouse, Consultant, Boehringer Ingelheim GmbH; Spouse, Consultant, Ligand Pharmaceuticals, Inc; Spouse, Consultant, Medgenics Inc; Spouse, Consultant, Kadmon Corporation, LLC; Spouse, Consultant, Johnson & Johnson; Spouse, Consultant, Achillion Pharmaceuticals, Inc; Spouse, Stock options, Spring Bank Pharmaceuticals, Inc; Spouse, Stock options, Medgenics, Inc; Spouse, Editor, John Wiley & Sons, Inc

LEARNING OBJECTIVES
1) To understand the clinical issues and current concerns in Prostate Cancer care. 2) To learn and understand how to apply mpMRI PIRADSV2 in clinical practice. 3) To understand the potential of quantitative metrics from mpMRI which may help in interpretation. 4) To learn the role of mpMRI in prostate biopsy and understand the different approaches. 5) To Understand the role of MRI in prostate cancer therapy.

ABSTRACT

RC607-02 Mp MRI and PIRADS 2016 Update
Thursday, Dec. 1 8:55AM - 9:20AM Room: E450B

Participants
Katarzyna J. Macura, MD, PhD, Baltimore, MD, (kmacura@jhmi.edu) (Presenter) Author with royalties, Reed Elsevier

LEARNING OBJECTIVES
View learning objectives under the main course title.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Katarzyna J. Macura, MD, PhD - 2012 Honored Educator
Katarzyna J. Macura, MD, PhD - 2014 Honored Educator

RC607-03 The PI-RADS Version 2 Lexicon: Application by Radiologists Inexperienced in Prostate MRI Interpretation
Thursday, Dec. 1 9:20AM - 9:30AM Room: E450B

Awards
Cancer Detection Rates of Category "4" Lesions for PI-RADSv2 on Prostate mpMRI

Thursday, Dec. 1 9:30AM - 9:40AM Room: E450B

Participants
Matthew Greer, BS, Cleveland Heights, OH (Presenter) Nothing to Disclose
Joanna Shih, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Nathan S. Lay, PhD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Tristan Barrett, MBBS, BSc, Guildford, United Kingdom (Abstract Co-Author) Nothing to Disclose
Leonardo K. Bittencourt, MD, PhD, Rio De Janeiro, Brazil (Abstract Co-Author) Nothing to Disclose
Samuel Borovsky, MD, Washington, DC (Abstract Co-Author) Nothing to Disclose
Ismail M. Kabakus, MD, PhD, Ankara, Turkey (Abstract Co-Author) Nothing to Disclose
Yan Mei Law, MBBS, Singapore, Singapore (Abstract Co-Author) Nothing to Disclose
Jamie Marko, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Haythem M. Shebel, MD, Mansoura, Egypt (Abstract Co-Author) Nothing to Disclose
Francesca Mertan, BS, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Maria Merino, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Petro Pinto, Bethesda, MD (Abstract Co-Author) Nothing to Disclose
Peter L. Choyke, MD, Rockville, MD (Abstract Co-Author) Researcher, Koninklijke Philips NV; Researcher, General Electric Company; Researcher, Siemens AG; Researcher, iCAD, Inc; Researcher, Aspyрин Therapeutics, Inc; Researcher, Imaginab, Inc; Researcher, Aura Biosciences, Inc
Ronald M. Summers, MD, PhD, Bethesda, MD (Abstract Co-Author) Royalties, iCAD, Inc; ;
Baris Turkbey, MD, Bethesda, MD (Abstract Co-Author) Nothing to Disclose

PURPOSE
PI-RADS version 2 (v2) includes a detailed lexicon to guide scoring a lesion's level of suspicion. While the lexicon has been evaluated among experienced radiologists, a key intended benefit of PI-RADS v2 is to assist interpretation by radiologists without prostate MRI expertise. Thus, our aim was to evaluate the performance of radiologists inexperienced in prostate MRI interpretation in applying the PI-RADS v2 lexicon.

METHOD AND MATERIALS
Four radiology residents without prior prostate MRI training evaluated 40 prostate MRI exams. Readers were provided screen captures indicating the location of one specific lesion per case (20 in PZ; 20 in TZ), along with the PI-RADS v2 document. Readers scored the specified lesion for a wide array of lesion components. These exams had previously been evaluated by six expert prostate MRI radiologists as part of a national multi-center reproducibility study; experts' consensus readings served as reference. Reader-averaged percent agreement with the reference was computed for the lexicon features (considered excellent when >80%).

RESULTS
In PZ, novice radiologists' agreement with the expert-derived reference was excellent (84%-90%) for features related to DWI (focal shape; marked high b-value hyperintensity; marked ADC hypointensity; DWI >3). Though moderate (75%) for DCE (+). In TZ, agreement was excellent for T2 encapsulation (86%), though moderate (61%-78%) for other T2WI features (circumscribed shape; lenticular shape; heterogeneity; moderate hypointensity; T2 >3) and moderate (74%-81%) for DWI features. Agreement for PI-RADS >3 was 89% in PZ and 75% in TZ. Kappa values were also generally better for PZ than for TZ features (average kappa 0.57 and 0.32 respectively), with moderate to substantial agreement for all PZ features except DCE (fair), but nonsignificant slight agreement for heterogeneity, intensity, and invasiveness, and negative kappa for lenticular, in the PZ. For overall PI-RADS >3, kappa was 0.61 in PZ and 0.40 in TZ.

CONCLUSION
Novice radiologists performed reasonably well using the PI-RADS v2 lexicon, achieving excellent agreement with expert readers in PZ for DWI and overall PI-RADS >3. However, performance was weaker for DCE in PZ and for numerous TZ features.

CLINICAL RELEVANCE/APPLICATION
The results are encouraging regarding novice radiologists' ability to apply PI-RADS v2 lexicon in practice. Further education should target DCE in the PZ and textural T2-related features in the TZ.
RESULTS
Among all readers a total of 654 lesions were detected. There were 3, 70, 115, 212, 305, and 161 lesions at PIRADS =1, 2, 3, 4, and 5, respectively. Of the 305 PIRADS =4 lesions, 79.7% were in the peripheral zone (PZ) and 20.3% were in the transition zone (TZ). Of the PZ lesions, 89 lesions were scored PIRADS =3 on DWI and positive in DCE (3+1) to be overall PIRADS =4. Of the TZ lesions, 4 were graded PIRADS =3 on T2W and PIRADS =5 on DWI. The CDR for PIRADS =3 was 33.3% for CS lesions. For all PIRADS =4 lesions the CDR was 80.1% and 72.9% for all and CS lesions. PIRADS =3+1 had a CDR of 67.1% for all tumors and 56.9% for CS tumors. With the PIRADS =3+1 lesions removed, the CDR for PIRADS =4 improved to 87.7% and 82.2% for all and CS lesions. This was similar to the CDR for PIRADS =5 of 90.4% and 89.7% for all and CS lesions.

CONCLUSION
On PI-RADSV2 the category of PIRADS =4 represents a diverse subset of lesions. PIRADS =3+1 lesions decrease the CDR of PIRADS =4 and may be better represented as a separate category.

CLINICAL RELEVANCE/APPLICATION
PIRADS v2 characterizes prostate cancer on MRI. Further refinement to optimize its utility as a reporting tool, especially for PIRADS =4 lesions, may improve cancer detection rates on MRI.

PURPOSE
To evaluate the combination of ADC values with PI-RADS v2 for the diagnosis of clinically significant prostate cancer (CS-PCa).

METHOD AND MATERIALS
This retrospective IRB approved study included 170 men whom underwent 3-Tesla prostate MRI and subsequent MR/US fusion biopsies at a single non-academic center from 11/2014 to 3/2016. All scans were performed with a surface coil and included T2, diffusion-weighted (b-values of 10, 400, 800 and 1200) and dynamic contrast enhanced sequences. Suspicious findings were classified using Prostate Imaging Reporting and Data System (PI-RADS) v2, and all were targeted using MR/US fusion biopsies. Mixed effect logistic regression analyses were used to determine the ability of PIRADS v2 alone and combined with ADC values to predict CS-PCa (Gleason score ≥7). Performances of PIRADS v2 alone and combined with ADC values were compared utilizing the area under receiver-operating characteristic curves (Az ROC). As categories are more practical in clinical situations than numeric values, an additional model with ADC categories of ≤800, 800-1000 and ≥1000 was performed.

RESULTS
A total of 282 suspicious lesions were detected, 71 of which were CS-PCa, 33 were Gleason score 3+3 PCa, and 168 were negative. The overall PIRADS v2 score is a statistically significant predictor of CS-PCa (p<0.001). The area under the ROC curve for PI-RADS v2 to discriminate between patients with and without CS-PCa was 0.69 (95% CI=0.63-0.76). ADC values and ADC categories were both independent predictors on univariate models (P<0.001), Az ROC curve=0.77, 95% CI=0.71-0.83, and 0.74, 95% CI=0.68-0.79, respectively. Both PIRADS v2 and ADC value categories are significant predictors of CS-PCa in a multivariate analysis (P<0.05). The Az ROC of PIRADS v2 alone and PIRADS v2 with ADC categories are significantly different (P=0.005). Further analysis of the ROC curves also shows the main benefit of utilizing ADC values is better discrimination of PI-RADS 4 lesions.

CONCLUSION
ADC values improve the PI-RADS v2 prediction of clinical significant prostate cancer.

CLINICAL RELEVANCE/APPLICATION
Our study suggests that a PI-RADS v2 4 lesion should perhaps be upgraded to PI-RADS v2 5 when associated with an ADC value ≤ 800.
Matthew D. McInnes, MD, FRCP, Ottawa, ON (Abstract Co-Author) Nothing to Disclose
Wael M. Shabana, MD, Ottawa, ON (Abstract Co-Author) Nothing to Disclose

Purpose:
Extraprostatic extension (EPE) of prostatic carcinoma is a critical prognostic outcome; however, pre-operative diagnosis of EPE remains challenging. This study compares previously described subjective and quantitative imaging features of EPE using mp-MRI.

Method and Materials:
With IRB approval, 115 men underwent mp-MRI and radical prostatectomy (RP) between 2012-2015. Gleason scores were: 3+3=6 (N=3), 3+4=7 (48), 4+3=7 (49), 4+4=8 (N=5) and 4+5=9 (N=10). Two blinded radiologists evaluated mp-MRI for: 1) EPE (using the PI-RADS v1.0 scoring system) and 2) length of capsular contact. Dominant tumor foci were co-registered from RP to ADC map and 1) mean, 50th, 25th and 10th centile ADC histogram values and 2) first order ADC texture features (Skewness, Kurtosis, Entropy) were calculated. Outcomes were studied using chi-square, logistic regression and ROC analysis.

Results:
Mean age and PSA were 63.4 ± 4.8 years and 8.0 ± 11.7 ng/mL with no difference between groups (p>0.05). At histopathology, 71.3% (82/115) of patients had EPE. PI-RADS version 1.0 score of ≥3 yielded ROC-AUC of 0.62 (CI 0.47-0.79) with sensitivity/specificity (SENS/SPEC) of 71.4%/53.8% for diagnosis of EPE. Length of capsular contact was greater with EPE (22.4 ± 15.2 vs 14.2 ± 7.0 mm), although the difference was not significant (p=0.06). ROC-AUC was 0.69 (CI 0.54-0.86) with ≥ 19 mm yielding SENS/SPEC of 57.1%/76.9% for EPE. There was no difference in mean ADC, 10th, 25th or 50th centile ADC values between groups (p>0.05). ADC kurtosis and skewness did not differ between groups (p>0.05); however, ADC entropy was larger with EPE (7.67 ± 1.26 vs 6.48 ± 1.10), (p=0.01). ADC Entropy yielded an ROC-AUC of 0.78 (CI 0.64-0.91) with SENS/SPEC of 57.1%/92.3% for diagnosis of EPE using a threshold of ≥7.83. There was no difference comparing ROC-AUC between subjective and quantitative metrics, (p=0.20).

Conclusion:
ADC entropy was the most useful quantitative metric for evaluation of EPE. Length of capsular contact also showed some value; however, skewness, kurtosis and ADC histogram values were not useful. Compared to subjective assessment, quantitative metrics had higher specificity but lower sensitivity for diagnosis of EPE, although the difference in accuracy was not significant.

Clinical Relevance/Application:
Diagnosis of EPE in prostate cancer using mp-MRI is challenging, ADC Entropy and length of capsular contact may improve specificity compared to subjective analysis alone.

Learning Objectives:
View learning objectives under the main course title.

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

Learning Objectives:
View learning objectives under the main course title.

Participants:
Clare M. Allen, MBCh, London, United Kingdom (Presenter) Nothing to Disclose

Learning Objectives:
View learning objectives under the main course title.

Participants:
Jinxing Yu, MD, Richmond, VA (Presenter) Nothing to Disclose
Ann S. Fulcher, MD, Midlothian, VA (Abstract Co-Author) Nothing to Disclose
Mary A. Turner, MD, Richmond, VA (Abstract Co-Author) Nothing to Disclose
William C. Behl, MS, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Sarah G. Winks, MD, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Anna L. Ware, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Meagan Sok, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Baruch Grob, Richmond, VA (Abstract Co-Author) Nothing to Disclose
Lance Hampton, Richmond, VA (Abstract Co-Author) Nothing to Disclose

Purpose:
To determine the detection rate of prostate cancer by TRUS guided biopsy in patients with elevated PSA, negative mp-MRI and no prior prostate biopsy and to determine the necessity of performing a baseline standard systematic prostate biopsy if mp-MRI is negative.

Method and Materials:
Materials and Methods: A total of 102 consecutive men with elevated PSA, negative mp-MRI, and no prior TRUS guided prostate biopsy underwent standard systematic prostate biopsy (12 cores). Histopathology results including presence of prostate cancer...
PURPOSE
To determine the safety and efficacy of in-bore magnetic resonance-guided prostate biopsy (MRGB) for detection of clinically significant disease (CSD) in untreated men with known or suspected prostate cancer (PCa), and to compare MRGB results by mp-MRI assessment grade.

METHOD AND MATERIALS
512 patients underwent multiparametric magnetic resonance imaging (Mp-MRI) followed by MRGB at one of three centers in this IRB-approved, HIPAA-compliant, retrospective study. Exclusion criteria were prior prostate cancer therapy and incomplete Mp-MRI (n = 51). Patients (n = 461) were analyzed in two subcohorts: no prior PCa (NP) (n = 381) and active surveillance (AS) (n = 80).

RESULTS
Mean patient age was 66 years, median prostate-specific antigen (PSA) was 7.5 ng/mL, and median prostate volume was 54 cc. A mean of 1.7 targets was sampled per gland. Significant adverse events (urosepsis and hematuria with obstruction) occurred in 1% (5/461). Overall PCa detection rates were 51% per patient (233/461) and 37% per lesion (282/757). 65% (151/233) of men with detected PCa had CSD. Per patient PCa detection rates in the NP and AS subcohorts were: 47% (178/381) and 69% (55/80), respectively, significantly higher in the AS group (p < 0.001). CSD was detected in 10% (47/451), 43% (96/225) and 84% (68/81) of lesions with Mp-MRI assessment grades of 3, 4 and 5, respectively. Older age, higher PSA, and lower prostate volume predicted PCa detection. Logistic regression was performed to identify predictors for detection of PCa and CSD.

CONCLUSION
In-bore MRGB is safe and high-yield for detection of CSD among men with high and very high suspicion targets (grades 4 and 5). The yield of MRGB for CSD among men with intermediate suspicion targets (grade 3) is lower, such that it may be reasonable to defer biopsy in select cases.

CLINICAL RELEVANCE/APPLICATION
MRGB is a safe and high-yield technique for detecting clinically significant PCa and may be useful in men with suspected PCa but no prior definitive diagnosis and those on AS.
To retrospectively evaluate whether Prostate Imaging Reporting and Data System version 2 (PI-RADS v2) is helpful for the detection of clinically significant prostate cancer.

METHOD AND MATERIALS
Consecutive patients whose PSA level elevated underwent mpMRI (T2WI, DWI and DCE, at 1.5 or 3 Tesla scanner) and transrectal US-guided biopsy between January 2014 and December 2015. An experienced radiologist blinded to any clinical information was assigned to score each patient according PI-RADS v2. Six to 14 biopsy cores were sampled per patient depending on MR detection and operator. Significant prostate cancer was defined as no less than grade 2 according to 2014 International Society of Urological Pathology (ISUP) grading system. The Cochran-Armitage trend test was used to analyze the association between PI-RADS score and significant cancer at biopsy.

RESULTS
A total of 529 patients were included in the analysis. Patients' mean (±sd) age, prostate-specific antigen were 67.2 (±8.9) years and 51.32 (±194.22) ng/mL, respectively. Overall, biopsies were negative, clinically insignificant and clinically significant in 224 (42.3%), 71 (13.4%) and 234 (44.2%) patients, respectively. Twelve of 173 (6.9%) men with PI-RADS scores of 1 and 2 had significant prostate cancer. The negative predictive value of PI-RADS scores of 1 and 2 for clinically significant prostate cancer was 93.1%. PI-RADS scores of 3 to 5 gave a sensitivity of 94.9% and a specificity of 54.8%. Receiver-operator curve analysis gave an area under the curve of 0.850.

CONCLUSION
PI-RADS v2 is helpful in predicting significant prostate cancer and can be used in the decision-making process for prostate biopsy. However, a small amount of significant cancer is misdiagnosed among PI-RADS score of 1 and 2.

CLINICAL RELEVANCE/APPLICATION
MpMRI provides extensive anatomical and functional imaging of the prostate. PI-RADS is useful in predicting clinically significant prostate cancer which would be important for guiding biopsy and treatment.
SSQ09-01  Shearwave Sonoelastography Evaluation of Renal Allograft: Intergroup Comparison Between Stable Allograft, Dysfunction

Participants
Nitin P. Ghonge, MD, New Delhi, India (Presenter) Nothing to Disclose
Mohita Mohan, MBBS, New Delhi, India (Abstract Co-Author) Nothing to Disclose

PURPOSE
To evaluate whether Shearwave Sonoelastography (SSE) could differentiate stable renal graft from acute graft dysfunction and chronic graft dysfunction and to correlate SSE values with resistive index (RI), serum creatinine (Cr), nankivelle GFR (Ngfr) and biopsy findings.

METHOD AND MATERIALS
Total of 60 post renal transplant patients were assessed by ultrasonography (US), SSE and Doppler US. Three major groups; stable, Acute graft Dysfunction (AD) and Chronic graft dysfunction (CD) were segregated based on clinical parameters. Recipients with skin-allograft distance > 3cms, peri-transplant fluid collection and/or recipients with allograft parenchymal thickness < 1cm were excluded from the study. AD was defined as an abrupt reduction in renal functions fulfilling any one or more criteria; Ngfr < 50 ml/min, an absolute increase in Cr ≥ 0.3 mg/dL or increase of ≥ 50%, proteinuria +ve and prior to the episode baseline values similar to the stable group. CD was defined as progressive worsening of renal functions for > 3 months without recovery (Ngfr<50ml/min, increased Cr, proteinuria). RI of segmental arteries and SSE at upper,mid interpolar and lower pole were taken and mean values were calculated. BANFF 07 score was used in cases where graft biopsy was done.

RESULTS
Out of 60, 30 patients were having graft dysfunction; (AD - 19, CD - 11). Mean renal graft parenchymal stiffness (PS) was 12.25±6.72 kPa (range 3.94 - 32.98) and in stable graft, AD and CD was 8.51±2.44, 11.06±2.91 and 24.50±4.49 kPa respectively. SSE was able to differentiate stable graft from AD (p< 0.01) and CD (p< 0.001). PS values of chronic allograft nephropathy (CAN). Grade 1 differed significantly from grade 2 (p 0.02). However, there is no significant difference between grade 2 and grade 3. PS showed a highly significant negative correlation with Ngfr (Pearson r:-0.725, p:<0.001) and positive correlation with RI (r:0.562, p:<0.001) and Cr (r:0.714, p<0.001).

CONCLUSION
SSE can differentiate stable graft from AD and CD. The inverse correlation of SSE-based Parenchymal Stiffness with Ngfr and positive correlation with RI and Cr shows that SSE can effectively reflect functional status of the renal graft.

CLINICAL RELEVANCE/APPLICATION
SSE reflects the graft’s functional status and grade of fibrosis. Increase of Parenchymal Stiffness over time can predict renal graft failure and progression to Chronic Allograft Nephropathy and consequent need for immunosuppressive drugs regimes.

SSQ09-02  Quantifying Renal Lipid Deposition and Functional Assessment with MR Imaging in Diabetic Nephropathy

Participants
Ying-Lian Feng, MD, Nanjing, China (Presenter) Nothing to Disclose
Shenghong Ju, MD, PhD, Nanjing, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
To determine the difference in renal lipid deposition and water molecular diffusion features among non-diabetic volunteers and type 2 diabetic patients without and with microalbuminuria by using Dixon imaging and diffusion tensor imaging (DTI).

METHOD AND MATERIALS
A total of 38 diabetic volunteers (normoalbuminuria: n = 20; microalbuminuria: n = 18) and 14 healthy volunteers were included in this study. Quantified magnetic resonance imaging (MRI) parameters including Dixon imaging parameters (renal fat fraction [RFP] and subcutaneous fat fraction [SFP]) and DTI parameters (mean values of fractional anisotropy [FA], apparent diffusion coefficient [ADC], and eigenvalues [λ]) were measured. All of the MRI parameters were compared among cohorts using one-way ANOVA with Bonferroni post hoc analysis. Correlations between DTI imaging parameters and estimated glomerular filtration rate
(eGFR) were evaluated.

RESULTS
Renal lipid percentage in microalbuminuric group was significantly higher compared with normoalbuminuric group and healthy volunteers group (6.2% ± 1.6%, 5.1% ± 0.9% and 4.6% ± 0.6%, respectively; P < .001). However, subcutaneous fat percentage in microalbuminuric group was significantly lower than the other two groups (81.8% ± 3.9%, 85.1% ± 2.9% and 86.0% ± 1.8%, respectively; P < .002). Both cortical and medullary FA values were reduced in microalbuminuric group (cortex: r = 0.222 ± 0.045; medulla: r = 0.306 ± 0.059) than in normoalbuminuric group (cortex: r = 0.260 ± 0.027, P < .002; medulla: r = 0.392 ± 0.050, P < .000) and healthy volunteers (cortex: r = 0.254 ± 0.032, P < .002; medulla: r = 0.442 ± 0.032, P < .000). The cortical ADC values in the microalbuminuric group ([2.4 ± 0.3] × 10⁻³ mm²/s) was significantly lower than the normoalbuminuric group ([2.6 ± 0.3] × 10⁻³ mm²/s). There were positive correlations between eGFR and FA (cortex: r = 0.52, P = .000; medulla: r = 0.395, P = .003).

CONCLUSION
Dixon imaging and DTI may serve as useful non-invasive biomarkers in evaluating the progression of diabetic nephropathy.

CLINICAL RELEVANCE/APPLICATION
(Dealing with Dixon and DTI imaging)”Dixon and DTI imaging of renal parenchyma may be useful in monitoring renal lipid deposition and water molecular diffusion features for patients with type 2 diabetes.”

SSQ09-03 Shear Wave Elastography Evaluation of Renal Transplant Fibrosis

Participants
Heather M. Early, MD, Folsom, CA (Presenter) Nothing to Disclose
Ellen Cheang, MD, Sacramento, CA (Abstract Co-Author) Nothing to Disclose
Jorge Aguilara, BS, Sacramento, CA (Abstract Co-Author) Nothing to Disclose
Ghaneh Fananapazir, MD, Sacramento, CA (Abstract Co-Author) Nothing to Disclose
John P. McGahan, MD, Sacramento, CA (Abstract Co-Author) Nothing to Disclose

PURPOSE
To evaluate the utility of 2D Shear Wave Elastography (SWE) in accurately detecting renal allograft fibrosis. To find a noninvasive, low-cost method for monitoring and predicting renal allograft outcomes.

METHOD AND MATERIALS
70 renal transplant recipients were prospectively studied at our institution between August 2015 through February 2016 who were scheduled for either standard-of-care 3-month renal allograft biopsy or in patients suspected of having allograft dysfunction. B-mode and Doppler ultrasound of the entire kidney and SWE of the select region to be biopsied was performed using the General Electric (GE) LOGIQ E9 system prior to biopsy. Cortical and medullary shear wave measurements were acquired and post-processed separately. The median and mean results of 10 SWE measurements for each the cortex and the medulla were computed separately. The median and mean results of 10 SWE measurements for each the cortex and the medulla were computed separately. The median and mean results of 10 SWE measurements for each the cortex and the medulla were computed separately. The median and mean results of 10 SWE measurements for each the cortex and the medulla were computed separately.

RESULTS
Upon separating the median and mean SWE results for each the cortex and medulla, no statistical significance was found for mean cortical, median cortical or mean medullary SWE values (p-values: 0.32, 0.37 and 0.06, respectively) in correlation to fibrosis. Only the univariate median medulla SWE values reached statistical significance (p = 0.044). We further found that for every unit increase in the median medulla shear wave measurement, the odds of fibrosis increase by about 20%. Low medulla SWE values also demonstrated a trend towards significance (p = 0.0709), suggesting that patients with lower medullary SWE values have a lower likelihood of having fibrosis.

CONCLUSION
Use of SWE within the renal allograft population remains tenuous. Although no significant correlations were found between fibrosis and SWE of the renal cortex in our study, our median medulla results do suggest a correlation with fibrosis. Further investigation remains to validate our shear wave results and clinical relevancy.

CLINICAL RELEVANCE/APPLICATION
Evaluating SWE in the transplanted kidney has proven challenging, yet trends in our data indicate shear wave elasticity evaluation of renal allografts remains a hopeful prospect on the horizon

SSQ09-04 Predicting Renal Function Loss after Radiofrequency Ablation

Participants
Cinthia Cruz, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
James H. Thrall, MD, Boston, MA (Abstract Co-Author) Stockholder, Peregrine Pharmaceuticals, Inc; Stockholder, ibio, Inc; Stockholder, Antares Pharma, Inc; Speaker, Bracco Group; ;
Debra A. Gervais, MD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Azadeh Tabari, Boston, MA (Abstract Co-Author) Nothing to Disclose
Alexi Otrakji, MD, Boston, MA (Presenter) Nothing to Disclose

PURPOSE
Determine the capability of a prototype threedimensional quantitative method of the index of renal parenchyma enhancement as a predictor of kidney function (eGFR/Creatinine) and kidney function loss in patients with renal cell carcinoma after ablation.
Can Computed Tomography Volumetry Replace MAG3-Szintigraphy for Determination of Split Renal Function?

Thursday, Dec. 1 11:10AM - 11:20AM Room: E353B

Participants
Christian P. Houbois, MD, Cologne, Germany (Presenter) Nothing to Disclose
Stefan Haneder, MD, Mannheim, Germany (Abstract Co-Author) Nothing to Disclose
David C. Maintz, MD, Koln, Germany (Abstract Co-Author) Nothing to Disclose
Matthias Schmidt, MD, Koeln (Cologne), Germany (Abstract Co-Author) Nothing to Disclose
Martin Hellmich, MD, PhD, Cologne, Germany (Abstract Co-Author) Nothing to Disclose
Roger Wahba, Cologne, Germany (Abstract Co-Author) Nothing to Disclose
Michael Puesken, MD, Munster, Germany (Abstract Co-Author) Nothing to Disclose

Purpose
The current gold standard for determination of renal function, split for each kidney, is Tc-99m-mercapto-acetyltriglycin (MAG3) scintigraphy. Several pre-operative preparations, e.g. before nephrectomy, include the assessment of the split renal function (SRF), contrast-enhanced computed tomography (CT) for the anatomy. A difference in SRF over 20% is a relative contraindication for operation. Initial studies comparing MAG3-scintigraphy and renal cortex volumetry (RCV) using CT showed equal results for the split renal in specific patient collective with normal renal function. This study aimed to compare MAG3-scintigraphy and CT-RCV within a large patient collective including impaired renal function.

Method and Materials
Retrospective single institution HIPAA compliant and institutional review board approved study from 2002-2015. Consecutive single kidney patients who had biopsy proven RCC and underwent radiofrequency ablation were included. Pretreatment and posttreatment CTs at 1, 3 and 6 months, with precontrast and arterially enhanced phases for each time point, were analyzed. Manual segmentation of the enhancing parenchyma was performed excluding the tumor. The prototype software calculates the volume of renal enhancement (VE) based on the count of voxels' intensities (Hounsfeld units) after excluding the nonenhanced voxels based on the reference region) within the segmented area as well as viability percentage. Pearson correlation tests were done to evaluate for relationships between the volume and units of enhancement (viable kidney), and kidney function (KF, as GFR/creatinine). Pearson correlation and linear regression were used to assess correlations.

Results
26 patients (F:M, 8:18) and 104 sets of axial CT images were analyzed. The mean VE in the pretreatment and time points (TP) 1, 3 and 6 were: 396.4, 404.4, 389.7 and 375.4 cm³, respectively. Mean of contrast enhancement were: 116, 119, 124 and 115 HU, concordant with VE. Viability percentages 90.3, 89.8, 93.5 and 90.7 were not concordant to enhancement and VE. KF showed progressive worsening with time: 0.88, 0.91, 0.92 and 0.93. Significant correlations were found between the VE and KF at the different time points (R: 0.47, R:0.45, R:0.56 and R:0.60, p=0.01) and between the enhancement units and KF at pretreatment, 3 and 6 months. (R: 0.67, R:0.65 and R:0.58 respectively p<0.001). VE increased in the first month after ablation in average 16/26 (61.5% p<0.01) of the cases. Viability percentage decreased by 11.6% in average 6 months after ablation, ranging from 0.6 to 29%.

Conclusion
Renal VE calculated with the prototype enhancement quantification tool highly correlates with renal function and may be used to predict the loss of kidney function after ablation.

Clinical Relevance/Application
Renal parenchymal enhancement evaluated by three-dimensional prototype software may be used as indicator of renal function.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Debra A. Gervais, MD - 2012 Honored Educator
SSQ09-06 Allergic Cross-Reactivity to Non-Ionic Iodinated and Gadolinium-Based Contrast Media; Analysis of More than 200,000 Injections

Thursday, Dec. 1 11:20AM - 11:30AM Room: E353B

Participants
Faezeh Sodagari, MD, Chicago, IL (Presenter) Grant, Siemens AG
Atilla Arslanoglu, MD, Chicago, IL (Abstract Co-Author) Grant, Siemens AG
Brenda D. Schmitz, RN, MS, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Frank H. Miller, MD, Chicago, IL (Abstract Co-Author) Research Grant, Siemens AG
Vahid Yaghmai, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose

PURPOSE
To assess the incidence and clinical characteristics of the cross-reaction between non-ionic iodinated (ICM) and gadolinium-based contrast media (GBCM).

METHOD AND MATERIALS
In this HIPAA-compliant, IRB-approved retrospective study, acute adverse reactions to non-ionic ICM- or GBCM used in a large academic institution were assessed during a four-year period. The data on the acute contrast reactions were extracted from the electronic health records. Patients who had acute adverse reactions to both non-ionic ICM and GBCM were identified. The total number of the injections of the contrast media were extracted from the radiology information system. The incidence rate and the clinical characteristics of the cross-reactions between ICM and GBCM were evaluated using descriptive statistics.

RESULTS
Of 213,725 (106,447 ICM and 107,278 GBCM) contrast injections during a 4-year period, a total of 821 (621 ICM and 200 GBCM) acute contrast reaction incidents in 776 individual patients were reported. The overall rates of the reaction to ICM and GBCM were 0.58% and 0.19%, respectively. Thirty-eight patients had more than one incidents of reaction with 7 patients (2 men, 5 women; mean age: 57.2 ± 16 yrs) showing a cross-reaction between ICM and GBCM (overall incidence rate: 0.003%). All cross-reactions were mild and occurred in outpatient imaging facilities. None of the patients required medication for the treatment of the cross-reaction. The time interval between the reactions ranged from 17 to 706 (median: 64) days. In 6 patients, the cross-reaction was observed after the injection of GBCM in those with a previous history of mild (4/6) or moderate (2/6) reaction to ICM. One patient showed a cross-reaction to GBCM despite receiving standard allergy premedication for previous mild allergic reaction to ICM.

CONCLUSION
The cross-reaction between non-ionic ICM and GBCM, although possible, is an extremely rare incident that may present as a mild acute reaction.

CLINICAL RELEVANCE/APPLICATION
There is no significant cross-reaction between ICM and GBCM used in CT and MRI studies.

Honored Educators
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Vahid Yaghmai, MD - 2012 Honored Educator
Vahid Yaghmai, MD - 2015 Honored Educator
Frank H. Miller, MD - 2012 Honored Educator
Frank H. Miller, MD - 2014 Honored Educator

SSQ09-07 NSsaFe: Observational Study on the Incidence of Nephrogenic Systemic Fibrosis in Patients with Renal Impairment Following Gadoterate Meglumine Administration

Thursday, Dec. 1 11:30AM - 11:40AM Room: E353B

Participants
R G. McWilliams, Liverpool, United Kingdom (Presenter) Speaker, FUJIFILM Holdings Corporation; Consultant, Cook Group Incorporated; Research Grant, Endologix, Inc

PURPOSE
To determine the incidence of Nephrogenic Systemic Fibrosis (NSF) in patients with renal impairment after gadoterate meglumine (DOTAREM®, Guerbet, France) administration.

METHOD AND MATERIALS
The NSsaFe study is a worldwide post-marketing study including hundreds of patients with moderate, severe or end stage renal impairment, scheduled to undergo a routine contrast-enhanced Magnetic Resonance Imaging (MRI) using gadoterate meglumine. At inclusion visit, medical history, indications for MRI and product administration conditions were recorded for each patient. Adverse Events (AEs) occurring during MRI examination or usual follow-up period post-contrast agent administration were recorded. Patients were followed up over 2 years with 3 visits separated by at least 3 months in order to detect any signs of NSF.

RESULTS
As of 16 March 2016, data of 540 patients were analyzed (mean age: 69.6 ± 12.7 years [min-max: 21-95]; male: 58.5%; mean BMI: 26.3 ± 5.3 kg/m² [13.2-50.2]). Renal impairment was evaluated as moderate for 69.3% of patients, severe for 16.1% and...
end-stage for 12.0%; 2.6% of patients had undergone a previous kidney transplant. The mean (±SD) estimated Glomerular Filtration Rate (eGFR) was 37.6 ± 15.7 ml/min/1.73 m² [4.0-74.2]. Main MRI indication was to assess suspected abnormalities of the central nervous system (34.6%) and mean total volume injected was 15.8 ± 5.9 ml. A total of 407 patients (97.4%) attended the first follow-up visit, 308 (73.7%) attended the second, and 222 (53.1%) attended the third. No AEs considered to be related to the administration of gadoterate meglumine were reported. No cases of NSF have been observed.

CONCLUSION
Intermediate data of the NSsaFe study show no cases of NSF after gadoterate meglumine administration in patients with at least moderate renal impairment. Data collected so far confirm the good safety profile of gadoterate meglumine in this high risk population.

CLINICAL RELEVANCE/APPLICATION
Intermediate data of 540 patients in the NSsaFe study show no cases of NSF after gadoterate meglumine administration in patients with at least moderate renal impairment.

SSQ09-08  Gadolinium Chelate Safety in Pregnancy: Nearly Undetectable Levels in the Juvenile Nonhuman Primate after in Utero Exposure

Thursday, Dec. 1 11:40AM - 11:50AM Room: E353B

Awards
Student Travel Stipend Award

Participants
Joao Prola Netto, MD, Portland, OR (Presenter) Nothing to Disclose
Mark Woods, PhD, Portland, OR (Abstract Co-Author) Nothing to Disclose
Victoria Roberts, PhD, Beaverton, OR (Abstract Co-Author) Nothing to Disclose
Christina A. Miller, BS, Portland, OR (Abstract Co-Author) Nothing to Disclose
Antonio E. Frias Jr, MD, Portland, OR (Abstract Co-Author) Nothing to Disclose
Karen Y. Oh, MD, Portland, OR (Abstract Co-Author) Nothing to Disclose

PURPOSE
To determine whether gadolinium is found in juvenile nonhuman primate tissues after maternal injection of intravenous gadoteridol (ProHance).

METHOD AND MATERIALS
Gravid rhesus macaques and their offspring were prospectively studied in one research protocol to evaluate the effects of a maternal malnutrition (hypoproteic diet) on the placenta and fetal development (n=5 subjects and 5 controls). On gestational day 85 and 135 (term pregnancy of 165 days), the macaques were sedated, intubated, and placed in the MRI scanner. Intravenous gadoteridol contrast (0.1 mmol/kg of maternal weight) was administered for placental imaging. Amniocentesis was performed on day 135 prior to the second ProHance dose. After spontaneous normal term delivery, the offspring were followed for approximately 7 months. Gadolinium concentration in the juvenile macaque tissues (bone, liver, skin, spleen, lungs, brain, and kidney) was measured by inductively coupled plasma mass spectrometry (ICP-MS) and is expressed as percent maternal dose per gram of juvenile tissue (%ID/g).

RESULTS
Sampled juvenile tissues showed gadolinium was detectable at extremely low levels in only two tissues: the femur (2.5 x 10^-5 %ID/g) and liver (0.15 x 10^-5 %ID/g). No detectable amounts in the remaining organs, with a limit of detection (LOD) of 0.0003 x 10^-5 %ID/g. Gadolinium concentration in the amniotic fluid was 0.028 x 10^-5 %ID/g, at 50 days post administration of a single ProHance injection.

CONCLUSION
Minimal gadolinium in the amniotic fluid 50 days after the first maternal injection confirms it crosses the placenta, as shown in our previous study. However, only trace gadolinium is found in juvenile macaque tissues after in utero exposure to two weight-based clinical doses of gadolinium chelate, indicating clearance of contrast agent. Given the similarities between human and nonhuman primate placental physiology, we suggest there could be relatively little deposition in human fetal tissues following maternal ProHance injection.

CLINICAL RELEVANCE/APPLICATION
Our results may have implications for the safety of contrast-enhanced MRI in pregnancy as only trace gadolinium is found in tissues of juvenile offspring after maternal infusion of gadoteridol.

SSQ09-09  Breakthrough Reaction Rates in High-Risk Patients Receiving Accelerated Corticosteroid Premedication before Contrast-Enhanced CT

Thursday, Dec. 1 11:50AM - 12:00PM Room: E353B

Awards
Trainee Research Prize - Fellow

Participants
Benjamin Mervak, MD, Ann Arbor, MI (Presenter) Nothing to Disclose
Richard H. Cohan, MD, Ann Arbor, MI (Abstract Co-Author) Nothing to Disclose
James H. Ellis, MD, Ann Arbor, MI (Abstract Co-Author) Consultant, General Electric Company
Matthew S. Davenport, MD, Cincinnati, OH (Abstract Co-Author) Royalties, Wolters Kluwer nv;

PURPOSE
To determine the allergic-like breakthrough reaction rate in high-risk patients premedicated with an accelerated corticosteroid
METHOD AND MATERIALS

IRB approval was obtained and informed consent waived for this retrospective study. Patients (n=179) were identified that completed a variety of corticosteroid premedication regimens, each with a duration of <10 hours, prior to LOCM-enhanced CT between 6/1/2008-1/1/2016. Breakthrough reaction rates were compared to the breakthrough reaction rate for high-risk patients receiving a 13-hour premedication regimen, and the breakthrough reaction rate for patients premedicated for a known contrast allergy (2.1% [13/626]) using Chi square tests.

RESULTS

There were 36 one-hour, 83 five-hour, 16 six-to-nine-hour, and 44 "rapid" regimens with duration not otherwise specified. Most subjects (65% [116/179]) had a prior iodinated contrast reaction. The breakthrough reaction rate was 2.8% (5/179; 95% CI = 0.4-5.2%; vs. 1.2% [13/1051] previously reported for a 13-hour regimen, p=0.11). All breakthrough reactions occurred in subjects with a prior contrast reaction (4.3% [5/116], 95% CI = 0.6-8.0%; p=0.19 vs. patients with a prior contrast reaction receiving a 13-hour regimen); all 5 patients experiencing breakthrough reactions had received a five-hour regimen. Two reactions were severe, one moderate, and two mild. No reactions occurred in subjects premedicated for other reasons (0% [0/63]).

CONCLUSION

Rapid steroid premedication is associated with a breakthrough reaction rate approximately double the breakthrough reaction rate following a 13-hour regimen. However, the differences in breakthrough reaction rates of the rapid and 13-hour regimens were not statistically different for the number of patients included in this series.

CLINICAL RELEVANCE/APPLICATION

Subjects receiving an accelerated premedication regimen (n=179) had a breakthrough reaction rate that may be double the rate following 13-hour premedication, but the difference was not statistically significant.
A few recent studies suggest that apparent diffusion coefficient (ADC) is significantly lower in cervical cancer with parametrial invasion (PMI). However, as ADC itself does not directly provide morphological information but is rather functional in nature, caution may be needed when making an association between ADC and PMI. Therefore, we re-evaluated ADC for determining PMI in patients with cervical cancer, by stratifying them into subgroups based on a Likert scale using T2-weighted imaging (T2WI).

**METHOD AND MATERIALS**

In this retrospective study, 87 patients with FIGO stages IA2-IIB cervical cancer who underwent MRI followed by radical hysterectomy were included. The likelihood of PMI was assessed on T2WI using a 6-point Likert scale (0, MRI-invisible; 1, no PMI; 2, probably no PMI; 3, possible PMI; 4, probable PMI; 5, definite PMI) and ADC was measured. MRI findings were compared between patients with and without PMI using the linear-by-linear association and Mann-Whitney U test with subgroup analysis for each score group. The differences in ADC according to the Likert scale was assessed using Kruskal-Wallis test.

**RESULTS**

19 (21.8%) patients were identified to have PMI on pathology. The prevalence of PMI demonstrated a significant association with Likert scale (P<0.001). Mean ADC differed according to Likert scale (P<0.001). However, only tumors with a Likert score of 0 showed significantly greater the ADC values than others (P<0.001), while no significant difference was observed among patients with Likert scores of 1-5 (P=0.070-0.889). Patients with PMI had significantly lower ADC (0.854x10⁻³ mm²/s) than those without PMI (1.033±0.324 x 10⁻³ mm²/s, P=0.034). However, no significant differences were seen on subgroup analysis for each score group (P=0.180-0.857).

**CONCLUSION**

A Likert scale based on T2WI and ADCs were significantly associated PMI. However, the apparent association seen between ADC and PMI in the whole population may in fact be due to the contribution of MRI-invisible tumors.

**CLINICAL RELEVANCE/APPLICATION**

Assessment of radiological PMI using T2WI will help stratify patients with cervical cancer to receive proper management and help the clinician in predicting postoperative outcomes and counselling the patient. However, caution is needed when using ADC for determining PMI, as the apparent association seen between them may be due to the contribution of MRI-invisible tumors rather than reflect their true relationship.
METHOD AND MATERIALS

Multiparametric MRI exams were performed in 4-5 month old mice (n=7) prior to and 7 days after unilateral moderate ischemia reperfusion (I/R) injury (40min ischemia). Renal perfusion was assessed using ASL-MRI. Redox capacity was assessed after IV injection of HP 13C dehydroascorbate (DHA), which is reduced to Vitamin C (VitC) through a glutathione dependent process. The rate of DHA reduction to VitC, as measured by VitC/(VitC+DHA), reflects cellular redox capacity. Relative glycolytic and oxidative metabolism was assessed after injection of HP 13C-pyruvate. The relative ratios of the metabolites lactate (Lac), alanine (Ala), and bicarbonate (Bic) reflect a balance between the glycolytic pathway (pyruvate conversion to lactate) and the oxidative pathway (entry into the Kreb cycle).

RESULTS

7 days after I/R injury, renal perfusion dropped from 463±70 to 257±60 mL/min/100g in the AKI kidneys (p=0.001) and remained unchanged in the contralateral kidney. The VitC/(VitC+DHA) ratios were also significantly decreased in AKI kidneys, from 0.24±0.04 at baseline to 0.16±0.03 on day 7 (p=0.001), consistent with impaired redox capacity. Additionally, Lac/(Lac+Ala+Bic) ratios in the injured kidneys increased from 0.76±0.09 to 0.88±0.07 (p=0.03), suggesting a shift towards the glycolytic pathway, and/or away from the oxidative pathway.

CONCLUSION

ASL and HP 13C MRI can detect alterations in perfusion, redox capacity and pyruvate metabolism in a murine model of AKI. Studies are ongoing to assess longitudinal imaging changes during the evolution of AKI to CKD with pathology and tissue biochemical correlates. Notably, ASL and HP pyruvate MR have been applied to patients, and are readily translatable for the clinical evaluation of kidney injury.

CLINICAL RELEVANCE/APPLICATION

Commonly used serum markers such as creatinine are not sensitive for AKI detection. Perfusion and metabolic imaging may provide early biomarkers of kidney injury, and response to novel treatment.

GU248-SD-THA3 External Validation of ADNEX MR SCORING System

Participants
Kohei Sasaguri, MD, Saga, Japan (Presenter) Nothing to Disclose
Ken Yamaguchi, MD, Saga, Japan (Abstract Co-Author) Nothing to Disclose
Takahiko Nakazono, MD, PhD, Saga, Japan (Abstract Co-Author) Nothing to Disclose
Hiroyuki Irie, MD, PhD, Saga, Japan (Abstract Co-Author) Nothing to Disclose

PURPOSE

To evaluate the usefulness of a published MR imaging scoring system for characterization of adnexal masses (ADNEX MR SCORING system)

METHOD AND MATERIALS

The study population comprised 305 women with 360 adnexal masses who underwent pelvic MRI between January 2007 and December 2014 and then surgery for the masses. MR images of the patients were retrospectively reviewed by two radiologists who were blinded to pathological diagnosis. The adnexal masses were scored into 5 categories (1: no mass, 2: benign mass, 3: probably benign mass, 4: indeterminate mass, 5: probably malignant mass) according to the ADNEX MR SCORING system by consensus of the reviewers. The reference standard was surgical pathologic diagnosis: 268(74.4%), 25(6.9%) and 67(18.6%) of the 360 adnexal masses were benign, borderline malignant and malignant, respectively. Diagnostic performance of the scoring system for the differentiation of benign and malignant adnexal masses was evaluated by ROC analysis. Score 4 or greater was judged as malignant (including borderline malignancy) according to the original research.

RESULTS

Prevalence of malignancy in masses with the Score 2,3,4 and 5 were 1.5% (3/197), 19.2%(14/73), 77.3%(34/44) and 89.1%(41/46), respectively. The diagnostic performance of the scoring system was excellent with AUC (area under the ROC curve) of 0.936. The sensitivity, specificity and accuracy for the diagnosis of malignancy was 81.5% (253/311), 94.4% (253/268) and 91.1% (328/360). Among the 17 masses misclassified into benign, 8 masses were misclassified because of lack of measurable solid component; 7 of the 8 masses were mucinous borderline tumors. Other 9 masses were misclassified because of showing atypical enhancement pattern for malignant tumors. Histological diagnosis of the 15 cases misclassified into malignancy were variable including mature cystic teratoma with enhancing solid portion (n=4), struma ovarii (n=2), thecoma (n=2) and uterine subserosal myoma (n=2).

CONCLUSION

ADNEX MR SCORING system was highly accurate in the differentiation of benign and malignant adnexal masses, although less accurate for borderline tumors.

CLINICAL RELEVANCE/APPLICATION

The ADNEX MR SCORING system can help radiologists to differentiate benign from malignant when reporting MR imaging of patients with adnexal masses.

GU249-SD-THA4 The Learning Curve in Prostate MRI Interpretation: Self-Directed Learning versus Continual Reader Feedback

Participants
Andrew B. Rosenkranz, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Molly Somberg, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
Paul Smerek, MD, New York, NY (Abstract Co-Author) Nothing to Disclose
MRI is able to detect abnormal placentation in patients with placenta accreta reliably. The score of MR imaging features can be used specifically. Low b value (b=0) DWI could demonstrated dark intraplacental bands and abnormal vascularity better than other imaging features. The differences in MR imaging features were compared with the post-operative data, which were grouped into normal, placenta accreta, placenta increta and placenta percreta. The surgical findings confirmed placenta accreta in 46 (20.5%) patients, placenta increta in 52 (29.2%) patients, and placenta percreta in 53 (29.8%) patients. The score of MR imaging features was positively correlated with the degree of placenta invasion (P < 0.01). The differences in MR imaging features score by extent of placental invasion (normal versus placenta accreta, placenta accreta versus increta and placenta increta versus percreta) were all significant (P < 0.01). Compared to other features, uterine bulging indicated placenta increta or percreta specifically. Low b value (b=0) DWI could demonstrated dark intraplacental bands and abnormal vascularity better than other sequences.

CONCLUSION

A LC was plotted of reader accuracy over time. Logistic regression for correlated data and mixed-model ANOVA were performed. Reader confidence increased significantly only with feedback (p<0.01). Specificity improved from 54% to 71%-77% with feedback (both p<0.05), with no difference in extent of improvement between groups (p=0.9). Overall sensitivity improved from 59%-62% in batches 1-2 to 77%-82% with feedback (p=0.05), though did not improve without feedback (p=0.6). Sensitivity for TZ tumor showed a larger change (p=0.02) from batches 1-2 to 3-4 with feedback (27%-33% to 44%-67%) vs. without feedback (44%-78% to 44%-56%). Sensitivity for PZ tumor did not improve in either group (p=0.3). Reader confidence increased significantly only with feedback (p<0.01).

CONCLUSION

A LC in prostate MRI interpretation was largely due to self-directed learning. Additional continual feedback did not improve overall accuracy, though slightly helped TZ tumor detection and improved reader confidence.

CLINICAL RELEVANCE/APPLICATION

Caution is warranted regarding clinical prostate MRI interpretation by novice radiologists. Insights into the self-directed LC and incremental role of feedback may help guide training efforts.

GU250-SD-  Value of Magnetic Resonance Imaging in the Prenatal Diagnosis of the Degree of Placental Invasion

THAS

Station #5

Participants

Chenyu Yan, MD, Zhengzhou, China (Presenter) Nothing to Disclose
Chengqun Chen, Zhengzhou, China (Abstract Co-Author) Nothing to Disclose
Xuemei Gao, zhengzhou, China (Abstract Co-Author) Nothing to Disclose
Jingliang Cheng, MD,PhD, Zhengzhou, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

The purpose of this study was to evaluate the role of magnetic resonance imaging (MRI) in the prenatal diagnosis of abnormal placental invasion in women with placenta previa and to assess the ability of MR imaging features to define the degree of placenta invasion.

METHOD AND MATERIALS

A retrospective review including a total of 178 patients (range 26.3 to 39.7 gestation weeks) with placenta previa between January 2015 and December 2015. All patients underwent prenatal MRI examination with a 1.5 T scanner, including half-Fourier Acquisition Single-Shot Turbo Spin-Echo (HASTE), true fast imaging with steady-state precession (TrueFISP) and Diffusion Weighted Image (DWI) sequence. The MRI features used were dark intraplacental bands and abnormal vascularity, uterine bulging, disruption of the uteroplacental zone and placental thickened and deformity. Based on the presence of four MR imaging features associated with placenta previa, the radiologic impression of the extent of placental invasion was graded on a 5-point scale. The scores of MR imaging features were compared with the post-operative data, which were grouped into normal, placenta accreta, placenta increta and placenta percreta.

RESULTS

A total of 27 (15.2%) patients were confirmed no placenta invasion at operation. The surgical findings confirmed placenta accreta in 46 (20.5%) patients, placenta increta in 52 (29.2%) patients, and placenta percreta in 53 (29.8%) patients. The score of MR imaging features was positively correlated with the degree of placenta invasion (P < 0.01). The differences in MR imaging features score by extent of placental invasion (normal versus placenta accreta, placenta accreta versus increta and placenta increta versus percreta) were all significant (P < 0.01). Compared to other features, uterine bulging indicated placenta increta or percreta specifically. Low b value (b=0) DWI could demonstrated dark intraplacental bands and abnormal vascularity better than other sequences.

CONCLUSION

MRI is able to detect abnormal placenta in patients with placenta accreta reliably. The score of MR imaging features can be used
to predict the degree of placenta invasion in patients with placenta previa with acceptable diagnostic accuracy.

**CLINICAL RELEVANCE/APPLICATION**

The score of MR imaging features can be used to predict the degree of placenta invasion in patients with placenta previa with acceptable diagnostic accuracy.

**GU251-SD-THA6**  
**Impact of Renal Function on Gadolinium Retention Following Administration of Gadolinium-based Contrast Agents in a Mouse Model**

**Station #6**

Participants
Achmad A. Kartamiharja, MD, Maebashi, Japan (Presenter) Nothing to Disclose  
Takahito Nakajima, MD, Maebashi, Japan (Abstract Co-Author) Nothing to Disclose  
Satomi Kameo, PhD, Maebashi, Japan (Abstract Co-Author) Nothing to Disclose  
Hiroshi Koyama, MD, PhD, Maebashi, Japan (Abstract Co-Author) Nothing to Disclose  
Yoshito Tsuchima, MD, Maebashi, Japan (Abstract Co-Author) Institutional Research Grant, Bayer AG; Institutional Research Grant, DAIICHI SANKYO Group; Institutional Research Grant, Eisai Co, Ltd; Institutional Research Grant, Nihon Medi-Physics Co, Ltd; Institutional Research Grant, FUJIFILM Holdings Corporation; Institutional Research Grant, Fuji Pharma Co, Ltd; Institutional Research Grant, Siemens AG; Institutional Research Grant, OncoTherapy Science, Inc; Institutional Research Grant, Becton, Dickinson and Company; Speaker, Bayer AG; Speaker, DAIICHI SANKYO Group; Speaker, Eisai Co, Ltd; Speaker, Fuji Pharma Co, Ltd; Speaker, Guerbet SA; .;

**PURPOSE**

To investigate the effect of renal failure on gadolinium (Gd) retention in various organs after Gd-based contrast agent (GBCA) injection.

**METHOD AND MATERIALS**

Following local animal care and review committee approval, 18 normal mice and 18 with renal failure were divided into three treatment groups (Gd-DTPA-BMA, 5 mmol/kg; Gd-DOTA, 5 mmol/kg; GdCl3, 0.02 mmol/kg). Each agent was intravenously administered on weekdays for 4 weeks. All groups were divided into two sub-groups based on sample collection time; days 3 (3D) and days 45 (45D) after the last injection. Saline (5 mL/kg) was injected to different groups as control. Gd concentrations were quantified by mass spectrometry analysis.

**RESULTS**

GdCl3 analysis on the 45D was not obtained due to the limitation of sample number. In the Gd-DTPA-BMA group, impaired renal function increased 3D Gd retention in the liver, bone, spleen, skin, and kidney ($p < 0.01$) but did not affect 45D Gd retention. Although Gd retention in the Gd-DOTA group was generally low, impaired renal function increased only 45D hepatic Gd retention. Hepatic and splenic Gd retentions were significantly higher than other organs’ Gd retention in the GdCl3 group ($p < 0.01$). Gd retention in the brain was less affected by renal function, regardless of the Gd compound used.

**CONCLUSION**

The tendency of Gd retention varied according to the agent, regardless of renal function. Although renal impairment increased 3D Gd retention after Gd-DTPA-BMA administration, 45D Gd retention for GBCAs was almost unaffected by renal function, suggesting that the chemical structures of retained Gd may not be consistent and some Gd is slowly eliminated after initially being retained.

**CLINICAL RELEVANCE/APPLICATION**

Gd retention in the Gd-DOTA group was generally low even when administered in a high dose, hence it might be safer particularly for renal impaired patients.

**UR172-ED-THA7**  
**Contrast Enhanced Ultrasound (CEUS) for the Characterization of Intra-Scrotal Lesions**

**Station #7**

Participants
Noah A. Brauner, MD, Los Angeles, CA (Presenter) Nothing to Disclose  
Hisham A. Tchelepi, MD, Los Angeles, CA (Abstract Co-Author) Research Grant, General Electric Company; Research Grant, Roper Industries, Inc

**TEACHING POINTS**

Intra-scrotal lesions are primarily imaged using trans-scrotal ultrasonography (US). Although excellent at detecting intrascrotal lesions, conventional ultrasonography can have difficulty in differentiating benign and malignant entities. The aim of this educational exhibit is to briefly review the relevant scrotal/testicular anatomy, discuss the biophysical properties and safety profile of ultrasound contrast agents (UCAs) and highlight the utility of contrast enhanced ultrasound (CEUS) examinations for the characterization of a spectrum of intrascrotal pathology. We will also briefly discuss the implications of this improved diagnostic certainty on tailoring clinical management.

**TABLE OF CONTENTS/OUTLINE**

Testicular and scrotal anatomy UCAs: biophysical properties and safety profile CEUS of the testicles: How it's done CEUS and conventional US appearance of infection CEUS and conventional US appearance of neoplasm CEUS and conventional US appearance of scrotal trauma Implications for management: preventing unnecessary orchiectomy
GU252-SD-THB1

MRI/US Fusion for Assessment of the Postpartum Uterus - Does it Allow Standardized Measurement of Anterior and Posterior Uterine Wall Thickness after Cesarean Section and Vaginal Delivery?

Station #1

Participants
Cary L. Siegel, MD, Saint Louis, MO (Moderator) Nothing to Disclose

Sub-Events

PURPOSE
To prospectively evaluate the lower uterine segment after vaginal delivery and the Cesarean scar at 6 weeks using transabdominal (TAUS) and transvaginal ultrasound (TVUS) and magnetic resonance imaging (MRI)/US image fusion to evaluate whether image fusion allows standardized and reproducible localization of the scar and uterine wall thickness measurement compared with high-resolution MRI.

METHOD AND MATERIALS
Six weeks after delivery, plain pelvic MRI (premedication with 40 mg intramuscular butylscopolamine, HR T2-weighted TSE sequence in sagittal orientation; 1.5T, Siemens, Erlangen, Germany) was performed in 30 women (10 each after primary Cesarean section (PCS), secondary Cesarean section (SCS), and vaginal delivery (VD)). The MRI DICOM datasets were transferred into the ultrasound system (Aplio 500, Toshiba Medical Systems, Otawara, Japan), followed by TAUS (5MHz) and TVUS (10 MHz) using smart fusion with MRI for navigation. The lower uterine segment was examined in a comparable view in real time. Vascularization was determined as percentage area using power Doppler US. Anterior and posterior uterine wall thickness (AW, PW) was measured using TAUS and TVUS with and without MRI fusion and MRI alone.

RESULTS
TVUS with image fusion was successfully applied for uterine assessment at the end of the puerperium. TAUS failed to identify the scar region in 3 women. All techniques investigated were similar in evaluation of the AW and PW following VD. Comparison of the AW or scar region after PCS and SCS in terms of the difference relative to the PW showed that only MRI and MRI/TVUS fusion revealed significant differences (MRI: PCS=4.3mm; SCS=4.2mm; VD=0.8mm; p=0.034, TVUS-fusion: PCS=2.0mm; SCS=3.3mm; VD=0mm; p=0.010). The degree of vascularization measured by power Doppler US was lower after PCS and SCS (PCS 13.1±9.4 %/area, SCS 17.0±8.2 %/area) than after VD (VD 34.6±8.5 %/area, p=0.0017).

CONCLUSION
MRI/US image fusion can be performed in a reproducible manner for examination of the postpartum uterus. MRI/TVUS fusion allows standardized localization of the scar region and yields measurements comparable to MRI. Vascularization is reduced in the scar region.

CLINICAL RELEVANCE/APPLICATION
MRI/US Fusion of the postpartum uterus allows standardized measurement of uterine wall thickness after Cesarean Section and Vaginal Delivery.
RESULTS
Homogeneous opacification of the bladder lumen was always obtained. 10 patients were unable to perform the MR examination. In all the volunteers and in all the patients studied (76 pts) we obtained a perfect evaluation of the male urethra with voiding MR-cystourethrography. The visualization of the urethra with MIP reconstructed images was considered comparable to that obtained with conventional cystourethrography. We detected 24 bladder neck obstructions, 36 urethral strictures (32 single and 4 double strictures), 10 cases following TURP and TUIP procedures, 2 urethral papillomatosis and 4 BPH. The number, site and length of urethral strictures were accurately determined by MRI. The analysis of 3D sagittal scans allowed a better evaluation of the morphology of the urethral strictures in comparison with conventional cystourethrography.

CONCLUSION
Voiding MR-cystourethrography demonstrates the morphology of the bladder neck and urethra during micturition and can substitute standard retrograde and micturating cystourethrogram. This novel technique avoids radiation exposure to the gonads and urinary catheterization.

CLINICAL RELEVANCE/APPLICATION
Voiding MR-cystourethrography demonstrates the morphology of the bladder neck and urethra during the micturition and can substitute standard cystourethrogram in bladder outlet obstruction.

GU254-SD-THB3 Diagnostic Performance of Quantitative CT Texture Analysis for Differentiating Lipid-poor Adrenal Cortical Adenoma from Pheochromocytoma

Station #3

Participants
Bing Shi, Beijing, China (Presenter) Nothing to Disclose
Gu Mu Yang Zhang, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Hao Sun, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Hua Dan Xue, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Zheng Yu Jin, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose

PURPOSE
To evaluate diagnostic performance of using CT texture analysis (CTTA) to differentiate lipid-poor adrenal cortical adenoma (lp-ACA) from pheochromocytoma.

METHOD AND MATERIALS
In this retrospective study, patients with surgically removed ACA and pheochromocytoma were identified from the pathology database. Patients were excluded for absence of preoperative multiphasic CT images or if the adrenal lesion was primarily cystic. Patients with ACA were further excluded if there was visible fat in the lesion on non-enhanced CT. As a result, 66 lp-ACA and 98 pheochromocytoma lesions were identified for analysis. CTTA was performed on the largest cross-sectional area for each lesion on non-enhanced and enhanced CT images by using TexRAD software, with quantification of texture parameters including mean gray-level intensity (Mean), standard deviation (SD), entropy, mean of positive pixels (MPP), skewness and kurtosis for fine to coarse textures (filters 0-6, respectively). Receiver operating characteristic (ROC) analysis was performed and the area under the ROC curve (AUC) was calculated for texture parameters that were significantly different for the objectives. Sensitivity (Se), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV) and accuracy were calculated by using the cut-off value of each AUC.

RESULTS
Compared to pheochromocytoma, lp-ACA had significantly lower mean at all texture scales, and lower entropy (filter 0), lower MPP (filter 0) and higher skewness (filter 0.2) at fine texture scales on non-enhanced CT images (P<0.001). On enhanced CT images, there was predominantly at the medium and coarse texture scales for most of the quantifiers (mean, SD, entropy and MPP) (P<0.001) as mean and MPP at fine texture scales (filter 0). Specifically, these texture-quantifiers followed a significant trend where mean, SD, entropy and MPP were lower in lp-ACA in comparison to pheochromocytoma. A mean<34.5 at fine texture scale on non-enhanced CT images by using TexRAD software, with quantification of texture parameters including mean gray-level intensity (Mean), standard deviation (SD), entropy, mean of positive pixels (MPP), skewness and kurtosis for fine to coarse textures (filters 0-6, respectively). Receiver operating characteristic (ROC) analysis was performed and the area under the ROC curve (AUC) was calculated for texture parameters that were significantly different for the objectives. Sensitivity (Se), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV) and accuracy were calculated by using the cut-off value of each AUC.

CONCLUSION
CTTA could be used to accurately differentiate lp-ACA from pheochromocytoma.

CLINICAL RELEVANCE/APPLICATION
CTTA could be used as a non-invasive tool to complement adrenal CT washout calculations for differentiating lp-ACA from pheochromocytoma on regular multiphasic CT images.

GU255-SD-THB4 Utility of Diffusion-Weighted MR Imaging in the Diagnosis of Morbidly Adherent Placenta

Station #4

Participants
Anna Ellermeier, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Tom Winter, Salt Lake Cty, UT (Abstract Co-Author) Nothing to Disclose
Susanna I. Lee, MD, PhD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Daniel S. Hippe, MS, Seattle, WA (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company

Abstract Co-Author
Xue, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Zheng Yu Jin, MD, Beijing, China (Abstract Co-Author) Nothing to Disclose
Winter, Salt Lake Cty, UT (Abstract Co-Author) Nothing to Disclose
Ellermeier, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Rising incidence and potential for catastrophic surgical outcomes underscore the need for sensitive prenatal diagnosis of morbidity adherent placenta (MAP). As such, ambiguous US findings often necessitate MRI. By better defining the border between placenta and myometrium, we hypothesized that diffusion-weighted imaging (DWI) may be a useful adjunct to traditional prenatal MRI.

METHOD AND MATERIALS
Following IRB approval, 2 radiologists blinded to history and pathology retrospectively reviewed MR images (1.5T) from singleton pregnancies with and without pathologically-proven MAP. T2W only and T2W+DWI images were reviewed in separate sessions 2 weeks apart to avoid recall bias, with normal and MAP randomized within and between sessions. Reviewers completed questionnaires regarding placenta/uterus features, MAP presence and diagnostic confidence. MR findings were compared to pathology results with Chi-squared tests, interreader agreement was evaluated with Cohen’s kappa and diagnostic accuracy was compared with the sign test.

RESULTS
In total, 17 patients (mean gest 27w4d) were reviewed (indications: suspected MAP 14/17, fetal anomaly 2/17, abd pain 1/17). Typical MR criteria were reported more frequently with pathologic MAP: loss of retroplacental T2 dark zone (T2W, p = 0.008) and dark/thick interplacental bands (T2W+DWI, p = 0.032). Compared with T2W only, addition of DWI significantly increased interreader agreement (p = 0.045) and tended to increase sensitivity (69% vs. 94%, p = 0.25) but decrease specificity (56% vs. 39%, p = 0.5) for MAP. Although readers reported increased diagnostic confidence with DWI in 65%, explicit confidence ratings (p = 0.7) and diagnostic accuracy (p > 0.99) did not change.

CONCLUSION
MAP is a potentially life-threatening condition that requires increased clinical and radiographic sensitivity to optimize management. Small sample size (due to low incidence), inexperience with DWI interpretation in pregnancy, and poor resolution of DWI are limitations of our study. Trends toward increased sensitivity and improved interreader agreement suggest that DWI may complement traditional MRI evaluation of MAP but more experience and sequence improvement are necessary to improve diagnostic accuracy.

CLINICAL RELEVANCE/APPLICATION
DWI in conjunction with traditional prenatal MRI may aid in evaluation of MAP, a potentially life-threatening condition that requires extensive surgical planning and patient counseling.

HONORED EDUCATORS
Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Susanna I. Lee, MD, PhD - 2013 Honored Educator

GU256-SD-THB5
**Bilaterally Sustained Nephrograms Following the Parenteral Administration of Iodinated Contrast Material Administration Are a Potential Biomarker for Acute Kidney Injury, Dialysis, and Death**

Station #5

Participants
Jennifer S. McDonald, PhD, Rochester, MN (Abstract Co-Author) Research Grant, General Electric Company
Robert J. McDonald, MD, PhD, Rochester, MN (Presenter) Nothing to Disclose
Erik Steckler, MB, BS, Tampa, FL (Abstract Co-Author) Nothing to Disclose
Richard W. Katzberg, MD, Charleston, SC (Abstract Co-Author) Research Grant, Siemens AG;
David F. Kallmes, MD, Rochester, MN (Abstract Co-Author) Research support, Terumo Corporation Research support, Medtronic plc Research Consulting, Cerenox Medical, Inc Research support, Benvenue Medical, Inc Research support, General Electric Company Consultant, General Electric Company Consultant, Medtronic plc Consultant, Johnson & Johnson
Eric E. Williamson, MD, Rochester, MN (Abstract Co-Author) Research Grant, General Electric Company
Nelson Leung, MD, Rochester, MN (Abstract Co-Author) Nothing to Disclose

PURPOSE
To determine whether persistent bilateral global CT nephrograms are associated with acute kidney injury (AKI), dialysis, and death in patients following parenteral administration of iodinated contrast material.

METHOD AND MATERIALS
This retrospective study was HIPAA compliant and approved by our institutional review board. All patients who received 1) either a contrast-enhanced CT exam or cardiac catheterization with the low-osmolar, nonionic monomer iohexol 350 mgI/mL between 2000-2014 and 2) an unenhanced abdominal CT exam in the subsequent 18-30 hours were identified. Patients who lacked sufficient pre- and post-procedure creatinine results, or who received additional contrast material within 14 before to 3 days after the contrast-enhanced exam were excluded. Nephrograms were identified by radiologist review. The incidence of AKI (AKIN Stages 1-3), dialysis, and death were compared between patients with bilateral global nephrograms and those without using Pearson’s chi-squared test.

RESULTS
A total of 128 patients met all inclusion criteria. The baseline eGFR subgroups were 77 (60%) > 60 mL/min/1.73 m2; 44 (34%) 30-59 mL/min/1.73 m2; and 7 (5.5%) < 30 mL/min/1.73 m2 patients. The overall incidence of persistent global nephrograms was 20% (n=25), with a similar incidence following cardiac catheterization (20%, 13/65) and contrast-enhanced CT (19%, 12/63).

Nephrogram patients had significantly higher rates of AKI (Stage 1: 64% (16/25) vs. 19% (20/103), OR = 7.38 (95% CI 2.85-19.1, p<.0001), dialysis (24% (6/25) vs. 2.9% (3/103), OR = 10.5 (2.40-45.8), p=.0002), and death (24% (6/25) vs. 1.9% (2/103), OR = 15.9 (2.99-85.0), p<.0001) compared to non-nephrogram patients.
The observation of persistent bilateral global nephrograms on unenhanced CT suggests a risk of greater adverse clinical outcomes of AKI, dialysis, and death in this selected patient population when compared to patients whose kidneys fully eliminate the contrast material.

**CLINICAL RELEVANCE/APPLICATION**

Patients who develop a persistent nephrogram following contrast administration are at higher risk of AKI and should warrant greater clinical surveillance.

**GU257-SD-THB6  Accuracy and Agreement of Nine Readers on PI-RADSv2 for Prostate Cancer mpMRI**

**CONCLUSION**

Multiple readers demonstrate good sensitivity for detecting high grade index lesions with PI-RADSv2 in a controlled study, but specificity was experience dependent. Readers demonstrate high agreement for true positive lesions and low agreement for overall score.

**CLINICAL RELEVANCE/APPLICATION**

By using PI-RADSv2 readers with varying experience can reproducibly detect high-grade index lesions. Agreement differs on precise scoring of PI-RADSv2.
Renal Cell Carcinoma: How Imaging Can Be Used to Select among Treatment Options and Monitor Response

Thursday, Dec. 1 4:30PM - 6:00PM Room: E352

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Erick M. Remer, MD, Cleveland, OH, (remere1@ccf.org) (Coordinator) Nothing to Disclose
Steven S. Raman, MD, Santa Monica, CA (Presenter) Nothing to Disclose
Raghunandan Vikram, MBBS, FRCR, Houston, TX (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) The attendee will learn how imaging can be used to predict renal tumor subtype and grade. 2) Imaging findings that guide renal tumor management toward percutaneous tumor ablation, partial, and radical nephrectomy will be described. 3) The use of imaging to evaluate patients after tumor ablation and nephrectomy will be reviewed. Assessment methods will be compared and complications will be illustrated. 4) Methods for assessing tumor response after chemotherapy such as RECIST, WHO, Choi / Modified Choi, and MASS criteria will be discussed with illustrative examples. Imaging appearances of post therapy complications will be reviewed.

ABSTRACT
Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Raghunandan Vikram, MBBS, FRCR - 2012 Honored Educator
**Participants**

**Sub-Events**

**RC710A  Multiple Gestations**

Participants
Anne M. Kennedy, MD, Salt Lake City, UT, (anne.kennedy@hsc.utah.edu) **(Presenter)** Author with royalties, Reed Elsevier

**LEARNING OBJECTIVES**

1) Determine chorionicity in multiple pregnancies. 2) Recognize the complications of monochorionic placentation particularly twin twin transfusion syndrome, twin reversed arterial perfusion sequence and the consequences of demise of one twin. 3) Recognize discordant twin growth.

**ABSTRACT**

Active Handout:Anne M. Kennedy

**Honored Educators**

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Anne M. Kennedy, MD - 2016 Honored Educator

**RC710B  Fetal Central Nervous System: Strategies for Accurate Diagnosis**

Participants
Roya Sohaey, MD, Portland, OR **(Presenter)** Nothing to Disclose

**LEARNING OBJECTIVES**

1) Develop an anatomic approach for evaluating the fetal brain at the time of mid-gestation anatomy scan. 2) Differentiate between significant and insignificant subtle findings when evaluating the fetal brain. 3) Develop an anatomy-based differential diagnosis for most brain anomalies. 4) Develop an understanding of which cases would benefit from fetal MR.

**ABSTRACT**

By the conclusion of this course, the participant will understand the strength of the current standard mid-gestational calvarial views for detecting subtle and obvious brain malformations. Additional scanning strategies are presented for more specific diagnoses once the anomaly is identified. When an accurate diagnosis is made, then the associations with genetic syndromes and other anomalies can be considered. Fetal MR is often additive and its benefits and limitations will be considered.

**RC710C  Placenta and Cervix**

Participants
Sara M. Durfee, MD, Boston, MA, (sdurfee@partners.org) **(Presenter)** Nothing to Disclose

**LEARNING OBJECTIVES**

1) Identify the cause of vaginal bleeding in patients with placental abnormalities that include placenta previa and placental abruption. 2) Describe the sonographic features of placenta accreta. 3) Apply practical techniques to a standard transvaginal examination of the cervix in the risk assessment for preterm birth during pregnancy.

**ABSTRACT**
Participants

Sub-Events

**RC713A**  
Fetal Imaging - Looking Outside the Fetus

Participants  
Maria A. Calvo-Garcia, MD, Cincinnati, OH, (maria.calvo@cchmc.org) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) List frequent or important extrafetal conditions potentially encountered during fetal MRI examinations. 2) Apply pattern-recognition guide of these processes during imaging interpretation.

**ABSTRACT**

An adequate evaluation of the pregnancy with fetal MRI will include not only assessment of the fetus. Major structures that will be analyzed and that could clearly affect the outcome of the pregnancy include the cervix, the placenta and the umbilical cord. In addition, congenital and acquired uterine and other maternal conditions could be encountered. Along the course of this presentation we will review extrafetal anatomic variants and pathologic conditions following a case-based format.

**RC713B**  
Fetal GU Imaging

Participants  
Ann M. Johnson, MD, Philadelphia, PA, (johnsona@email.chop.edu) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Understand MRI techniques to characterize complex GU abnormalities in the fetus. 2) Recognize patterns of abnormality to diagnose complex fetal GU abnormalities.

**RC713C**  
Fetal Chest Anomalies

Participants  
Teresa Victoria, MD, PhD, Philadelphia, PA, (victoria@email.chop.edu) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) To discuss the most common fetal lung masses. 2) To identify imaging algorithms and patterns that can be helpful in reaching a diagnosis.

**ABSTRACT**
**Six Common Difficult Problems in GI and GU MRI: The Expert’s Approach**

Friday, Dec 2 8:30AM - 10:00AM Room: E353B

**Participants**

Heró K. Hussain, MD, Ann Arbor, MI (Moderator) Nothing to Disclose

**Sub-Events**

**RC809A**  
**The CT Indeterminate Lesion in the Non-Cirrhotic Liver: Extracellular or Hepatobiliary Contrast-Enhanced MRI**

Participants

Reena C. Jha, MD, Washington, DC, (jhar@gunet.georgetown.edu) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Compare the advantages and limitations of extracellular and hepatocellular contrast agents for indeterminate liver lesions. 2) Apply the most appropriate radiological guidance based on clinical context.

**ABSTRACT**

**RC809B**  
**Is MRI Needed to Further Evaluate a CT Indeterminate Renal Mass?**

Participants

Maryellen R. Sun, MD, Boston, MA, (msun@bidmc.harvard.edu) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Review the heterogeneity of renal masses and importance of renal mass diagnosis to treatment planning and prognosis. 2) Discuss MRI technique and interpretation in characterization of renal masses. 3) Learn scenarios in which MRI evaluation of renal masses can further enhance diagnosis and clinical management of previously indeterminate lesions.

**ABSTRACT**

**RC809C**  
**Perianal Fistulae: What Does the Surgeon Want to Know?**

Participants

Mahmoud M. Al-Hawary, MD, Ann Arbor, MI (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Identify normal pelvic muscles, pelvic spaces and anal sphincter complex on MRI examination. 2) Differentiate and classify types of perianal fistulas and associated complications. 3) Develop a system of reporting the findings to clinical providers.

**ABSTRACT**

**RC809D**  
**How Do I Perform and Interpret MRI of Pelvic Floor Weakness?**

Participants

Victoria Chernyak, MD, Bronx, NY, (vichka17@hotmail.com) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Familiarize themselves with MR protocols for assessment of pelvic floor dysfunction. 2) Learn techniques for improving patient cooperation for dynamic images. 3) Identify normal anatomy of anterior, middle and posterior compartments. 4) Apply reference lines and angles used in assessment of pelvic floor dysfunction. 5) Identify and grade the severity of pelvic floor relaxation. 6) Identify and grade the severity of pelvic organ prolapse.

**ABSTRACT**

Active Handout: Victoria Chernyak


**RC809E**  
**Is MRI the Next Step after US to Evaluate Non-Obstetric Pelvic Pain in Pregnancy?**

Participants

Keyanoosh Hosseinzadeh, MD, Winston Salem, NC, (khossein@wakehealth.edu) (Presenter) Nothing to Disclose

**LEARNING OBJECTIVES**

1) Discuss non-obstetric etiologies of pelvic pain in pregnancy. 2) Highlight indeterminate or inconclusive sonographic appearance of
How Do I Perform a Diagnostic MRI in a Non-cooperative Patient?

Participants
Mustafa R. Bashir, MD, Cary, NC, (mustafa.bashir@duke.edu) (Presenter) Research support, Siemens AG; Research support, Guerbet SA; Research support, General Electric Company; Imaging Core Lab, NGM Biopharmaceuticals; Imaging Core Lab, TaiwanJ Pharma

LEARNING OBJECTIVES
1) Describe patient and technical factors that may contribute to suboptimal or nondiagnostic body MRI examinations. 2) Assess methods for reducing the impact of the above factors.
Carotid and Renal Doppler (Hands-on)

Friday, Dec. 2 8:30AM - 10:00AM Room: E264

AMA PRA Category 1 Credits ™: 1.50
ARRT Category A+ Credits: 1.50

Participants
Gowthaman Gunabushanam, MD, New Haven, CT (Presenter) Editor, WebMD Health Corp;
Shweta Bhatt, MD, MBBS, Rochester, NY, (Shweta_Bhatt@urmc.rochester.edu) (Presenter) Nothing to Disclose
Wui K. Chong, MD, Chapel Hill, NC (Presenter) Advisory Board, Bracco Group;
Corinne Deurdulian, MD, Los Angeles, CA, (Corinne.Deurdulian@med.usc.edu) (Presenter) Nothing to Disclose
Vikram S. Dogra, MD, Rochester, NY (Presenter) Editor, Wolters Kluwer nv;
Ulrike M. Hamper, MD, MBA, Baltimore, MD (Presenter) Nothing to Disclose
Davida Jones-Manns, Hampstead, MD (Presenter) Nothing to Disclose
Mark E. Lockhart, MD, Birmingham, AL, (mlockhart@uabmc.edu) (Presenter) Author, Oxford University Press
Margarita V. Revzin, MD, Milton, CT (Presenter) Nothing to Disclose
Michelle L. Robbin, MD, Birmingham, AL (Presenter) Consultant, Koninklijke Philips NV;
Leslie M. Scoult, MD, New Haven, CT, (leslie.scoult@yale.edu) (Presenter) Consultant, Koninklijke Philips NV
Ravinder Sidhu, MD, Rochester, NY (Presenter) Nothing to Disclose
Sadhna Verma, MD, Cincinnati, OH, (drsadhnaverma@gmail.com) (Presenter) Nothing to Disclose
M. Robert Dejong, Baltimore, MD, (rdejong@jhmi.edu) (Presenter) Nothing to Disclose

LEARNING OBJECTIVES
1) Describe the technique and optimally perform carotid Doppler ultrasound. 2) Describe the technique and optimally perform renal Doppler ultrasound. 3) Review qualitative and quantitative criteria for diagnosing abnormalities in carotid and renal ultrasound Doppler examinations.

ABSTRACT
This hands-on course will provide participants with a combination of didactic lectures and an extended "live" scanning opportunity on normal human volunteers, as follows: Didactic lectures (30 minutes): 1. Carotid Doppler Ultrasound: scanning technique, diagnostic criteria and interesting teaching cases. 2. Renal Doppler Ultrasound: scanning technique, diagnostic criteria and interesting teaching cases. Mentored scanning (60 minutes): Following the didactic lectures, the participants will proceed to a scanning area with normal human volunteers and ultrasound machines from different manufacturers. Participants will be able to perform live scanning with direct assistance (if needed) by faculty. Faculty will be able to offer feedback, help participants improve their scanning technique as well as answer any questions. Faculty will also be available to answer general questions relating to all aspects of vascular Doppler, not limited to carotid and renal Doppler studies.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/

Leslie M. Scoult, MD - 2014 Honored Educator
Sadhna Verma, MD - 2013 Honored Educator
SST05

The Role of Urethral Sphincter Dysfunction and Funneling Change in Indicating the De Novo SUI in Severe Anterior Vaginal Wall Prolapse Women Before Pelvic Floor Rehabilitation

Friday, Dec. 2 10:30AM - 10:40AM Room: E351

Participants
Paul Nikolaidis, MD, Chicago, IL (Moderator) Nothing to Disclose
Liina Poder, MD, San Francisco, CA (Moderator) Nothing to Disclose

Sub-Events

SST05-01 The Role of Urethral Sphincter Dysfunction and Funneling Change in Indicating the De Novo SUI in Severe Anterior Vaginal Wall Prolapse Women Before Pelvic Floor Rehabilitation

Friday, Dec. 2 10:30AM - 10:40AM Room: E351

Participants
Na Li, Tianjin, China (Presenter) Nothing to Disclose
Wen Shen, Tianjin, China (Abstract Co-Author) Nothing to Disclose
Changlu Yu, Tianjin, China (Abstract Co-Author) Nothing to Disclose

PURPOSE

Patients with severe anterior vaginal wall prolapse are inclined to demonstrate de novo stress urinary incontinence (SUI) after pelvic floor rehabilitation. The aim of our study was to investigate the role of urethral sphincter dysfunction and funneling change of urethrovesical junction in predicting de novo SUI preoperation.

METHOD AND MATERIALS

47 patients with severe anterior vaginal wall prolapse but without complaining of SUI were enrolled. Preoperatively static and dynamic MRI examination of pelvic floor were performed with prolapse reduction. Urethral sphincter dysfunction was indicated when widen of the proximal urethra and funneling at the urethrovesical junction was observed. Urethral mobility was defined by rotation of urethra. Vesical neck movement was evaluated by its distance to pubococcygeal line (PCL). A published levator ani muscle (LAM) scoring system was used to characterize morphological changes of LAM and divided the severity of injury into three categories as none, minor and major. Primary outcome was de novo SUI at 1 year postoperative follow-up by an experienced gynecologist.

RESULTS

Of the 47 patients, 5 cases (10.6 %) demonstrated de novo SUI postoperatively. Urethral sphincter dysfunction and funneling were present in all of de novo SUI patients whilst only 7.14% in continent patients. De novo SUI patients were having more minor but not major LAM defects than continent patients, both in puborectal muscle (minor 40.0% vs. 21.4%, major 60.0% vs. 50%; P=0.06) and iliococcygeal muscle (minor 80.0% vs. 33.3%, major 20.0% vs. 19.0%; P=0.33). The value of vesical neck downward movement measured in de novo SUI patients was more than in continent patients (23.4±16.4 vs. 19.9±11.4, P=0.06) though without significant difference. Urethral mobility was equally active in de novo SUI patients and continent patients (50.8±32.4 vs. 50.4±26.1, P=0.46).

CONCLUSION

The urethral sphincter dysfunction and funneling can be treated as a practical indicator of de novo SUI preoperation for patients with severe anterior vaginal wall prolapse, especially when combined with more minor LAM injury and more active vesical neck downward movement.

CLINICAL RELEVANCE/APPLICATION

Severe anterior vaginal wall prolapse women with urethral sphincter dysfunction and funneling change during MR examination have higher risk of developing de novo SUI, we suggest counselling such women for concomitant pelvic rehabilitation and anti-incontinent surgery.

SST05-02 Diagnostic Accuracy of Abnormal Placentation on MRI Correlated with the Surgical Findings

Friday, Dec. 2 10:40AM - 10:50AM Room: E351

Participants
Ayumi Seko, MD, Otsu, Japan (Presenter) Nothing to Disclose
Yukihiro Nagatani, MD, Otsu, Japan (Abstract Co-Author) Nothing to Disclose
Norihisa Nitta, MD, Kyoto, Japan (Abstract Co-Author) Nothing to Disclose
Hitoshi Kitahara, MD, Otsu-Shi, Japan (Abstract Co-Author) Nothing to Disclose
Kiyoshi Murata, MD, Otsu, Japan (Abstract Co-Author) Nothing to Disclose
Shun-Ichiro Tsuji, Otsu, Japan (Abstract Co-Author) Nothing to Disclose
Keiko Tsuchiya, Otsu, Japan (Abstract Co-Author) Nothing to Disclose

PURPOSE

The purpose of this study was to assess the preoperative diagnostic accuracy of abnormal placentation by MRI.

METHOD AND MATERIALS

Forty-one gravid women with placenta previa or low-lying placenta who underwent MRI were retrospectively assessed. Their mean...
Abnormalities of the Yolk Sac and Its Association with First Trimester Abortion

Friday, Dec. 2 11:00AM - 11:10AM Room: E351

Forty-one gravid women with placenta previa or low-lying placenta who underwent MRI were retrospectively assessed. Their mean age was 34 years old (22-42). We compared 5 MR findings and the prevalence of abnormal placentation. The MR findings that we assessed were 1) heterogeneous signal intensity within the placenta, 2) dark intraplacental bands on T2WI, 3) focal uterine bulging, 4) focal interruptions in the myometrial wall and 5) flow voids in the placenta. The numbers of dark intraplacental bands on T2WI were also counted.

RESULTS

All patients had C-section. Eight patients were identified with placenta accreta, one was placenta increta and one was placenta percreta, pathologically. Three cases which had a defect of the myometrium after the placental removal and one case which the placenta attached firmly to the myometrium were included to a placenta accreta (PA). MR findings 1)-5) had sensitivity of 0.642, 0.857, 1, 0.714 and 0.57, specificity of 0.74, 0.629, 0.592, 0.888, and 0.703, positive predictive value (PPV) of 0.562, 0.954, 0.538, 0.769 and 0.6, and negative predictive value (NPV) of 0.8, 0.894, 1, 0.857, and 0.904, respectively. The average numbers of “dark bands” on T2WI were 0.69 with PA(-) and 2.93 with placenta accreta , increta or percreta (+).

CONCLUSION

Of the five MRI findings, the dark intraplacental bands on T2WI had the highest sensitivity and the focal uterine bulging had the highest specificity. Higher numbers of dark intraplacental bands on T2WI could indicate abnormal placentation. When a number of evaluated MRI findings increases the risk of abnormal placentation also increases.

CLINICAL RELEVANCE/APPLICATION

Patients with two or more of our evaluated five findings were considered as a high risk group when they were delivering. Radiologists should be careful not to overlook our evaluated findings.

Abnormalities of the Yolk Sac and Its Association with First Trimester Abortion

Friday, Dec. 2 11:00AM - 11:10AM Room: E351

Participants
Krishnarjun Peethambaram, MBBS, Davangere, India (Presenter) Nothing to Disclose
Parthasarathy K R, MBBS, MD, Bangalore, India (Abstract Co-Author) Nothing to Disclose
Kishan A. Bhagwat, MBBS, MD, DAVANGERE, India (Abstract Co-Author) Nothing to Disclose
Reddy Priyatham Tulasi, MBBS, Davangere, India (Abstract Co-Author) Nothing to Disclose
Shashikiran B R, MBBS, Davangere, India (Abstract Co-Author) Nothing to Disclose
Naveen Rathod, Gulbarga, India (Abstract Co-Author) Nothing to Disclose

PURPOSE

To determine all the sonological abnormalities of the yolk sac and establish their association with adverse perinatal outcomes in the first trimester

METHOD AND MATERIALS

The study involves the prospective analysis of 578 pregnant women, who came for first trimester scan (5th to 13th week gestational age). All examinations were performed with GE Voluson 730 expert ultrasound equipment in a 5-9mHzendocavitory 3D probe (GE healthcare, Milwaukee, WI). The gestational sac measurements were taken along with the CRL (crown rump length), yolk sac diameter and FHR (fetal heart rate). All 578 cases were divided into the control group (normal yolk sac) and the study group (abnormal yolk sac) and subjected to statistical analysis. The primary outcome measure was the abortion rate between the two groups.

RESULTS

Out of the 578 cases, 104 had abnormal yolk sacs. The study group was divided into the patients who had a normal or uneventful outcome of pregnancy and patients who had an abnormal outcome (embryonic demise, anembryonic pregnancy). Out of the 104 cases of abnormal yolk sac, 54 patients were associated with first trimester abortion and 50 patients had an uneventful pregnancy. The statistical analysis demonstrated a sensitivity of 94.9%, specificity of 61.9% and chi-square statistic of 80.2131. The p value is <0.00001, which shows that the results are significant. The overall abortion rate with abnormal yolk sacs was 51.9%. The outcome of pregnancy was also studied with respect to the sonological abnormality of the yolk sac. Absent and calcified yolk sacs always lead to abortion. Large and small yolk sacs had a 40-50% abortion rate. Irregular yolk sacs had a 25% abortion rate. But echogenic and persistent yolk sacs had an overall abortion rate of only 9%.

CONCLUSION

Evaluating the yolk sac should be an integral part of the overall first trimester sonological examination as it can be used to anticipate the course of pregnancy.

CLINICAL RELEVANCE/APPLICATION

Importance of the size, shape and internal contents of the yolk sac can predict embryonic death or abnormalities in the first trimester.

Predibirth Software Prospective Study: The Interest of the Virtual Trial of Labor (VTOL)

Friday, Dec. 2 11:10AM - 11:20AM Room: E351

Participants
Olivier Arni, MD, PhD, Clermont Ferrand, France (Presenter) Nothing to Disclose
Lucie Cassagnes, MD, Clermont-Ferrand, France (Abstract Co-Author) Nothing to Disclose
Jean-Christophe Maran, PhD, MA, Creteil, France (Abstract Co-Author) Nothing to Disclose
Dominique Musset, MD, Clamart, France (Abstract Co-Author) Nothing to Disclose
PURPOSE

The aim of this study was to evaluate the diagnostic interest of computerized virtual trial of labor from 482 finite elements reconstruction of the maternal pelvis and fetus from magnetic resonance imaging data sets, followed by 3D childbirth simulation.

METHOD AND MATERIALS

482 pregnant women were enrolled in this prospective study (NATVISTA study). A pelvimetry with MRI on every pregnant woman on 4 maternity centers over a 6 months duration of study. Both fetus and pelvis were segmented for 3D vectorial reconstruction with Predibirth (Babyprogress - France) software. Favorability of childbirth was estimated using the percentage of possibility to deliver regarding tested possibilities for fetal engagement, descent and rotation for each variety of presentation tested. Childbirth was defined with a percentage of fetal head compression along the birthcanal.

RESULTS

Of the 482 pregnant women tested, the mean MAGNIN score was 23. The positive predictive value of predibirth was 96 %, the negative predictive value was 97 %, the false positives rate was 4 %, the false negatives rate was 2%. Maternal satisfaction using virtual trial of labor was 93%. Caregivers satisfaction using virtual trial of labor was 90%. Compared to obstetrical decisions based on pelvimetry, the VTOL improved of 80 % birth predictions. The overal cesarean section rate didn't change (from 28 % before VTOL to 27 % with VTOL), but the emergency C-section rate dropped drastically (from 16 % before VTOL, to 3 % after VTOL).

CONCLUSION

VTOL with Predibirth software is a new and promising tool to detect labor dystocia and seem to be a significant improvement over pelvimetry to decrease biomechanical risks during childbirth.

CLINICAL RELEVANCE/APPLICATION

VTOL may soon change obstetrical decisions at the time of Childbirth

STTOS-06 Utility of Diffusion-Weighted MR Imaging in the Diagnosis of Morbidly Adherent Placenta

Friday, Dec. 2 11:20AM - 11:30AM Room: E351

Participants
Anna Ellemie, MD, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Tom Winter, Salt Lake Cty, UT (Abstract Co-Author) Nothing to Disclose
Susanna I. Lee, MD, PhD, Boston, MA (Abstract Co-Author) Nothing to Disclose
Daniel S. Hippe, MS, Seattle, WA (Abstract Co-Author) Research Grant, Koninklijke Philips NV; Research Grant, General Electric Company
Manjiri K. Dighe, MD, Seattle, WA (Presenter) Research Grant, General Electric Company

PURPOSE

Rising incidence and potential for catastrophic surgical outcomes underscore the need for sensitive prenatal diagnosis of morbidly adherent placenta (MAP). As such, ambiguous US findings often necessitate MRI. By better defining the border between placenta and myometrium, we hypothesized that diffusion-weighted imaging (DWI) may be a useful adjunct to traditional prenatal MRI.

METHOD AND MATERIALS

Following IRB approval, 2 radiologists blinded to history and pathology retrospectively reviewed MR images (1.5T) from singleton pregnancies with and without pathologically-proven MAP. T2W only and T2W+DWI images were reviewed in separate sessions 2 weeks apart to avoid recall bias, with normal and MAP randomized within and between sessions. Reviewers completed questionnaires regarding placenta/uterus features, MAP presence and diagnostic confidence. MR findings were compared to pathology results with Chi-squared tests, interreader agreement was evaluated with Cohen's kappa and diagnostic accuracy was compared with the sign test.

RESULTS

In total, 17 patients (mean gest 27w4d) were reviewed (indications: suspected MAP 14/17, fetal anomaly 2/17, abd pain 1/17). Typical MR criteria were reported more frequently with pathologic MAP: loss of retroplacental T2 dark zone (T2W, p=0.008) and dark/thick interplacental bands (T2W+DWI, p=0.032). Compared with T2W only, addition of DWI significantly increased interreader agreement (p=0.045) and tended to increase sensitivity (69% vs. 94%, p=0.25) but decrease specificity (56% vs. 39%, p=0.5) for MAP. Although readers reported increased diagnostic confidence with DWI in 65%, explicit confidence ratings (p=0.7) and diagnostic accuracy (p>0.99) did not change.

CONCLUSION

MAP is a potentially life-threatening condition that requires increased clinical and radiographic sensitivity to optimize management. Small sample size (due to low incidence), inexperience with DWI interpretation in pregnancy, and poor resolution of DWI are limitations of our study. Trends toward increased sensitivity and improved interreader agreement suggest that DWI may complement traditional MRI evaluation of MAP but more experience and sequence improvement are necessary to improve diagnostic accuracy.

CLINICAL RELEVANCE/APPLICATION

DWI in conjunction with traditional prenatal MRI may aid in evaluation of MAP, a potentially life-threatening condition that requires extensive surgical planning and patient counseling.

Honored Educators

Presenters or authors on this event have been recognized as RSNA Honored Educators for participating in multiple qualifying educational activities. Honored Educators are invested in furthering the profession of radiology by delivering high-quality educational content in their field of study. Learn how you can become an honored educator by visiting the website at: https://www.rsna.org/Honored-Educator-Award/
SST05-07  Quantitative Heterogeneity Analysis of MRI Can Aid in the Diagnosis of Placenta Accreta

Friday, Dec. 2 11:30AM - 11:40AM Room: E351

Awards
Student Travel Stipend Award

Participants
Christopher Miller, Chicago, IL (Presenter) Nothing to Disclose
Kejia Cai, PhD, Chicago, IL (Abstract Co-Author) Nothing to Disclose
Winnie A. Mar, MD, Chicago, IL (Abstract Co-Author) Nothing to Disclose

PURPOSE
Accurate antenatal diagnosis of placenta accreta remains a challenge. Placental heterogeneity is an MRI feature of placenta accreta which is subjectively determined. The purpose of this study is to evaluate advanced quantitative mathematical algorithms for heterogeneity analysis in order to differentiate placenta accreta from normal placentas objectively.

METHOD AND MATERIALS
We performed retrospective image analysis of 23 cases, with 16 normal cases and 7 cases of placenta accreta based on pathological diagnosis. Sagittal single shot fast spin echo T2-weighted MRI sequences acquired on a GE 1.5 T MRI scanner were analyzed using custom in house software run on a Matlab platform. An ROI of the entire placenta was manually drawn, and confirmed by an experienced radiologist. Placental heterogeneity was quantified with various mathematic algorithms: coefficient of variation, histogram analysis, gray level co-occurence matrices (GLCM), histogram oriented gradients (HOG), random walk analysis, and fractal analysis with box size from 2 to 256. One-tailed unpaired Student’s t test was used to compare the group heterogeneity indices with statistical significance prescribed with p<0.05.

RESULTS
Each algorithm produced a different quantitative measure of image heterogeneity. With a limited sample size, fractal analysis with a box size of 256 provides the highest statistical power for differentiating placenta accreta from normal (p=0.02). The analyses obtained from HOG (p = 0.08) and GLCM (p=0.09) are encouraging, with p values approaching significance: The least statistical power was observed from random-walk, histogram, and co-variance analysis with p = 0.48, 0.34, and 0.16 respectively.

CONCLUSION
Fractal analysis was found to be the most promising objective approach in identifying placenta accreta in the limited sample size we have so far. Work will be continued with further algorithm optimization and increased sample size. Quantitative heterogeneity analysis shows promise in the diagnosis of placenta accreta with MRI.

CLINICAL RELEVANCE/APPLICATION
Quantitative heterogeneity analysis may be used to increase diagnostic certainty in the diagnosis of placenta accreta with MRI.

SST05-08  Can Three-Dimensional Pelvimetry by Low-Dose Stereoradiography Replace Low-Dose Helical CT Pelvimetry?

Friday, Dec. 2 11:40AM - 11:50AM Room: E351

Participants
Sebastien L. Aubry, MD, PhD, Besancon, France (Presenter) Nothing to Disclose
Pierre Padoin, MD, Besancon, France (Abstract Co-Author) Nothing to Disclose
Yolande R. Petegnief, PhD,DIPPHYS, BESANCON, France (Abstract Co-Author) Nothing to Disclose
Jean-Philippe Nueffer, MD, Besancon, France (Abstract Co-Author) Nothing to Disclose
Didier Riethmuller, MD, PhD, Besancon, France (Abstract Co-Author) Nothing to Disclose
Eric Delabrousse, MD, Besancon, France (Abstract Co-Author) Nothing to Disclose

PURPOSE
To evaluate the reliability of pelvimetry measurements assessed by stereoradiography imaging (SRI) and to assess maternal and fetal radiation dose compared to low-dose helical CT (MDCT) pelvimetry.

METHOD AND MATERIALS
The institutional review board approved this study, and written informed consent was obtained from thirty-five pregnant women. They were prospectively included and underwent consecutively a synchronous front and lateral low-dose SRI and a low-dose MDCT of the pelvis. Pelvimetry measurements were anonymously measured on dedicated SRI software and PACS viewer, and were then compared. Skin dosimeters were used to evaluate the radiation dose.

RESULTS
SRI-MDCT correlation (Pearson; mean bias) was very good for the transverse inlet diameter (0.92; -0.09cm), the anteroposterior diameter of pelvic Inlet (0.92; 0.47cm), the maximal transverse diameter (0.9; 0.21cm), and the sacrum length (0.9; 0.09cm). Correlation was good for the sacrum curvature (0.75; 0.06cm), the Magnin index (0.7; 0.5cm) and the anteroposterior diameter of pelvic outlet (0.6; 0.52cm). It was low for the transverse outlet diameter (0.5) and very low for the bipinous diameter (0.22; -0.8cm). The fetal dose was 13.1 times lower in SRI (87+/−26 μGy) than in CT (1140+/−220μGy, p<0.0001). The effective maternal dose was 3.1 times lower in SRI (97+/−21 μSv) than in CT (310+/−60 μSv, p<0.0001).

CONCLUSION
Pelvic inlet measurements by SRI are reliable. For each of the other diameters, measurement bias is low. Compared to CT pelvimetry, SRI leads to a significant decrease in fetal and maternal radiation dose.
CLINICAL RELEVANCE/APPLICATION
Reliability of the pelvic inlet measurements and lower radiation dose suggests that SRI should be proposed as an alternative to CT pelvimetry.

SST05-09  Regional Placental Bold Changes with Gestational Age in Normally Developing Pregnancies using Long Duration R2* Mapping in Utero
Friday, Dec. 2 11:50AM - 12:00PM Room: E351

Participants
Manjiri K. Dighe, MD, Seattle, WA (Presenter) Research Grant, General Electric Company
Bhagya Sannanaraja, MD, San Antonio, TX (Abstract Co-Author) Nothing to Disclose
Debosmita Biswas, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Susan McKown, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Jason Cacutt, Seattle, WA (Abstract Co-Author) Nothing to Disclose
J C. Gatenby, Seattle, WA (Abstract Co-Author) Nothing to Disclose
Colin Studholme, PhD, San Francisco, CA (Abstract Co-Author) Nothing to Disclose

PURPOSE
The placenta is a key organ determining healthy fetal development. Pathological development of the placenta has been related to fetal growth restriction and pre-eclampsia (PE). Blood flow in the maternal and fetal regions within the placenta permit the transfer of both oxygen and nutrients to the fetus and the removal of waste products. BOLD MRI can assess tissue oxygenation non-invasively and is based on the magnetic properties of hemoglobin. The purpose of our study was to examine the use of R2* mapping with BOLD MRI in the placenta with the aim of providing a reference for blood oxygenation levels.

METHOD AND MATERIALS
Written informed consent was obtained from pregnant patients with uncomplicated pregnancies. Imaging was performed on a Philips 1.5T scanner, using a 16-channel Torso XL coil. Dual echo EPI BOLD data was collected and repeated in a dynamic acquisition consisting of between 90 and 150 time frames. A set of multiple 3D regions of interest were manually outlined within the placenta on each frame using the segmentation tool in the rview software http://rview.colin-studholme.net. The ROI's were separately adjusted on each frame and each slice to ensure selected voxels fell within the placenta. A total of between 3 and 5 slices clearly in the placenta were marked on each subject. Mean R2* values were then calculated.

RESULTS
The average age of the fetus was 28 weeks 1 day. Average R2* in the placenta was 8.99 +/- 2.21 (range 2.17 to 14.51). There was an increase in the R2* with gestational age. In fetuses with multiple scans performed at different time points, there was an increase in the R2* over time. The average standard deviation in the multiple acquisitions in each patients was 0.75. One outlier was seen with a low R2* and this variability could be due to motion seen in the images in this outlier.

CONCLUSION
Evaluating the R2* in placenta is feasible. The R2* values were seen to increase with gestational age. It will be possible to evaluate the R2* in placenta in patients with intrauterine growth retardation (IUGR) which is expected to be lower than the normal R2*.

CLINICAL RELEVANCE/APPLICATION
Evaluation of the R2* in the placenta with BOLD MRI is feasible and can help in early prediction of placenta dysfunction like in IUGR. Further studies of IUGR patients are needed to access the utility of BOLD imaging in the placenta.