

# B

## Scientific Sessions and Clinical Trials in Radiology (B)

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Internal mammary arteries were effectively avoided during biopsies in 68.9% (31/45) cases of CEUS group. Biopsies sampling the active areas demonstrated on CEUS had 100% success rate and 95.6% pathological diagnosis rate, which were higher than conventional ultrasound guided group (88.9% and 84.4%,  $P < 0.05$ ).

**Conclusion:** By depicting internal necrotic areas, active areas and internal mammary arteries, CEUS guided biopsy of anterior mediastinal lesion is a promising technique with accuracy, safety and success.

## B-1229 11:26

### Preliminary in vitro and in vivo results of a MR-safe guidewire

A. [Massmann](#), A. Buecker, G.K. Schneider; *Homburg a.d. Saar/DE* ([Alexander.Massmann@uks.eu](mailto:Alexander.Massmann@uks.eu))

**Purpose:** To evaluate a MR-safe guidewire (GW) for endovascular purposes.

**Methods and Materials:** The used GWs (MaRVis, Germany) are composed of glass- and aramid-fibres embedded in resin doped with metal particles and a hydrophilic PTFE shrinktube. The diameters/length were 0.89 mm (0.035"/260 cm in a standard and stiff version and 0.36 mm (0.014"/300 cm. After in vitro evaluation of visualisation and handling in a flow-model, all GWs were used in a swine-model (n=9; mean weight, 65±5 kg). Under MR-guidance, iliac arteries, abdominal/thoracic aorta, renal arteries, iliac and inferior cava vein were catheterized using real-time GRE-sequences (temporal resolution 5 images per second; FOV 150 mm; matrix 128x128) in an 1.5 Tesla scanner (Magnetom Aera Siemens, Germany). Balloon-dilatation and stent-implantation were performed using the GWs. Visualisation, handling and catheterization-time for vessel-regions were obtained.

**Results:** MRI depicted the GWs with a well-visualized continuous artefact of the shaft with a diameter of 2 mm and 4.5 mm at the tip. Precise handling and sufficient stiffness achieving adequate transfer of traction and torsion allowed accurate navigation to the target vessels (mean time for the abdominal/thoracic aorta/inferior vena cava 4 s; visceral/renal arteries 7 s and contralateral iliac arteries 7 s). All procedures were technically successful. No GW-associated complications occurred. Handling regarding stiffness, flexibility and guidance were similar to usual standard angiographic GWs.

**Conclusion:** Preliminary results of this newly available MR-guidewire are a basis for future clinical application for MR-guided endovascular interventions in humans.

## B-1230 11:34

### MRI-guided biopsies and MR-guided wire localisation biopsies of soft tissue tumours based on contrast-enhanced images

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**Purpose:** Diagnostic biopsies of soft tissue masses are sometimes difficult in CT or US due to problems in identifying relevant tumour areas. With the advent of large-bore MR-system routine biopsies, comparable to the techniques used in CT are nowadays possible. Due to the better tissue contrast, MRI allows for easy depiction of lesions and contrast medium can be used to identify the most aggressive parts of tumours.

**Methods and Materials:** 45 patients with different soft tissue tumours underwent MR-guided biopsy. Tissue sampling areas were chosen based on contrast enhancement of different tumour areas (MultiHance 0.1 mol/kg BW). Tissue samples underwent histopathologic examination and grading based on biopsies were compared with the final tumour grading.

**Results:** In 29 out of 45 patients, complete resection of tumours was performed and final grading was identical with the grading-based MR-guided biopsies. In 6 patients either lymphoma or metastases of different primary tumours were diagnosed and chemotherapy was initiated. The remaining tumours were benign and follow-up studies were recommended.

**Conclusion:** MR-guided biopsies with tissue sampling based on maximum contrast enhancing areas of soft tissue tumours allow for correct grading of even large, heterogeneous tumours and thus enable optimal planning of final tumour therapy.

**Author Disclosures:**

G. [Schneider](#): Investigator; Bracco. Research/Grant Support; Siemens, Bracco. Speaker; Siemens, Bracco. A. [Buecker](#): Research/Grant Support; Siemens, Bracco.

## B-1231 11:42

### FDG PET/CT guided biopsy

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**Purpose:** Biopsy of suspect tissues is required to reach a diagnosis and to plan adequate treatment. However, imaging-guided biopsies (US, CT) have an accuracy between 70-90%, with several non-diagnostic procedure. FDG PET/CT detects abnormal signals even before cancer-related morphological changes occur, and can potentially be used to drive the biopsy to the most

active area within a suspect malignant mass. The aim of this study is to preliminarily assess FDG PET/CT guided biopsy feasibility and accuracy in the diagnosis.

**Methods and Materials:** 10 patients with suspect hypermetabolic findings were enrolled. 8/10 had a suspect malignancy relapse and 2/10 had suspect findings without a previous significant clinical history. 5/10 had a previous non-diagnostic CT-guided biopsy. They underwent a FDG PET/CT real-time guided biopsy performed by experienced personnel. 5/10 patients underwent also contrast media injection to depict vessels surrounding the suspect lesion. The needle was tracked by driving its progression into the area with the highest SUVmax through repeated PET/CT acquisition. The procedure was performed under cytological extemporaneous exam guide.

**Results:** 10/10 patients had a definitive pathological diagnosis after PET/CT biopsy: 1 tuberculosis, 1 sacral chordoma, 2 rectal cancer relapse, 1 serous papillary ovarian cancer, 2 intermediate lymphoma, 1 Langerhans cell histiocytosis, 1 node metastasis of uterine neoplasm, 1 post RT scar tissue. No patients had complications.

**Conclusion:** These preliminary results prove that FDG PET/CT guided biopsy is feasible in the clinical practice. Furthermore it positively impacted on the time to treatment onset in those patients with a previous non-diagnostic biopsy.

10:30 - 12:00

Room K

## Genitourinary

# SS 1807

## Tumours of the urinary tract and adrenals

**Moderators:**

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## B-1232 10:30

### CT prediction of histologic grade of small clear cell renal cell carcinoma

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**Purpose:** To evaluate the association between CT findings and histologic grade of small ( $\leq 4$  cm) clear cell renal cell carcinoma (ccRCC).

**Methods and Materials:** CT scans of 101 patients with small ccRCC were reviewed retrospectively and independently by two radiologist for tumour size, shape, margin, encapsulation, enhancement pattern on and visual relative enhancement. Enhancement patterns were defined according to the percentage of uniform enhancement (pattern 1, homogeneous  $\geq 90\%$ ; pattern 2, relatively homogeneous  $\geq 75$  and  $< 90\%$ ; pattern 3, heterogeneous  $< 75\%$ ). Quantitative parameters representing attenuation and degree of enhancement were calculated. Histologic grade was divided as low (Fuhrman grade I or II) and high (Fuhrman grade III or IV). CT imaging variables were analysed by using univariate and multivariate analysis.

**Results:** 63 low-grade and 38 high-grade small ccRCCs were assessed. Low-grade tumours differed from high-grade tumours in enhancement pattern 1 or 2 ( $P < 0.001$  and  $P = P < 0.001$ ), smaller size ( $P = 0.002$  and  $P = 0.001$ ), and lower attenuation on unenhanced scan ( $P < 0.001$  and  $P = 0.008$ ). In multivariate logistic regression analysis, enhancement pattern 1 or 2 and low attenuation ( $\leq 30$  HU) were identified as independent predictors of low-grade ccRCC. The sensitivity, specificity and accuracy of the model derived on the logistic regression analysis were 92.1%, 57.9%, 79.2% for reader 1 and 69.8%, 71.1%, 70.3% for reader 2, respectively.

**Conclusion:** CT imaging features including tumour attenuation and enhancement pattern can be useful to predict the biologic behavior of small ccRCC for adequate treatment strategy.

## B-1233 10:38

### Evaluation of enhancement degree in small renal masses using multiphasic CT scan: can we discriminate between renal cell tumours and oncocytomas?

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**Purpose:** To evaluate the role of morphological characteristics and enhancement degree using multiphasic computed tomography (CT) for differentiating renal cell carcinoma (RCC) subtypes and oncocytomas in small renal masses ( $\leq 4$  cm).

**Methods and Materials:** We retrospectively reviewed the CT of 81 SRMs with a confirmed pathological diagnosis of oncocytoma or RCC subtypes (clear cell, ccRCC; papillary, pRCC; chromophobe, chRCC). The morphological features, the pattern of enhancement and the quantitative analysis of the degree of enhancement were assessed for each lesion. Comparison between the radiological features, the mean values of the enhancement parameters (absolute attenuation, relative enhancement and tumour-to-cortex

enhancement) and the histological subtypes were assessed by means of the Chi-square test and the Student-Fisher t test. The ROC analysis was used to determine the accuracy of differentiating the "Hypervascular" group from the "Hypovascular" group, subdivided based on the enhancement degree.

**Results:** The SRMs were subdivided as follows: 30 (37.1%) oncocytomas, 22 (27.1%) ccRCCs, 16 (19.8%) pRCCs and 13 (16%) chRCCs. Of the morphological features, only necrosis significantly correlated with ccRCC ( $p=0.014$ ). Quantitative analysis of the degree of enhancement showed that oncocytomas and ccRCCs had higher enhancement (Hypervascular group) and pRCC and chRCC had a lower enhancement (Hypovascular group), especially during the arterial phase. The ROC analysis confirmed the differentiation between the two groups.

**Conclusion:** Our study demonstrated the necessity of the careful analysis of the enhancement degree, in particular in the arterial phase, to distinguish hypervascular from hypovascular tumours. This observation has important implications for the clinical practice.

## B-1234 10:46

### Clear cell adenocarcinoma of the urethra: MR image findings for differentiation from non-adenocarcinomas

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**Purpose:** To evaluate the differential MRI findings of clear cell adenocarcinoma of the urethra (CCAU) from non-adenocarcinomas of the urethra (NACU).

**Methods and Materials:** Six patients with CCAU and six patients with NACU (four transitional cell carcinomas and two squamous cell carcinomas) who underwent MRI and procedures for pathologic confirmation were recruited. MR images were retrospectively reviewed in consensus by two genitourinary radiologists who were blinded to the pathologic information. The comparison of MRI findings between CCAU and NACU was performed using Mann-Whitney U test and Fisher's exact test. The evaluation of the distinctive MR image findings for diagnosis was performed using Univariate and multivariate logistic regression analyses with Firth's bias.

**Results:** All cases of CCAU were associated with urethral diverticulum. CCAU showed lower height to width ratio, more frequent intratumoural septa and larger the proportion of the preserved normal urethra than NACU with statistical significance. The prominent T2 dark SI rim sign and the preserved tendency of the bladder neck on CCAU were other meaningful MR image findings for differentiation.

**Conclusion:** CCAU showed the distinctive MR image findings for differentiation from NACU. All CCAU were associated with urethral diverticulum and CCAU showed lower height to width ratio, more frequent intratumoural septa and more preserved normal urethra than NACU. The prominent T2 dark SI rim sign and the preserved tendency of the bladder neck on CCAU may be meaningful MR image findings for differentiation.

## B-1235 10:54

### Can quantitative CT texture analysis be used to differentiate between low- and high-grade urothelial carcinoma?

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**Purpose:** To determine the capability of CT texture analysis to differentiate between low- and high-grade urothelial carcinoma

**Methods and Materials:** A total of 105 patients with pathologically approved high-grade urothelial carcinoma (HG-UrCa,  $n=106$ ) and low-grade urothelial carcinoma (LG-UrCa,  $n=18$ ) were included in this retrospective study. Both non-enhanced CT (NECT) and contrast-enhanced CT (CECT) images of the largest tumour cross-sectional area were analysed, with quantification of entropy, mean of positive pixels (MPP), mean gray-level intensity (Mean), standard deviation (SD) of the histogram, for fine to coarse textures (filters 0-6, respectively). The value of each texture feature was compared; receiver operating characteristic (ROC) curves were performed and the area under the ROC curve (AUC) was calculated for differentiation of HG-UrCa and LG-UrCa.

**Results:** Compared to LG-UrCa, HG-UrCa has significantly higher entropy quantified from medium to coarse texture on UECT and fine to coarse texture on CECT images with a maximum AUC of  $0.73\pm 0.06$  (CECT: filter 6), higher MPP quantified from fine or coarse texture on UECT and fine texture on CECT images with a maximum AUC of  $0.78\pm 0.07$  (UECT: filter 0), and higher mean gray-level intensity quantified from fine texture on both UECT and CECT images with a maximum AUC of  $0.74\pm 0.07$  (UECT: filter 0). SD quantified from coarse texture on CECT images was also significantly higher in HG-UrCa with an AUC of  $0.65\pm 0.07$ .

**Conclusion:** CT texture analysis could be used as a reliable method to differentiate between LG-UrCa and HG-UrCa.

## B-1236 11:02

### Qualitative assessment and quantitative assessment for evaluation of optimal linear blending image in dual-source dual-energy CT for detection of renal solid mass

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**Purpose:** To evaluate the image quality of various dual-energy CT linear blending image in the patient with solid renal mass at nephrographic phase compared with 120 kVp Acquisition.

**Methods and Materials:** Eighteen patients underwent DECT examination. Image fusion was calculated using linear blending method with following weight factors (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, and 0.9). The CT values of solid renal mass, mormal renal parenchyma, aorta, psoas muscle were measured for each dataset. Each area was measured 4 times and the mean value was calculated. The CT value and standard deviation (SD) of the retroperitoneal fat was also measured to determine the image noise, CNR and SNR were calculated. Subjective image quality evaluated using five scale method for a standard 120 kVp acquisition and optimal linear blending image.

**Results:** The mean CT values of renal parenchyma, aorta, psoas muscle, renal lesion increase when increasing weighting factors used, however, the mean CT value of retroperitoneal fat decreases when increasing the weighting factors. The highest CNR and SNR values of renal lesion were found in blending image when the weighting factor 0.5. All the overall image quality (weighting factor 0.5 and a standard 120 kVp acquisition) could be provided satisfactory clinical diagnosis ( $\geq 3$ ). There was significant difference in image quality score between mixed energy images with weight factor 0.5 and a standard 120 kVp acquisition ( $Z=-3.000$ ,  $P < 0.05$ ).

**Conclusion:** The mixed energy images with weighting factor 0.5 can improve the image quality of DE nephrographic phase in patient with solid renal mass.

## B-1238 11:10

### Complementary value of contrast-enhanced ultrasound (CEUS) in the diagnostic algorithm of complex renal cysts

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**Purpose:** To assess the role of CEUS in the diagnostic algorithm of complex cysts, classified following the Bosniak system, compared with CE-CT.

**Methods and Materials:** From March 2011 to September 2013 we selected 42 patients that underwent CE-CT after US finding of complex renal cysts (Bosniak  $\geq$  IIF). All patients were also evaluated with CEUS within a week. Two independent radiologists analysed results of both techniques. Therapeutic approach was planned based on the highest grading CE-CT or CEUS.

**Results:** CE-CT images found 14 B-II, 8 B-IIF, 9 B-III, and 11 B-IV, while CEUS images found 12 B-II, 13 B-IIF, 8 B-III, and 11 B-IV. CEUS upgraded CE-CT Bosniak grading from B-II to B-IIF in 2 cases, from B-IIF to B-III in 3 cases and downgraded from B-III to B-IIF in 6 cases. Complete concordance between CEUS and CE-CT was observed in B-IV graded cysts. All B-III and B-IV cysts (23/42) underwent surgery and pathological findings documented 4 benign lesions and 19 malignant lesions. CE-CT overestimated all benign lesions and understaged 3 malignant lesions. CEUS overestimated only 1 malignant lesion resulting Minimal-fat angiomyolipoma with no case of downstaging. All other patients were under imaging follow-up, showing morpho-dimensional stability at 2 years.

**Conclusion:** CEUS showed promising results evaluating renal complicated cysts, especially differentiating B-IIF from B-III with better results than CE-CT; therefore CEUS should be considered in diagnostic algorithm of renal complex cysts as a second step imaging tool after B-mode US to better screen lesions that will require CE-CT planning before surgery.

## B-1239 11:18

### Peritoneal seeding of renal cell carcinoma: analysis of histologic characteristics and prognosis

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**Purpose:** We retrospectively analysed histologic characteristics and prognosis of peritoneal seeding in patients with renal cell carcinoma (RCC).

**Methods and Materials:** Between January 2005 and June 2015, a total of 25 patients who have histologically confirmed RCC and histologically or radiologically diagnosed peritoneal seeding were analysed. No patient had another type of malignancy. Histologic subtype, Fuhrman grade, sarcomatoid differentiation, and T-stage of the initial tumour were assessed. Pre- or postoperative presentation of seeding and status of surgical margin were investigated. Kaplan-Meier survival curve was conducted to assess median survival time and overall survival rate (1, 2, and 3-year survival rates) since the detection of peritoneal seeding.

**Results:** Of 25 patients, 15 (60%) expired and 4 (16%) hopelessly discharged (median follow-up time, 6 months; range, 1-62 months). Histologic subtypes were clear cell (76%, 19/25), papillary (16%, 4/25), chromophobe (4%, 1/25),