**Specialty area:** Innovation in Body MRI
**Speaker:** Ivan Pedrosa   (ivan.pedrosa@utsouthwestern.edu)
**Highlights**
- The superb sensitivity of MRI to gadolinium contrast agents allows for accurate differentiation of neoplastic and non-neoplastic renal lesions.
- MRI allows for excellent delineation and staging of renal masses prior to surgery
- A specific histopathologic diagnosis is frequently possible with MRI based on its excellent soft tissue contrast and use of a feature analysis

**Title:** Renal Mass Characterization
**Target audience:** – Physicians with interest in genitourinary pathology, researchers who want to learn about renal mass characterization with MRI
**OUTCOME/Objectives:** – To review an MRI protocol tailored to evaluation of renal masses and to understand how to analyze MRI images to determine the presence of enhancement in a renal mass. To review the use of MRI in the staging of renal cancer with emphasis on assessment of patients prior to nephron-sparing surgery as well as evaluation of those with locally advanced renal cancer. To illustrate the MRI characteristics that are specific to certain histopathologic subtypes.
**PURPOSE:** – MR imaging is a powerful tool for the characterization of renal masses. In this talk, we will review an MRI imaging protocol for evaluation of renal masses using standard T1- and T2-weighted images (1). The advantages of 3D spoiled-gradient echo T1-weighted images over 2D approaches will be emphasized. Novel MRI techniques for assessment of renal masses, including non-contrast techniques like diffusion-weighted imaging (2) and arterial spin labeling will be discussed (3). The MR imaging findings that allow for accurate characterization of malignant renal neoplasms and their distinction from non-neoplastic lesions and benign neoplasms will be presented.
**DISCUSSION:** Non-neoplastic lesions (e.g. complex cysts, hemorrhagic cysts) and benign neoplasms (e.g. angiomyolipoma, oncocytoma) can mimic renal cancer and their preoperative distinction is often challenging.  We will present the MR imaging findings that are associated to these entities and that may facilitate their diagnosis, thus avoiding unnecessary intervention. Presence of contrast enhancement within a lesion after the administration of gadolinium is the most reliable way of differentiating solid from cystic lesions (5). If a lesion if primarily cystic but demonstrates non-cystic contents, enhancement of those non-cystic elements can differentiate debris from true solid tissue.  The detection of bulk fat with MRI allows for an accurate diagnosis of 'classic' angiomyolipoma (AML).  The available strategies most commonly used in clinical practice for detection of intralesional fat on MRI will be reviewed. In addition, imaging features that suggest a diagnosis of AML containing minimal fat will be presented. Furthermore, the classic appearances of the different histopathologic subtypes of renal cancer will be discussed. After confirming the presence of a renal tumor, accurate staging is important prior to developing a surgical or percutaneous ablation plan. Assessment of advance local disease, venous involvement, as well as lymph node and distant metastases is crucial in patient management.  During this talk, we will review the staging of renal

masses with MRI.  The potential advantages and pitfalls in interpretation of the MR examinations will be also discussed.

**REFERENCES**:
1.      Sun MR, Ngo L, Genega EM, et al. Renal cell carcinoma: dynamic contrast-enhanced MR imaging for differentiation of tumor subtypes--correlation with pathologic findings. Radiology. 2009 Mar;250(3):793-802.
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2.      Taouli B, Thakur RK, Mannelli L, et al. Renal lesions: characterization with diffusion-weighted imaging versus contrast-enhanced MR imaging. Radiology. 2009;251(2):398-407.

3.      Lanzman RS, Robson PM, Sun MR, P et al. Arterial spin-labeling MR imaging of renal masses: correlation with histopathologic findings. Radiology. 2012;265(3):799-808