

Image-guidance of minimally invasive interventions for diagnosis and therapy has been a rapidly evolving field, particularly with respect to incorporation of increasing advanced imaging equipment for the planning, targeting, monitoring and assessment of procedures. Traditionally, these vascular, therapeutic and biopsy procedures have been carried out using fluoroscopy, ultrasound or CT. MRI is an inherently 3D, non-ionizing imaging modality offering multiple soft-tissue contrast mechanisms as well as functional imaging in a single locale. Because of these unique properties, use of MRI for guidance of interventions has been of growing interest in recent years for a number of procedures requiring stereotactic localization and planning or real-time image guidance and monitoring, such as biopsy and thermal therapy delivery.

However, despite the recent proliferation of commercially available hardware and software solutions for MR guided procedures, integration of MRI into an intraoperative and interventional environment remains a challenge. Because of the cost associated with equipment acquisition and siting, careful attention should be paid to specifying the MR system as well as the location of the facility. The specification of hardware and software, as well as the layout of the suite, strongly influence workflow and domain of possible procedures that can be realistically performed in the suite. Last, but certainly not least, the safety of patients and staff working in the MR environment must be considered and programs put in place to continuously educate staff who work in these suites.

This talk aims to provide an overview of MR-guided interventional procedures which are currently performed clinically on high-field ( $\geq 1.5\text{T}$ ) cylindrical bore systems with an emphasis on the potential for guidance of thermal ablative therapies. Illustrations of the use of MRI for planning and targeting lesions as well as monitoring and assessing thermal therapy delivery (i.e., cryotherapy and laser ablation) will be presented and challenges associated with these procedures discussed .

Learning Objectives:

1. Understand some of the enabling technology facilitating MR-guided interventions as well as be able to identify challenges and safety concerns.
2. Understand some of the tradeoffs in MR imaging of tumors for treatment planning, targeting, real-time monitoring and post-therapy assessment of thermal therapy.