MR Guidance of Neurosurgical and Endovascular Procedures

Alastair Martin, PhD, Dept of Radiology and Biomedical Imaging

- MR offers unique imaging capabilities that can benefit a range of interventional procedures
- Performing procedures in the MR environment is challenging and requires that MR offers substantial benefit.

- Insertion of DBS electrodes can be performed on anesthetized patients in relatively short operative durations.
- Sub-mm targeting accuracy has been demonstrated in deep brain targets; only a single brain penetration is required.
- Clinical outcomes have demonstrated efficacy comparable to DBS electrodes inserted with conventional approaches.

- Left - MR monitoring of tumor resections can help the surgeon optimize resection completeness and improve patient outcomes.
- High targeting accuracy can be applied to other minimally invasive procedures.
- Laser ablations benefit not only from precise placement, but also the ability of MR to monitor temperature changes.

- Right - An MR visible trajectory guide permits precise biopsy needle placement and assures diagnostic yield.
- Hybrid suites allow for the best use of each modality.
- Hybrid XR/MR suites offer promise for optimizing the treatment of acute stroke.
- Endovascular devices that are optimized to be both safe and visible on XR and MR would assist workflow within XR/MR suites.

Summary
- Intraoperative MR provides critical feedback on resection completeness
- MR guidance of minimally invasive neurosurgical procedures can provide accurate placement of devices
- MR can provide critical real time feedback on thermal ablation and the distribution of administered therapeutics
- Hybrid suites afford the opportunity to add high value MR assessments in a time efficient manner