

## AbstractID: 10898 Title: Stability of T1 relaxation time and DCE-MRI measures

### **Purpose:**

With the increased interest in using MR as a means of assessing therapy response, it is important to assess longitudinal systematic variations. In this study, T<sub>1</sub> and contrast-to-noise ratio (CNR) variations during a dynamic contrast enhanced (DCE) acquisition were assessed on three scanners at three time points.

### **Method and Materials:**

CNR and T<sub>1</sub> measures were calculated from images of a modified Eurospin TO-5 phantom (DiagnosticSonar, Scotland) consisting of 19 compartments with T<sub>1</sub> values ranging from 208-1630 ms. Three GE Excite HD scanners were evaluated. Multiple TI (N=10) inversion recovery (IR), multiple flip angle (N=7) fast spoiled gradient echo (FSPGR), and FSPGR DCE data were acquired at three time points (baseline, 1 hr, 1 week). T<sub>1</sub> measurements were obtained using both IR and FSPGR data. CNR measurements were computed using the longest T<sub>1</sub> sample as a reference. Correlation and Bland-Altman repeatability (same scanner) and agreement (different scanners) measures were computed.

### **Results:**

Correlations of the IR- and FSPGR-based T<sub>1</sub> measures were significant for all three scanners ( $R^2 > 0.996$ ; slopes ranging from 0.84-1.11). Short-term (1 hr) and one-week FSPGR repeatability results ranged from 7.0-9.1ms and 10.0-17.4 ms, respectively, with limits of agreement ranging from -15.5-15.1 ms and -21.5-31.7 ms, respectively. The FSPGR BA analyses indicated a linear increase in T<sub>1</sub> differences with increasing T<sub>1</sub> and the maximum difference was 343 ms. The IR based measurements did not demonstrate such a linear trend and differences were less than 40 ms. Short-term (1 hr) IR/FSPGR repeatability and limits of agreement results ranged from 91.3-185.1 ms and -330.7-39.5 ms, respectively. Intra-DCE scan CNR variations ranged from 0.3-0.6% across scanners and time points.

### **Conclusion:**

The clinical scanners evaluated demonstrate good repeatability of T<sub>1</sub> and CNR measurements on a given scanner with larger variations seen between different scanners, even from the same vendor.