AbstractID: 11311 Title: Comparsion of diffusion weighted imaging (DWI), T2-weighted and post contrast T1 weighted imaging after MR guided high intensity focused ultrasound treatment of uterine leiomyomata: preliminary results

Purpose: To investigate the agreement between diffusion weighted imaging (DWI), T_2 weighted imaging(T_2WI), and contrast T_1 weighted imaging (cT_1WI) in uterine leiomyoma following treatment by magnetic resonance imaging guided high intensity focused ultrasound surgery (MRg-HIFUS).

Materials and Methods: Twenty-one patients (45±3.8yrs) with clinical symptoms of uterine leiomyoma were treated by MRg-HIFUS using an integrated 1.5T MRI-FUS System. The post MRg-HIFUS treatment volume in the leiomyoma was assessed by cT_1WI and DWI. MRI parameters consisted of DWI, T_2WI, and T_1 weighted fast spoiled gradient echo (FSPGR) before and after contrast. Trace apparent diffusion coefficient (ADC) maps were constructed for quantitative analysis. The regions of the treated uterine tissue were defined by a semi-supervised segmentation method called the Eigenimage filter using both cT_1WI and DWI. Signal to noise ratios were determined for the T_2WI pretreatment images. Segmented regions were tested by similarity index for congruence. Descriptive, regression, and ANOVA statistics were completed.

Results: All the patients exhibited heterogeneously increased DWI signal intensity localized in the treated leiomyoma regions and were colocalized with the cT_1WI defined area. The mean pretreatment T_2WI signal intensity ratios were T_2WI/muscle=1.8±0.7 and T_2WI/myometrium=0.7±0.4. The congruence between the regions was significant, with a similarity of 84% and a difference of 8% between the regions. Regression analysis of the cT_1WI and DWI segmented treatment volumes were found to be significantly correlated (r^2=0.94,$p<0.05$) with the linear equation, (cT_1WI)=1.1(DWI)–0.66.

Conclusion: Diffusion weighted imaging exhibited excellent correlation and agreement with the cT_1WI defined region of treatment in uterine leiomyoma. Therefore, DWI could be useful as an adjunct for assessing treatment of uterine leiomyomata by MRg-HIFUS.