

AbstractID: 10385 Title: Treatment of Bone Metastases using MR Guided Focused Ultrasound

Purpose: To evaluate the safety and efficacy of MR guided focused ultrasound (MRgFUS) treatment for bone metastases.

Method and Materials: A 50-year-old patient with painful scapula bone metastases refractory to pain medication was recruited in this study. The treatment was performed under local IRB approval using an MRgFUS system consisting of an Insightec ExAblate 2000 with a GE 1.5T MR scanner. The focal region is approximately 2mm in diameter and 10mm in length. Beside the regular monthly and annual quality assurance (QA) measurements, pre-treatment machine calibration included the functionality of the treatment software and the mechanical motion control. The focal spot was verified using MR thermometry. The safety system and panic buttons were checked. The patient is positioned on a gel pad on the treatment table in line with the transducer. The gel pad was immersed in degassed water that acts as an interface between the treatment table and the gel pad for acoustic coupling. Caution was taken with all gas bubbles removed between the interfaces. Treatment was performed under conscious sedation. Six sonications were delivered with frequency 1 MHz, acoustic power 32 ± 4 W, energy 628 ± 78 J and 20s durations. Phase MR Images were used to monitor the temperature change in real-time. Based on the treatment feed back, acoustic power was adjusted to reach designed temperatures (≥ 60 °C) for individual sonications.

Results: The patient tolerated the MRgFUS treatment well. There were no treatment-related adverse events including skin toxicity. The patient reported rapid pain decrease from 8 out of 10 (0 –10 scale) pretreatment to 2 within 24 hrs, and has continued to report between 2 – 2.5 up to 2 months following treatment.

Conclusions: MRgFUS is a safe, effective and noninvasive treatment modality for bone palliation and pain relief. A comprehensive QA program has been developed for the MRgFUS system.