Abstract ID: 18586   Title: Clinical Experience at Fox Chase Cancer Center for Treatment of Bone Metastases Using ExAblate 2000 with MR Guidance

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

Methods: Six patients with scapula (2), humeral head, sacrum, ilium and pubic ramus bone metastases were treated using ExAblate 2000 under MR guidance. In addition to the monthly and annual quality assurance (QA), pre-treatment machine calibration was performed before each treatment including the functionality of the treatment software and the mechanical motion control systems. The effective ultrasound focal spot was verified with an acoustic phantom using MR thermometry. The patient was positioned on a gel pad. The interface between the treatment table, the gel pad and the patient was immersed in degassed water for acoustic coupling. Caution was taken to remove all gas bubbles between the interfaces. Treatment was performed under conscious sedation. Six to eighteen sonications were delivered for each patient treatment depending on each lesion’s size. Patients were treated with a frequency of 1 MHz; 32 ± 4.0 to 96 ±11W acoustic power and 628 ± 78 to1859 ± 338J energy for 20-30s for each sonication. MR phase images were used to monitor the temperature changes in real-time. Based on the temperature feedback, the acoustic power was adjusted to reach designed temperatures (≥60 °C) for individual sonications. Pain was assessed using the visual analog scale (VAS).

Results: All patients tolerated the MRgFUS treatment well. No skin toxicity or other complications were observed. The VAS pain rating was significantly reduced for all 6 patients from 8.2 ± 0.8 before treatment to 4.7 ± 3, 2.7 ± 1.5 and 1.8 ± 1.1 at one day, one month and three months respectively.

Conclusions: A comprehensive QA program has been developed for the MRgFUS system. Our data suggest that MRgFUS is a safe, effective and noninvasive treatment modality for palliation of bone metastases.