AbstractID: 8838 Title: Image-Guided Thermal Ablation in Bone Using Dynamic Chemical Shift Imaging

Purpose: To investigate the use of a novel dynamic chemical shift imaging technique for guiding image-guided thermal therapy delivery in bone *ex vivo*. **Materials and Methods:** Interstitial laser applicators (980-nm) were placed into the yellow marrow of freshly excised canine femur under MR-guidance. A fluoroptic probe was inserted 0.5 cm from the laser source in order to provide an absolute measurement of temperature. Image acquisition was performed using a multiple gradient-echo at 1.5T and a super-resolution spectral processing algorithm was used to calculate the PRF of water and lipid. A six-pixel ROI near the fluoroptic probe was created and the PRF of water and lipid were measured as a function of temperature to calculate the temperature sensitivity coefficient (TSC). Another bone was used to perform an external laser ablation. This was performed at 3.0T to demonstrate the use at higher fields even in the presence of gradient power constraints. Temperature maps were created using lipid as an internal reference for susceptibility and field drift correction. **Results:** The TSC of water was measured to be -0.0108±0.0001ppm/°C(R^2=0.981). The lipid showed low correlation and sensitivity to temperature with a TSC of -0.0020 ±0.0001 ppm/°C(R^2=0.438). Interestingly, the TSC of the difference between water and lipid was -0.0087±4e-6ppm/°C(R^2=0.961) which is consistent to findings in lipid-water based phantom calibrations. **Conclusion:** We've demonstrated the ability of monitoring temperature changes in bone marrow which would be a great benefit in using image-guided thermal therapies for treatment of primary and metastatic bone neoplasms. The technique possesses the ability to monitor the water PRF separate from the lipid, which alleviates the problem of lipid contamination in PRF temperature mapping with no time or SNR penalty. In addition, use of the lipid signal can potentially be exploited as an internal reference to correct for field-drift or susceptibility errors in temperature estimation.