AbstractID: 6876 Title: microRT multi-modality treatment planning

Purpose: To evaluate image registration and fusion techniques for multi-modality microRT treatment planning. **Methods and Materials:** Subject mice were first anesthetized and positioned within the custom microRT couch/head immobilization assembly. The immobilized subjects were then imaged using both a Phillips 64-slice Brilliance CT scanner and a small-animal MR imaging scanner built around a 4.7 T Oxford Instruments magnet and a Varian imaging console. The CT data was imported into CERR using the 'DICOM-import' CERR tool, while the MRI data was imported into CERR using a custom Matlab *.FDF-importer function. Using the CERR contouring tool, CT contours were generated for the brain, lung, and skin, and MRI contours were generated for the liver, lung and skin. The CT images were then registered to the microRTP treatment planning space using a custom Matlab registration algorithm for the microRT couch. Lastly, the resultant MR images were merged and fused to the registered CT plan, both translationally and rotationally, using the CERR 'image fusion' tool. **Results:** Previously-published microRT studies have demonstrated the translational and rotational capabilities of CERR image fusion for merged CT plans. As expected, in this study, MRI was qualitatively superior for identifying and contouring target structures that had relatively low contrast variation on CT. **Conclusions:** CT/MRI co-registration improves microRT treatment planning by providing verification of target positioning for organs contoured on both imaging modalities, as well as by providing increased target definition for soft-tissue organs visualized effectively using MRI but not CT. CT/MRI phantom validation studies are currently in progress. Future planned studies include rotational MRI evaluation, as well as additional co-registration studies evaluating the integration of PET, SPECT, and optical imaging modalities.