AbstractID: 11672 Title: In Vivo Biological Evaluation of Micro-CT Based 3D Conformal Radiotherapy System

Purpose: Typically small animal irradiation is performed in the laboratory using single field techniques using lead blocks for beam shaping. This method is incapable of the accuracy of dose distribution and delivery to small regions possible in an average cancer center. To mitigate this, a collimator was installed in a microCT system which made the system capable of accurate dose delivery. By collimating the x-ray beam from the CT, we are able to shape the beam down to 1mm at the isocenter of the system. With a bed capable of 3d movement, we are able to move the target to the isocenter of the system for treatment. We evaluated the effectiveness of dose delivery *in vivo* and tracked the biological effects of various doses and targets. **Methods:** Using multiple mice, we tested several aspects of the system. We evaluated the ability to treat a small target by using a small aperture and delivering dose to spontaneous lung tumors grown in transgenic mice. Immediately after treatment the mice were sacrificed, the tumor regions sliced for histology, and H2AX stained to evaluate double strand DNA breaks. In addition, subcutaneous teratomas expressing luciferase were also irradiated and monitored with bioluminescence imaging to assess radiation response. **Results:** The system is capable of accurate dose delivery, as verified by phantom and *in vivo* studies. It is able to deliver dose to targeted areas while avoiding dose to others, and produce biological effects measurable by both histologic and macroscopic imaging methods. Dose fractionation allows the system to deliver a greater total dose within the dose rate constraints. **Conclusion:** The microCT/RT system is capable of dose delivery closely related to clinical systems. This opens many possibilities to perform pre-clinical studies related to radiotherapy.