AbstractID: 13791 Title: Comparison of dose distributions for small animal radiotherapy using a microCT scanner and a single-field irradiator

Purpose: To compare dose distributions for small animal radiotherapy performed on a microCT scanner with multiple 120kV beams and a single-field irradiator with a 200kV beam. **Materials and Methods**: A microCT scanner with a maximum x-ray tube potential of 120kV and a single-field irradiator operating at 200kV were modeled in the EGSnrc/BEAMnrc Monte Carlo code. The models were validated using dose in air and depth dose curves in solid water for various beam sizes measured with an ionization chamber and gafchromic films. Treatment plans for a mouse with subcutaneous teratoma and a mouse with a spontaneous lung tumor were created for both the microCT scanner and the single-field irradiator. On the microCT, the teratoma treatment was prescribed as tangential 80° and 180° beams and lung tumor treatment consisted of eighteen beams equally spaced between 90° and 270°. On the single-field irradiator, the mice were planned with a left lateral beam and an anterior posterior beam, respectively. The 5Gy dose to the PTV and the dose to critical structures were calculated in the EGSnrc/DOSXYZnrc code. **Results**: In both cases, the dose distributions achieved with the microCT scanner using a 120kV beam were superior to the dose calculated for a single 200kV beam. The teratoma case showed 4Gy dose to 30% of the left lung whereas the dose to all critical structures on the microCT scanner was below 0.2Gy. In the case of the lung tumor, the dose to the spinal cord and right lung is considerably larger for the single-field irradiator plan. Left lung and heart are completely spared in the single-field treatment, however, the dose to these structures is below 1.5Gy in the microCT plan. **Conclusions**: This work demonstrates that small animal radiotherapy on a microCT scanner yields better critical organ sparing and is therefore preferred over single-field irradiator radiotherapy.