AbstractID: 6784 Title: A feasibility study on the of using CT scanners for small animal irradiation

Purpose: We present a feasibility study on the use of CT scanners for conformal small animal irradiation. We carried out a dosimetric study on CT scanners to determine the feasibility of using CT for image-guided small animal irradiation. This was done in two parts: (I) Determination of output on a GE eXplore Locus II Micro-CT scanner (GE Healthcare) and (II) the feasibility of using a custom translational collimator for image-guided small animal irradiation.

Methods and Materials: (I) An Exradin A1SL chamber (Standard Imaging WI, 0.056cc) was cross-calibrated against a Farmer chamber (Capintec, 0.6cc) under a superficial treatment unit using 150kVp (**Therapax 150**). A filter (#7) made of 0.3mm Cu and 1.1 mm Al was employed, as well as a 5cm collimator. The cross-calibrated Exradin ion chamber was used to measure dose in-phantom for the **GE eXplore micro-CT**. (II) A dual layer, ring collimator (inner diameter =9.8cm) was constructed using lead and ABS plastic. The collimator was then placed inside a Philips 16-slice Brilliance CT scanner (Philips Medical Systems Inc.) and GafChromic EBT film was irradiated with the scanner operating at 140kVp and 255mAs for 500 cycles (2 sec/cycle) for a total of 17 minutes.

Results: (I) At 30% X-Ray tube capacity, we obtained a dose rate of 9.7 cGy per minute in a collimated field. (II) An approximate dose of 2.4 Gy was obtained with a FWHM of ~1.5 cm in the high dose region. The FWHM agreed with that predicted using trigonometric analysis.

Conclusions: The micro-CT scanner has a reasonable dose rate after collimation down to 1.5 x 2cm^2 field. However the FWHM of the high dose region was slightly large at a 1.5 cm diameter. According to our derivation, a reduction of the ring's inner diameter to 6cm would produce 1cm FWHM dose distribution.