AbstractID: 8334 Title: Additional skin entrance dose delivered with radiographic image Guidance System in Cyber Knife Robotic Treatment Delivery

Purpose: To independently report the additional radiation dose from the image guidance and tracking part of the treatment delivery of Cyber Knife system. Method and Materials: The entrance dose on the skin and dose at 1cm depth in a specially designed phantom using calibrated diagnostic dose measurement equipment was measured. Using a Barracuda MPD probe placed perpendicularly to the beam measured dose from one exposure from one of the X-ray source and was converted to pair of images to account for both X-ray sources. The doses were measured for varying potential (kV) and beam current (mA) representing common clinical situations. Dose estimation from exposures was determined on the basis of the average number of treatment nodes and the number of exposures per treatment in setup, treatment and realignment for nonlung and lung targets. A rough estimate of the number of exposures for a course of 5 treatments for a non lung target is 150-280 while for a lung target or a moving target is 515-925. Results: Using a fixed imaging technique of 250mA, exposure time of 100 ms and kV varying from 100-125, we obtained a range of 0.51-0.68 mGy for an image pair on skin and 0.38 -0.51 mGy at 1cm depth. Using the estimated number of image pairs, this translates to an additional therapy skin dose of approximately 11-15cGy for non lung targets and 37-49 cGy for lung target, where as corresponding dose at 1 cm depth is 8-11 cGy for non lung and 27-37cGy for lung targets respectively. The doses were computed for varying beam currents and exposure times. Conclusion: It is recommended that the dose from imaging devices in CyberKnife radiation treatments should be closely monitored and be accounted in the total delivered dose such that a unified approach is maintained for clinical trial outcome analysis.