AbstractID: 7642 Title: A Study of the Transit dose for the Leksell Gamma Knife Model 4C using Diode and GafChromic Film in Air and Phantom

Purpose: To evaluate the undesirable dose to the patients due to uncollimated beam occurring in the Gamma Knife Model 4C before and after helmet docking, using diode and GafChromic film. **Material and Method**. The Leksell Gamma Knife model 4C was used for this study. The transit dose was measured along the Z axis (Leksell coordinate system) in air and inside the Elekta plastic phantom using diode and EBT GafChromic film. The detectors were calibrated against an Exradin-A19 0.007 cm^3 ionization chamber calibrated for AAPM-TG-21 protocol. The electrometer was the Max4000 (Standard Imaging). A Microtek scanner 1800f was used to scan the films. For the measurement in air, a 30 cm long plastic tube was mounted in air along the Z axis inside the helmet allowing the diode to be moved in all its extension, including the cap. The film were sandwiched in two half plastic cylinder mounted inside the helmet. A special cassette made of Mix-D (density 0.99 g cm^{-3}) was constructed to allow the diode slide inside the phantom along the z axis. The diode measurements were done for different exposure times, to obtain the dose for time zero by extrapolation. **Results**. The highest transit dose was observed in the region inside the helmet, with distribution approximately constant of 5.70 ± 0.12 cGy/shot. Inside the helmet the dose reaches another plateau of 4.72 ± 0.02 cGy/shot (10 to 15 cm from the isocenter). When the diode was positioned at the inner surface of the phantom, no significant difference from the in-air measurements was obtained. The film results presented higher values since they were obtained with several shots and includes scatter radiation. **Conclusion.** The results show that a significant dose may result for several shots and confirm the values published for the model C, obtained with different methodology.