AbstractID: 3416 Title: Monte Carlo Evaluation of Cerrobend Eye Shield in Electron Beam Treatment

Purpose: The purpose of this study was to evaluate and validate the shielding effect of a cerrobend eye shield using Monte Carlo simulation.
Methods and Materials: A customized cerrobend cylindrical eye shield was made and attached to a hemisphere plastic sheath to protect the lens during orbital lymphoma treatment with a 12 MeV electron beam from a Varian 2100C Linac. Film dosimetry was accomplished for open and shielded beams at 10x10 cm^2 field size using a 30x30x30 cm^3 solid water phantom. Monte Carlo simulation based on EGSnrc/DOSRZnrc code was performed to obtain the open and the shielded dose distributions. Comparisons between the film measurements and the simulations are presented. The dose distribution of a shielded eye with 1 cm bolus is calculated by both Philips Pinnacle treatment planning system and Monte Carlo simulation with the same geometric considerations. The two results were compared.
Results: For the open field, the agreement between Monte Carlo simulation and film measurement was within 1%/1 mm for both percentage depth dose curves and cross beam profiles. For the shielded field, the agreement between simulation and film measurement was within 3%/2 mm for percentage depth dose curves and 2%/1mm for cross beam profiles. The treatment planning system could not provide reasonable results because of the high density of cerrobend. The simulation assured us that the dose to the lens is less than 10% of the tumor dose.
Conclusion: For the dose distribution evaluation of orbital lymphoma treatments with shielding, film measurements and treatment planning system have limitations due to non-regular geometry and inadequate inhomogeneity correction for high Z materials. Monte Carlo simulations provide assurance of dose distribution to physicians with acceptable accuracy.