

AbstractID: 11373 Title: Dosimetric evaluation of an internal shielding used with a HDR skin applicator

**Purpose:** The Valencia HDR skin applicators are accessories of the microSelectron HDR afterloading system (Nucletron) cup shaped to limit the dose to the irradiation area. Applicators sizes are: diameter 2 and 3 cm. The typical prescription depth is 3 mm. This work aims to evaluate the backscatter and electron contamination of an internal shielding used to reduce the dose to the ocular globe when the lesion is located at the eyelid. Monte Carlo (MC) and experimental methods have been used. **Method and Materials:** The geometry has been: the Valencia applicator (2 cm diameter) on the surface of a solid polystyrene slab phantom; inside, a 2 mm lead slab located at 3 mm depth. MC simulation characteristics: GEANT4 code (Version 9.0); Scored absorbed dose; Cell size: 0.1 mm in the depth axis; Photon histories:  $3 \times 10^8$ . Radichromic EBT film dosimetry setup and processing: Films depths: 1,5, 3, 5 and 7 mm, inside the phantom; Irradiations, with and without the lead shielding slab; Flatbed scanner; Matlab software to obtain the red channel and to filter noise; Verisoft (PTW) software utilities to calibrate the optical density against dose and to analyse the results. **Results:** MC simulation gives an overdose close the lead (backscatter component) of about 190% (range: 0.5 mm). The electron contamination under the lead is about 130% (range: 1 mm). These results agree with measurements with radichromic film within experimental uncertainties. The dose reduction behind the shield is about 60%. **Conclusion:** The use of an internal 2 mm lead shielding, in eyelid skin treatments with the Valencia applicators has been evaluated. The reduction in dose to the ocular globe with a 2 mm lead shielding is about 60%. A minimum bolus of 0.5 mm and 1 mm thickness must be added above and below the shielding, respectively to remove the dose contamination.