

AbstractID: 10495 Title: Novel plaques for iris melanoma I-125 and Pd-103 brachytherapy

Purpose: To calculate three dimensional dose distributions in the eye region for novel plaques used in the treatment of iris melanoma at the Mayo Clinic and compare these with dose distributions for other plaques used in these treatments. **Method and Materials:** The EGSnrc user-code BrachyDose is used to perform Monte Carlo simulations. Plaques and seeds are fully modeled. The Mayo Clinic plaques are based on the Collaborative Ocular Melanoma Study (COMS) 22 mm plaque design with a gold alloy backing, outer collimating lip, and silicone polymer insert. An inner collimating lip surrounds a 10 mm diameter cutout region at the plaque center. Plaques span 180, 270, and 360 degree arcs. Three-dimensional dose distributions in the eye region are calculated and are compared via depth-dose curves, tabulation of the dose at critical structures (cornea, sclera, lens, macula, optic disk), and isodose contours. **Results:** The inner lip reduces dose to the cornea and surrounding region by 30-45%. Doses at some points of interest (e.g. cornea) differ by as much as 60-70% compared to those calculated with the TG-43 protocol. The outer lip collimates radiation and significantly reduces doses to neighboring tissues. Catering plaque arc length to tumor extent reduces doses to the anterior portion of the eye outside the treatment area. For the same prescription dose, Pd-103 offers a lower dose to critical structures than I-125, with the exception of the sclera adjacent to the plaque. **Conclusion:** The Mayo Clinic plaques offer a number of advantages compared to other plaques used in the treatment of anterior eye tumors. Dose is significantly reduced to regions outside the treatment area. Calculations achieving 2% statistical uncertainty on the prescription dose take a few minutes on a single CPU, making BrachyDose sufficiently fast for routine clinical treatment planning.