

AbstractID: 13164 Title: Effect of uneven surface of incidence on dose distribution for electron beams during radiotherapy

Purpose: To measure and quantify the effects of an uneven surface of incidence on depth dose parameters (D_{max} , D_{90} and D_{50}), as well as dose output, and its clinical implications during electron beam radiotherapy. **Method and Materials:** Five phantoms with uneven surfaces were fabricated out of thermoplastic material to shape the surface of water in a three-dimensional motor driven water phantom. Beam scanning was performed with five energies (6, 9, 12, 16 and 20 MeV) along with two field sizes (10cm^2 and 15cm^2) for each uneven surface of incidence. Central axis depth doses and profiles were measured, as well as outputs at D_{max} , for the case of an uneven surface of incidence vs. a flat surface of incidence. These values were then compared to computed values using a Philips ADAC TP system. **Results:** Depth dose parameters became shallower for an uneven surface of incidence by as much as 9mm. The effect of an uneven surface was small for low energy electron beams. For a concave surface of incidence, the TPS calculated depth doses were off by as much as 6mm as compared to measured values. The beam output (cGy/MU) at D_{max} was altered by as much as 17% according to measured values. The outputs computed on ADAC Pinnacle were off by as much as 15% compared to measured values. **Conclusion:** Manual MU calculations assume flat surface of incidence which leads to significant differences between dose desired and dose delivered. Computerized planning also did not predict correct output values. It is critical to pay close attention to an uneven surface of incidence when performing planning and dosimetry of electron beam radiotherapy.