AbstractID: 3007 Title: Determination of skin dose for hypo-fractionated breast treatment using mixed photon and electron beams

Purpose: Estimation of surface dose is very important for patients undergoing radiation therapy. This work is aimed at accurate determination of the dose at the skin surface and at a depth of 0.07 mm, the practical reference depth for skin as recommended by ICRP and ICRU, using ultra thin TLDs and Monte Carlo calculations.
Method and Materials: Monte Carlo simulations and measurements were carried out for 5x5 cm^2 and 10x10cm^2 fields for 6, 10 and 18 MV photon beams as well as for electron beams of energies ranging from 6 to 21 MeV. For photon beams, the variation of the surface dose with angle of incidence and field size was investigated. Also, the exit dose was computed and measured for the same fields and angles of incidence. The dose at the ICRU reference depth was also computed for the electron beams at normal incident angles. Finally, the dose was measured and calculated for breast IMRT plans followed by dose uniformity enhancement by an additional electron beam for conventional and hypo-fractionated treatment protocols.
Results: Good agreement (±5%) was achieved between measurements and calculations. The surface dose at the entrance was increased as the angle of incidence and/or the field size increased. The exit dose was decreased as the angle of incidence increased but increased with field size.
Conclusions: The dose at the surface of the patient is mostly dependent on the beam energy, modality and beam obliquity rather than the field size and field separation. By correlating the TLD measurements to Monte Carlo calculations, one can predict the dose at the skin surface with great accuracy. Knowing the dose received at the surface of the patient can lead to prediction of skin reactions helping with the design of new treatment techniques and different dose fractionation schemes.