AbstractID: 4732 Title: Determination of skin dose for modulated electron radiation therapy

Purpose: Estimation of surface dose is very important for patients undergoing radiation therapy. This work is aimed at accurate determination of the dose to the skin at a depth of 0.07 mm, the practical reference depth for skin as recommended by ICRP and ICRU, using ultra thin TLDs, parallel ion chamber and Monte Carlo calculations for patients undergoing energy modulated electron radiation therapy (MERT).

Method and Materials: Monte Carlo simulations and measurements were carried out for 5x5 cm^2 and 10x10cm^2 fields for electron beams of energies ranging from 6 to 21 MeV. The dose at the ICRU reference depth was computed at normal incident angles. For patient undergoing MERT treatments, the SSD to the patients skin is 60cm and the treatment is delivered with the photon MLC. Finally, the dose was measured and calculated for breast MERT plans using the leaf sequence obtained for each case.

Results: Good agreement (±3%) was achieved between measurements and calculations. The surface dose at the entrance was increased as the electron beam energy and/or the field size increased. A decrease of the surface dose is observed when the SSD is smaller. The surface dose at 60cm was measured to be 1-4% lower than the one at 100cm SSD. The surface dose was increased under MERT conditions proportional to the modulation in MU of the treatment.

Conclusions: The dose at the surface of the patient is mostly dependent on the SSD, the electron beam energy and modality. 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.