AbstractID: 13554 Title: Dose perturbation caused by MOSFET dosimeter during in vivo dosimetry of photon and electron beam radiotherapy – a film dosimetry study

Purpose: In *in vivo* dosimetry, build-up caps were used to (i) promote electronic equilibrium (ii) reduce correction factors (iii) avoid steep dose gradient of depth dose curve (iv) radiation damage per unit accumulated dose. However, it attenuates the beam both qualitatively and quantitatively. Hence, the dose attenuation MOSFET detector with and without build-up was studied at different depths for ^{60}Co beams, 6 and 15 MV X-rays and electrons using film dosimetry.

Method and Materials: Dose attenuation was studied using solid water phantom. For electron beams, Kodak Xomat-V film was used and EDR-2 films used for photon beams. In 6, 9 12 and 15 MeV, attenuation of bare MOSFET was studied. In 15 MeV, Wide Energy Hemi-spherical build-up cap (WEHSBC) was used as recommended by the manufacturer. For ^{60}Co beams, 5 mm bolus was used. WEHSBC was used for 6 and 15 MV X-rays. Dose profiles were analyzed at surface and Dmax. Doses were normalized at the central axis of the field measured without MOSFET.

Results: Presence of bolus with the MOSFET increased the surface dose up to 85% and decreased the dmax dose to 5%. Field area of 1.5 × 1.5 cm^2 was perturbated. Attenuation of WEHSBC at dmax is 21.1% and 4.8% for 6 and 15 MV. Total area of 1.4 × 1.4 cm^2 and 1.6 × 1.6 cm^2 attenuated. Bare MOSFET showed 10%, 3.9%, 2.9% and 2.8% reduction in 6, 9, 12 and 15 MeV, respectively. No attenuation was found at dmax. In 15 MeV, MOSFET+WEHSBC, showed 35.6% and 54% reduction at surface and dmax.

Conclusion: WEHSBC can be used as a build-up cap for 6 and 15 MV X-rays with limited number of fractions. Attenuation of bare MOSFET in electron beams is negligible. WEHSBC should not be used for electron beam *in vivo* dose measurements.