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Dosimetric verification of the small field dose calculation using Acuros XB dose algorithm for heterogeneous media.

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The experimental determination of relative output factors presents the greatest challenge, especially for small fields with different detectors yielding measurements that exhibit a high degree of uncertainty and deviate significantly (Westermarck et al., 2000). The position and configuration of jaws above tertiary collimators could change dosimetric characteristics in both SRS and IMRT. The X-Y jaw setting can significantly change the fluence of the incident beam, distribution of dose and output of small fields.

Dose linearity, dose-rate dependence, pprofiles, percent-depth-dose and output factors were performed at Hôpital Chahids Mahmoudi (Tizi Ouzou, Algeria) with a Varian iX21 linear accelerator on a 6 MV photon beam in MLC and X-Y jaws shaped beams with a field size of 10×10 , 6×6 , 5×5 , 4×4 , 3×3 , 2×2 and 1×1 cm². Various detectors were chosen between the unshielded PTW p-type silicon, the PTW 31014 Pin-Point ionization chamber, the PTW semiflex 0.125 ionization chamber, the PTW microdiamond dosimeter, the PTW microLion liquide chamber and EBT3 films.

The dosimetric characterization undertaken in the present study demonstrates that the diamond detector is an appropriate measurement system for small field measurements.

The investigated data for the effect of jawposition away from the field edge generated by different tertiary collimating systems inferred that the opening of X-Y jaw highly influences the small field output factors. The orientation of the detectors and the position of the jaws could influence the output factors considerably in small fields. The present results were validated by studies published in the literature.

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