

DOSIMETRY FOR TOTAL SKIN ELECTRON BEAM RADIATION THERAPY

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Purpose : Dependent on the equipment and facilities available, we adopted “six-dual-field technique” to administer total skin electron radiation therapy (TSET). Our experience with dosimetric measurements for this modality is reported.

Materials and Methods : The source-to-surface distance (SSD) was extended to be 323 cm, and an 0.8 cm-thick acrylic screen was installed at 15 cm in front of the treatment plane to scatter the beam and attenuate the electron energy. At first, the optimal dual-field angle was determined in order to achieve feasible dose uniformity in the vertical dimension, and then field flatness could be assured. Film dosimetry was applied to define depth dose distribution profile of electron beam at treatment plane. Accordingly, the output of the linear accelerator could be calibrated. Multiplication factor was determined to be 2.68, represented as the ratio of the absorbed dose from all six dual-fields to that from one dual-field measured with thermoluminescent dosimeters (TLDs) taped at a Rando phantom. Thus, the value of MU for each field could be calculated. TLDs were used for in vivo dosimetry to verify the skin dose and evaluate dose variation at different anatomic sites.

Results : The determined dual-field angle (20°) and multiplication factor (2.68) were comparable to those described in the literature. Depth dose distribution and beam penetration were satisfying, and X-ray background level (0.75%) was also acceptable. Markedly decreased output of the Linac (0.0684 cGy/MU) could be partially compensated with the escalation of dose rate (600 MU/min). Thus, each treatment would not cost too much time. Dose variation among different sites at skin is compatible with the experience of other institutions. Instead, field flatness in the horizontal dimension ($\pm 10\%$ within 60 cm) did not meet the requirement given by AAPM.

Conclusion : The technique of TSET is complex. Dosimetry for this modality should be studied case by case systematically and thoroughly.

[Therapeut Radiol Oncol 2000; 7(1): 35 - 44]

Key words: Total skin electron radiation therapy (TSET) , Six-dual-field technique, Dosimetry