Analysis of Dose Distributions in Six Dual Field Total Skin Electron Therapy

Clinical implementation of a multiple field total skin electron therapy involves the absolute dose calibration in a circular phantom and dose uniformity measurements in the geometry selected. Dose uniformity is generally assessed in an idealized treatment using a Rando phantom. The published data for depth dose distributions using the Rando phantom are usually limited to the mid-transverse plane along a single direction. There is also insufficient data on the relative contribution of single dual fields to the composite treatment dose for different planes. We have done a detailed study of dose distributions in multiple planes with a Rando phantom using film and TLD dosimetry.

V-films were sandwiched between Rando slices and the phantom was irradiated with a six dual beam arrangement in a 6 MeV nominal TSEB degraded by 3.2 and 6.0 mm thick scatterers. Depth doses were measured by scanning the films along several radii of the phantom slices. The depth dose distributions varied among various scanning directions by 3-6 mm for all the slices studied. This information is useful when lesions of different thickness are being treated.

We also determined the relative contribution of single dual fields to composite treatment for different body parts to be between 2.25 and 2.65. In general, any particular site will get contribution from at least two but not more than three fields. When combined with patient TLD measurements, these results are important in assessing sources of nonuniformities.