The Distribution of Contamination Electrons is Therapeutic Radiation Photon Beam

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Purpose

Accurate knowledge of the distribution of contamination electrons(which comes from mainly gantry head by scattering, pair production, tray and air) at the surface and in the first centimeters of tissue is essential for the clinical practice of radiation oncology. Such contamination electron tends to reduce or eliminate the so called "skin-sparing" advantage of megavoltage photon beam radiotherapy. This informamtion is needed to prescribe a absorbed dose to a skin volume at a few millimeter depth in high energy therapeutic radiation phonton beam.

Materials and methods

All experiments were done with 15 MV photon beam from a dual energy linear accelerator(Clinac 1800, Varian). Field size is defined by the rectangular collimators of the linacs and ranged from 30 × 15 to 30 × 20 cm^2, The distribution of scattered dose(contamination electron, positrons and scattered lower energy photon) is measured by shifting of shielding 10 cm thick alloy block in the photon beam at the level of tray holder on the lucite plate of the 15 MV linac to produce variable blocked fields. The thimble chamber is used in Multi-data 3-D water phantom for % depthdose measured due to scattered electrons from surface to 20.0 cm on the blocked area and beam profile as

function of depth variation from surface to 8.0 cm below

Results and conclusions

A numerous contamination electron mainly are distributed as shape broad corn in the central photon beam and their path length in the water are shorter than 2.5 cm because of the electrons ehergy having around 3.0 MeV. These results clearly appears that the subtraction of scattered electron from the total depth dose curve not only lower the absolute dose in the bulidup region and surface dose, it also causes a shift of d_{max} to a deeper depth. In the therapeutic high energy photon beam, the absorbed dose near the buildup region is the combined result of incident contamination electrons, phantom generated electrons and pure photon beams