Purpose: Determination of skin dose is important for radiation treatment of tumors that are near the skin or where external devices may enhance the skin dose. Because of the steep dose gradient in the build-up region near the skin, accurate measurements or calculations in this region are difficult. This study aims to optimize the methodology of determination of skin dose for the composite multibeam 3DCRT or IMRT treatments using optically stimulated luminescent dosimeters (OSLD), diode, or planning system calculations.

Methods: OSLD’s were placed at three locations of interest marked on an anthropomorphic pelvic phantom which was CT scanned. Eight-beam 3DCRT and IMRT plans were created using Eclipse V10 (AAA-1mm dose grid) with identical beam arrangements. Eclipse was commissioned with accurate surface dose data. The phantom was irradiated with each plan using a Varian 2100C 6 MV x-ray source with either OSLDs or Scanditronix surface diodes at each marked location. The depth of the sensitive element beneath the surface of each detector was determined by measurement to be 1 mm and 0.7 mm for OSLD and diode, respectively.

Results: OSLD and diode measurements were compared to Eclipse calculations at respective locations. The percent difference of the OSLD doses compared to the Eclipse calculation was 1.2%+/−5.8% and 4.7%+/−4.0% for the 3DCRT and IMRT plan, respectively. The percent difference of the diode doses compared to the Eclipse calculation was 1.2%+/−7.0% and 1.3%+/−10.8% for the 3DCRT and IMRT plan, respectively. The isodose line through the detectors was found to be at the same depth under the adjacent skin, within 0.3 mm.

Conclusions: We have found good skin dose agreement between measurement and calculation at either 1 mm (OSL) or 0.7 mm (diode) depth in a composite 3DCRT or IMRT treatment. This work also validates OSLDs as accurate detectors for near-skin dose measurements.

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none