

AbstractID: 4775 Title: An experimental evaluation of the impact of setup uncertainty on dose near the surface for IMRT plans where the skin is considered a sensitive structure and is excluded from the PTV.

**Purpose:** (1) To investigate the impact of setup uncertainty on doses near the surface for IMRT plans where the skin is considered a sensitive structure and is excluded from the PTV. (2) To evaluate the impact of PTV design (how close to the skin the PTV is allowed) and number of gantry angles.

**Method and Materials:** Effects of setup uncertainty were investigated experimentally using a semi-cylindrical phantom with MOSFET dosimeters positioned at depths of 3, 6, 9 and 12mm. A CT image was taken of the phantom, and a node-like CTV was drawn near the surface. Two PTVs were created by uniformly expanding the CTV by 5mm, and then pulling back 3 and 5mm from the body contour (PTV(3mm) and PTV(5mm), respectively). A 2mm skin structure was contoured. Seven and nine-field IMRT plans were created using Eclipse for each PTV with the following guidelines: 99% of PTV volume to receive 90-93% of prescribed dose, maximum 105% hotspot, and minimize dose to skin structure. The phantom was then positioned at isocenter, the planned treatments delivered using a Varian 21Ex, and doses delivered to the build-up region were measured. Setup uncertainty was simulated by shifting the phantom laterally in a range  $\pm 5$ mm, and the experiment repeated.

**Results:** The number of beams did not significantly affect the results. For PTV(5mm), setup errors of 3 and 5mm reduced dose at 6mm depth by an average of 8% and 17%, respectively. For PTV(3mm), this was reduced to 4% and 12%, respectively. Corresponding numbers for 3mm depth were 8% and 12% for PTV(5mm), and 4% and 9% for PTV(3mm)

**Conclusion:** To avoid daily dose to the surface nodes being reduced by more than 5%, the PTV should not be pulled back more than 3mm from the body contour, and setup uncertainty should be kept below 3mm.