AbstractID: 4652 Title: Planning strategies to reduce unnecessary skin dose in head and neck IMRT, including experimental verification

Purpose: To investigate IMRT planning techniques that reduce skin dose without adversely impacting important doses at depth and to experimentally confirm these findings.

Method and Materials: A semi-cylindrical phantom was constructed with catheters at 3, 6, 9 and 12mm depths, allowing micro-MOSFET dosimeters to be inserted to measure dose at multiple points on the surface and in the build-up region. Critical structures, a node-like CTV, and 2mm surface structure ('skin') were contoured on a CT image of the phantom with and without an immobilization mask. A PTV was generated by expanding the CTV 5mm in all directions up to the body contour; three modifications were then implemented, pulling back the PTV 0, 3 or 5mm from the body contour. Seven-field IMRT plans were created using Eclipse to maximize PTV coverage, with one of the following strategies: (1) aim for maximum 110% hotspot, 115% allowed, (2) maximum 105% hotspot, (3) maximum 105% hotspot and 50% of skin to get maximum 70% of prescribed dose, (4) 99% of PTV volume to receive 90-93% of prescribed dose, maximum 105% hotspot, and dose to skin structure minimized. All twelve PTV and planning strategy combinations were investigated, with and without immobilization mask. The plans were then delivered using a Varian 21Ex, and dose to skin and build-up region was measured.

Results: From highest to lowest skin dose, the planning strategies were (3), (4), (2), (1), with little dependence on the PTV expansion approach. Technique (3), however, showed a tendency to underdose tissues at depth.

Conclusion: The best strategy to reduce unnecessary skin dose, while maintaining target dose, is to pull the PTV back 3-5mm from the skin surface, and plan such that PTV coverage is maximized, with 99% of PTV volume receiving 90-93% of prescribed dose, maximum 105% hotspot, and the skin structure dose minimized.