AbstractID: 4484 Title: The Potential for Dose Dumping in Normal Tissues with IMRT

Purpose: To understand the potential for dose dumping in normal tissues (>85% of prescription dose) and to analyze effectiveness of techniques used in reducing dose dumping during IMRT planning.

Method and Materials: We reviewed 249 IMRT plans for 53 patients with H&N, cervix and prostate cancers (6MV X-rays, 5-7F), to analyze in how many cases dose dumping occurred and types of techniques used to reduce dose dumping. Gantry angles, depth of beams, duration of optimization, severity of dose-volume-constraints (DVC) on normal structures, and spatial location of PTV were reviewed in relation to dose dumping. In addition, the effect of not contouring part of rectum in beam's path on dose dumping was studied.

Results: Dose dumping occurred at Dmax depth in 16 pelvic cases (85%-129%). This was related to: 1) depth of beams, 2) narrow PTV and 3) reduced presence of rectum and bladder in beam's path. Dose dumping could be reduced to 85% by changing beam angles and/or DVC for normal structures in 4 cases and by creating phantom structures in 12 cases. Decreasing iterations also reduced dose dumping and MUs. Part of uncontoured rectum, if present in the field, received a higher dose than the contoured rectum with DVC, indicating that complete delineation of normal structures and DVC is necessary to prevent dose dumping. In H&N, when PTV extends inadvertently into air beyond the body even by a few millimeters, dose dumping occurred in beam's path (170%, 7F plan). Keeping PTV margins within body contour reduced this type of dose dumping.

Conclusions: Beamlet optimization, duration of optimization, spatial location of PTV and DVC on PTV and normal structures**,** with the potential to cause dose dumping, are an integral part of IMRT inverse planning. Use of appropriate technique/s would reduce the dose dumping and time needed to obtain optimum plan.