

Purpose: While perineal template-based LDR Brachytherapy has been the treatment of choice for advanced stage cervical cancers, recently, there is increasing interest in HDR and IMRT treatments for this disease. This study compares LDR, HDR and IMRT dose distributions, using biological effective doses (BED's), based on a Linear-Quadratic model.¹

Methods and Materials: Afterloading needles were implanted in the OR using Syed-Neblett templates. A physician outlined the target, the rectum, and the bladder volumes on CT-MRI fused images. Images and structures were transferred to Pinnacle-III, Plato, and Corvus planning systems, used for LDR, HDR, and IMRT, respectively. Dosimetry parameters for the target (D100, D90, D50, D10) and for rectum and bladder (D50, D30, D20, D10), were transformed to BED's for comparison.

Results: Three patients were analyzed in this study. Plans were created for the same BED doses in these three modalities. Dosimetry parameters were normalized to D90. Average D100 values in LDR, HDR, and IMRT were 56%, 55% and 87% of D90, respectively. Although dose coverage in the target region was comparable in LDR and HDR, average value of D10 was higher in HDR than LDR (by 25%). However, average D30 and D50 values were comparable in LDR and HDR. In IMRT, average D10 was only about 8% higher than D90, indicating superior dose homogeneity. Rectum and bladder doses were lower in IMRT and in HDR compared to LDR.

Conclusion: While dose inhomogeneity in the target region was higher in HDR than LDR, normal structure doses were lower. IMRT provided better dose homogeneity and target coverage, and delivered lower doses to normal structures than LDR. Therefore, HDR and IMRT seem to be better for the treatment of advanced stage cervical cancer. IMRT has the added advantage of being non-invasive.

1) C. C. Ling, et. al. Radiotherapy and Oncology, 25 (1992) 103-110.