

Purpose: Significance of Patient Rotation for Dosimetry in IGRT

Method and Materials: Advances in technology has made IGRT widely available, especial Cone Beam CT (CBCT) for patient positioning. In our institution a Varian Trilogy was installed for IGRT using CBCT with On-Board Imaging Device. The patient positioning is done by comparing and fusing the CBCT images with original CT simulation images. Once the fusion is done the system provides operator with patient shifting information in 4-Dimension: Vertical Shift, Lateral Shift, Longitudinal Shift and Couch Rotation (Yaw), no information regarding Pitching and Roll is provided. While for majority of patient treatment on a flat (Carbon Fiber) Couch-Top the pitching is minimum, the patient roll is not uncommon showing soft tissue fused well but clear boney mark discrepancy. Assuming patient translational shift has been corrected; we have studied the effect of patient roll and yaw for three typical sites: Prostate, Lung and Head&Neck treatment by simulating the patient rotation in computer planning system.

Results: Histogram of GTV, OAR for Prostate, Lung and Head&Neck with various degrees of Roll and Yaw rotation are studied and compared with perfect matching. Up to 8 degree we found there is no effect of both roll and yaw rotation for prostate, small to negligible effect for lung. For Head and Neck IMRT treatment up to 3 degree roll, and 4 degree yaw, there is small effect in PTV 63 Gy region, but negligible effect in lower or higher dose region for treatment, and negligible effect for OAR.

Conclusion: As long as patient translational shift correction is done, small degree of patient rotational shift will not effect both the dose coverage of GTV, and dose effect of OAR, at least in the 3 sites we have studied: Prostate, Lung and Head&Neck.

Conflict of Interest (only if applicable):

None