Abstract ID: 16307 Title: Clinical Application of 40o Very Limited Angle CBCT (VLA CBCT) for Target Localization of Lung Cancer Patient who is treated with SBRT and ABC in Conventional Radiation Therapy

Purpose:40o VLA CBCT is used to verify the target position of lung cancer patient treated with x-ray Stereotactic Body Radiation Therapy (SBRT) and Automatic Breath Coordinator (ABC) using Elekta SynergyTM linear accelerator, and XVITM CBCT.

Methods:Limited Angle CBCT (LA CBCT) with 40o scanning angles is determined by (1) the maximum time the patient can hold breath (15-20 seconds) under ABC technique, and (2) the minimum scan angles to reconstruct the target with minimum artifacts due to incomplete projections, and (3) the start and stop angles of the LA CBCT, which is determined by the location of the tumor as well as geometry of the lung. Based upon the phantom study, 40o CBCT (with S20 collimator and H&N reconstruction option) starting from 160 to 200 is the optimum to reconstruct the target in coronal images. In the range of these angles, the target is minimally over-shadowed by the vertebral bodies and mediastinum, thus the target can be determined in the CBCT images.

Free-breathing (FB) CBCT is taken to determine the maximum range of the target movements, and 4 sets of VLA CBCT are taken to investigate the reproducibility of the VLA CBCT procedure.

Results:The target movements with FB CBFT are ~1cm in lateral and AP direction, and 2.5cm in Sup/Inf direction. The average motions during 4 breadth-hold procedures are less than 5mm, which is on the order of uncertainties in intra/inter user variation. Also, VLA CBCT's are taken every 3 fields of the treatment. Their movements are the same ranges.

Conclusions:The VLA CBCT is very effective to evaluate the target movements in the middle of the lung and to acquire images (20 seconds for VLA CBCT vs 2minutes for conventional 360o CBCT). Also, patient dose is reduced from 3-4cGy with standard CBCT to < 0.1cGy.