

AbstractID: 5032 Title: A Technique for Cone-Beam CT-Guided Stereotactic Body Radiation Therapy

Purpose: To develop and assess a technique using cone-beam CT (CBCT) to localize treatment targets for stereotactic body radiation therapy (SBRT).

Material and Methods: Patients selected for SBRT had 3-D or 4-D CT simulation with immobilization. GTV, CTV, ITV, and PTV were identified for treatment planning. Intensity-modulated radiation beams, multiple 3-D conformal beams, or dynamic conformal shaped arcs were designed (physician preference) and delivered using a Varian 21EX with 120-leaf MLC. Pre-treatment CBCT images (acquired over sixty seconds) were registered to the planning CT based on target soft tissue and bony structures. After the physician confirmed the potential deviations of the treatment target, the couch was automatically shifted for positioning correction. Radiographic images (kV, MV or CBCT) were taken before and after beam delivery to assess for potential intra-fraction motion.

Results: Five patients with lung, liver, and spine lesions received 18 fractions (all 3 fractions except one 6 fractions) using this technique. Pre-treatment CBCT images were successfully obtained for 17 fractions. Compared to traditional 2D matching using bony structures (tumor are usually not visible), use of CBCT, which is essentially imaging ITV, is able to correct target deviation from 1 mm to 15 mm with an average of 5 mm. The comparison on pre-treatment and post-treatment radiographic images demonstrated an average 2 mm deviation (ranging from 0-4 mm), suggesting that better immobilization might further improve the positioning accuracy. Typical total “in-room” times for the patients are about 1 hour.

Conclusion: CBCT-guided SBRT is reasonable and allows for alignment based on 3-D anatomical information prior to treatment.

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