

THE FEASIBLE STUDY IN THE CORRECTION OF RESPIRATORY MOTION FOR IMRT

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Purpose : Intensity modulated radiation therapy (IMRT) utilizes nonuniform beam profile to provide desired radiation dosage to the tumor volume more accurately. However, the problem of intra-fraction organ motion can cause distortion to the desired beam intensities. This study aims to develop a respiration adaptive technique to toggle the problem of respiratory motion in radiation therapy.

Materials and Methods : A video cue that shows a cyclic moving pattern is shown to the patient to help adjust his respiratory motion. Once the respiratory motion becomes regular, we can predict his respiratory phase during the treatment. The trajectory of the organ due to the respiratory motion can be obtained from the fluoroscopy study. The trajectory is then used to modify the velocities of MLC leaves so that the radiation field is synchronized with organ motion. Once the beam moves with the respiratory motion, the field size can be fixed on the tumor volume and reduce the distortion of dose distribution due to the organ motion.

Results and Conclusions : A phantom was built to simulate the respiratory motion. EDR2 films are employed for the measurement of dose distribution. Preliminary results show that modification of MLC can be used to reduce the distortion due to respiration. Visual cue can be used to improve the regularization of respiration. This technique can be applied to clinical cases. The advantage of this Respiration Adaptive IMRT is to eliminate the inaccuracy of the IM field delivery caused from respiration movement without the cost of treatment efficiency. It requires patient's cooperation for regular respiratory motion.

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Key words: IMRT, Respiration, MLC leaf sequence