

Purpose: To improve the quality of the treatment planning CT volume for cancer occurring in upper abdomen

Method and Materials: Delineation of tumors in liver or pancreas critically depends on the image quality due to rather weak radio-opacity difference between the tumor and surrounding tissue. Since for cases with tumor motion $> 0.5\text{cm}$, phase 50% scan is used for treatment planning the quality of this image is worse than its helical equivalent. Thus in order to improve Signal to Noise ratio (SNR) and Contrast to Noise ratio (CNR) of the phase 50 scan a synchronized averaging of the entire 4DCT data set is applied to create a composite CT volume equivalent to phase 50 scan. Four dimensional CT scans of ten patients with liver and pancreas cancer were used retrospectively in this study. In-house implementation of Demons algorithm allowed for adding the deformed CT phases to phase 50% scan.

Results: Improved SNR for all cases was observed. Average improvement of SNR for all cases in the region of interest was by a factor of 2.8. The scan also look better for a visual inspection.

Conclusion: Synchronized averaging of the 4 DCT scan can be used to obtain better quality treatment planning scans. However possible artefacts in 4DCT phases might preclude effective use of the entire set of CT phases.

Conflict of Interest (only if applicable):None