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SU-G-IeP2-02: A Proposed Solution to Accurate Delineation of External Body Contour Within CT Extended Field of View (eFOV) and the Evaluation o Dosimetric Impact from Image Distortion in EFOV

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Abstract

Purpose:
When a patient's anatomy spans beyond the scan field of view (sFOV) in a CT scanner, extrapolation techniques are applied to reconstruct data in the extended field of view (eFOV). However, it's challenging to delineate the external body contour accurately due to image distortions within eFOV. Our proposed solution is to apply TargetTape, a disposable radio-opaque adhesive strip, to patients. Our study investigates the accuracy of geometric reconstruction and the dosimetric impact when using TargetTape in eFOV.

Methods:
With a GE Optima CT, a cylindrical water phantom was scanned centrally within the sFOV as a reference image. Additional scans were acquired with the phantom extended at 2cm interval from the edge of sFOV to the edge of eFOV. All scans were performed with and without TargetTape. An anthropomorphic pelvic phantom was scanned with a lateral offset to assess the dosimetric impact. Two calculations were performed; one with the automatic external body contour and the other with the manual edits of external body contour based on the visualization of TargetTape.

Results:
With the aid of TargetTape, the external body contour was accurately delineated within eFOV. The auto-contouring tool in our TPS overestimated the phantom diameter by 0.7cm. For 6MV lateral POP, four-field box, seven-field IMRT and single arc VMAT plans on the pelvic phantom, the dose differences at isocentre were 1.3%, 0.8%, 0.5% and 0.4% respectively. Discrepancy in the DVH was more pronounced for lateral POP and four-field box techniques.

Conclusion:
The usage of TargetTape on anatomy extending beyond the sFOV provides clear visualization of the body. Although our study reveals small dose difference, our pelvic phantom underestimates the discrepancy. A real patient has image distortion on both sides of the pelvis whereas our phantom only has distortion on one side. Our next study will involve real patient datasets.

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