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Original Article

The Role of CT-Based Radiotherapy Planning on Dosimetric Correction

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Abstract:

Background/Objective: The dose distribution is affected by tissue inhomogeneities. The objective of this study was a dosimetric evaluation of the potential corrective role of computed tomography (CT) data in radiotherapy treatment planning (RTP) for various anatomical sites of the body (head and neck, abdominopelvis and thorax), separately.

Patients and Methods: Fifty-four cases of head and neck, pelvis, abdomen and breast cancers were included in this study. All of the patients were scanned with the same CT machine. Each case was planned with and without CT-based density correction by a two-dimensional ALFARD RTP system. Analyses of dosimetric parameters were performed for with and without inhomogeneity corrections based on the effective path length method. Dosimetric parameters were dose uniformity (Te), the average (Davg), minimum (Dmin) and maximum (Dmax) doses for both the planning target volumes and organs at risk. These parameters with and without CT-based density correction were compared in the head and neck, abdominopelvic and thoracic regions, separately.

Results: The mean difference of Te and Davg between these two methods was statistically significant in the thoracic region (7.13±5.55; p=0.001 for Te and 4.65±6.59; p=0.04 for Davg). Measurements of Te, Davg, Dmin and Dmax in the head and neck and abdominopelvic regions showed no statistically significant differences between the two methods (all p values≥0.05).

Conclusion: In some parts of the body, if the CT correction for density variation was not applied, the dose deviations could be out of the tolerance limits defined by the standards for tumors and normal tissues.

Keywords:

[Radiotherapy Planning](#) . [Density Correction](#) . [Target Volume](#) . [Organ at Risk](#) . [CT Planning](#)

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