Purpose: The study was aimed to evaluate the accuracy of lung cancer treatment dose calculations using a bulk electron density for forced-density correction, in situations where CT images are acquired in other institutions and the information of CT number to electron density (CT-to-ED) conversion is unavailable for conducting pixel density correction.

Methods: Eleven 3D SBRT lung cases were studied. Treatment plans were generated initially with pixel-density correction using a known CT-to-ED conversion, in a CMS XIO treatment planning system using superposition algorithm. The plans were re-calculated with contour-based density correction, i.e., forced-density correction: a density of 0.26 g/cm³ was assigned to lung structures, which was a population average taken from a literature, and unit density was assigned to other structures. Monitor units were kept the same in both plans.

Results: The doses calculated using forced-density correction were compared against those calculated using pixel-density correction. The absolute percentage differences of PTV D95, PTV mean dose, and V20, among the 11 cases, were 2.49±1.69%, 1.69±1.5%, and 1.88±2.36%, respectively.

Conclusions: The results showed that the dose calculation using the bulk density and forced density correction generated dose distributions close to those calculated using pixel-density correction and actual CT-to-ED conversion.

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None