Target position uncertainty during visually guided deep-inspiration breath-hold radiotherapy in locally advanced lung cancer - DTU Orbit (06/12/2018)

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Purpose: The purpose of this study was to estimate the uncertainty in voluntary deep-inspiration breath hold (DISH) radiotherapy for locally advanced non-small cell lung cancer (NSCLC) patients.

Methods: Perpendicular fluoroscopic movies were acquired in free breathing (FB) and DIBH during a course of visually guided DIBH radiotherapy of nine patients with NSCLC. Patients had liquid markers injected in mediastinal lymph nodes and primary tumours. Excursion, systematic- and random errors, and inter-breath-hold position uncertainty were investigated using an image based tracking algorithm.

Results: A mean reduction of 2-6 mm in marker excursion in DIBH versus FB was seen in the anterior posterior (AP), left-right (LR) and cranio-caudal (CC) directions. Lymph node motion during DIBH originated from cardiac motion. The systematic-(standard deviation (SD) of all the mean marker positions) and random errors (root-mean-square of the intra-BH SD) during DIBH were 0.5 and 0.3 mm (AP), 0.5 and 0.3 mm (LR), 0.8 and 0.4 mm (CC), respectively. The mean inter-breath-hold shifts were -0.3 mm (AP), -0.2 mm (LR), and -0.2 mm (CC).

Conclusion: Intra- and inter-breath-hold uncertainty of tumours and lymph nodes were small in visually guided breath-hold radiotherapy of NSCLC. Target motion could be substantially reduced, but not eliminated, using visually guided DIBH. (C) 2017 Elsevier B.V. All rights reserved.

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