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The optimal choice of energy during radiotherapy planning of the left breast with deep-inspiration breath-hold technique

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During the radiotherapy (RT) treatment of left-sided breast cancer, the heart and lungs receives a certain dose of radiation, which may result in acute and/or late toxicity [1]. This study aimed to estimate the efficacy of the deep inspiration breath-hold (DIBH) technique and optimize radiation exposition to the heart in radiation therapy for left-sided breast cancer [2, 3]. For the patient with left-sided breast cancer, CT scans were done, in the case of DBIH. Based on these CT scans intensity-modulated radiation therapy (IMRT) plan was made. It must be emphasized that reproducible DIBH positioning during radiation delivery enabled a 3D-surface monitoring system with visual feedback assured [2]. Planning target volume (PTV) was created by uniformly extending the clinical target volume (CTV) (cropped 4mm from the skin) with a margin of 1 cm. Using this technique provides optimal target coverage was maintained. The heart and the lungs are dealt with as organs at risk (OAR). Dose-volume histograms (DVH) were used to represent dose variations in PTV and OARs. In DIBH plans dose to the heart and left lung was significantly lower than in free breathing (FB) [5] and the mean dose to the heart (Dmean) was 2.1 Gy, and the lungs were 4.1 Gy. A mean dose reduction was an average ≥ 1.2 Gy compared to the FB method. The average D2%, V5 and V10 heart doses showed a difference between the DIBH and FB techniques. For the lungs reduced V20<30% was also obtained. DIBH technique provides good coverage of the target volume and effectively reduces heart exposure. This technique also gives the possibility to improve lung sparing for patients with more advanced diseases. DIBH technology satisfies all planning and construction requirements as well as low OAR dose constraints.

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