AbstractID: 1347 Title: Correspondence of respiratory-correlated CT data sets acquired using 4-D CT with those acquired using occlusion spirometry

Various methods have been proposed to acquire respiratory-correlated computed tomography (CT) image data sets, including four-dimensional (4-D) CT and spirometry-assisted breath hold. In the present work we compare CT image data sets acquired at end expiration and end inspiration using both techniques. 4-D CT image data sets were acquired on a multislice helical CT scanner using a technique in which projections were tagged at a specified point in the respiratory cycle, binned based on their phase relative to the tags, and reconstructed. End expiration and end inspiration data sets were extracted from the 4-D data set and compared to CT data sets acquired under breath hold using a computer controlled occlusion spirometer. Data sets were registered using a commercial radiation treatment planning system. Differences in diaphragm position of up to several cm were observed as well as differences in tumor position of up to 1 cm. Sources of these differences may be (1) the tags and phases in the 4-D reconstruction do not correspond exactly to the specified points in the respiratory cycle, (2) patients get fatigued after the spirometry, and (3) during the 4-D scan patients are coached into a breathing pattern different from breath hold. Consequently, breath hold CT image data sets acquired using spirometry-assisted breath hold may not give an accurate indication of tumor location in a free-breathing patient.

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