

AbstractID: 7391 Title: Lung localization and initial shifts based on implanted markers

Purpose:

The purpose of this study was to evaluate the daily setup error of small peripheral lung tumors based on implanted markers and stereoscopic x-rays.

Method and Materials:

Twenty-three patients with small peripheral lung tumors were implanted with radiographic markers for localized radiation therapy. Exhale CT scans were used for planning. At treatment, the patients were aligned to skin marks followed by exhale synchronized stereoscopic x-rays (Exactrac™, BrainLAB). Setup error is evaluated as the shift from initial skin alignment to the implanted x-ray alignment. The mean, σ mean, and RMS of σ for this data are reported.

Results:

A total of 790 daily treatment sessions on 23 patients were recorded. In all patients, an evaluation CT of the implanted marker was performed prior to treatment to verify marker location. The mean and σ for the 23 patients from initial setup to x-ray localization were 0.2 ± 3.8 mm laterally, 1.6 ± 5.3 mm longitudinally, and -0.7 ± 7.8 mm vertically. The RMS error was Lat 5.5 mm, Long 7.7, and Vert 6.4 mm.

Conclusion:

A large patient study using implanted markers for lung tumor alignment indicated large initial setup shifts from skin marks. Daily random errors on the order of 8mm were reported. The range of these shifts is as large as 3.0 cm in some instances indicating that a small target would potentially be missed without better setup or with localization. The large systematic error is most likely due to the difference in tumor position from exhale breath hold (CT) relative to free breathing exhale (X-Ray).

Conflict of Interest:

This work is supported in part from a research grant from BrainLAB, Inc.