

AbstractID: 10644 Title: Correlation between abdominal organ motion and an external marker toward respiratory-gated intensity-modulated radiation therapy for pancreatic carcinoma.

Purpose: To attain the respiratory-gated intensity-modulated radiotherapy (IMRT) for pancreatic carcinoma by using an external marker as a surrogate for tumor motion, the correlation between a motion of an external marker and displacement of a stent around pancreas was investigated.

Methods and Materials: Three patients who had undergone the ERCP for biliary decompression with placement of a stent were applied in this study. An anterior-posterior motion of an external marker placed on the patient's abdomen was monitored by the Varian® RPM system for two minutes, this was synchronously displayed on the X-ray fluoroscopic screen which acquired the stent's superior-inferior displacement. For each patient, the above measurement was performed at four sessions during the treatment course. Both the displacements of an abdominal marker and a stent were automatically extracted by in-house software based on the template-matching algorithm. The cross-correlation coefficients between displacement of an abdominal marker and a stent motion and their intra-fractional variations were evaluated. The predicted stent positions at 30%, 40% and 50% of respiratory phase, which were traced the regression line from 0%-phase (Exhalation), were compared with actual positions.

Results: The correlation coefficients (R^2) ranged from 0.77 to 0.97 and were inter-fractionally reproducible. The predicted stent's positions at 30 %, 40 % and 50 % of respiratory phase were discrepant with actual positions with errors of 1.6 mm, 2.0 mm and 2.1 mm on average, respectively.

Conclusions: The strong correlation between a motion of an external marker and a displacement of a stent around the pancreas was observed with a high reproducibility. An error of the predicted target position by an external marker was up to 3.1 mm for the expected-gating duration (~50 % respiratory phase) Our study demonstrated that the respiratory-gated IMRT for pancreatic carcinoma may be clinically acceptable.