

AbstractID: 13169 Title: Variation of Target Position Determined by Gold Fiducial Markers for Radiotherapy of Pancreatic Cancers

Purpose: To determine daily positional variations of the target relative to skeleton during pancreatic IMRT. To assess the dosimetric impact of these variation to target and critical organ.

Methods: Eight patients with pancreatic cancer underwent placement of at least 3 gold fiducials by endoscopic ultrasound guidance. Patients were immobilized using alpha-cradle for gated CT simulation and gated IMRT. Gated CT images were acquired with either prospective gating or retrospective gating (4D-CT). IMRT was planned and treated at end of expiration. A gated on-board kilovoltage (kv) image was acquired daily in the treatment position prior to IMRT. The gated kV image was registered with a DRR from the gated CT based on skeletal anatomy. The deviation in fiducial position in anterior-posterior, superior-inferior and left-right directions were recorded. IMRT plans were calculated to estimate change of DVH when patient was shifted with mean daily deviation for each patient.

Results: The mean (and range) daily (n=25 fractions) deviation for 8 patients between images based on skeletal fusion and fiducial location were 0.2 cm (0.1-1.0 cm), 0.5 cm (0.2-1.5 cm) and 0.4 cm (0.2-2.0 cm) in the anterior-posterior, superior-inferior and left-right directions. The dose coverage at 95% target volume would decrease by 3.7% (median, ranged 1.5-6.2%; n=8) when patient daily position was not adjusted. The cord max dose would increase by 5.8% (median, range 0.1-26.6%, n=8) when patient daily position was adjusted. The cord dose would not change (median 0% range -1.2-5.1%, n=8) when patient daily position was adjusted only in the S-I direction.

Conclusions: The daily soft-tissue set-up variations of target in the treatment of pancreatic cancer were measured. An additional margin is needed around the target when IMRT is delivered using skeletal registration without fiducials. Without real-time re-optimization, position adjustment using daily image-guidance might need compromise between tumor and critical organs.