

AbstractID: 9359 Title: The effect of changes in the content of air in the small bowel on dose distributions in proton and photon therapy for pancreatic cancer

Purpose: To determine how changes in the content of air in the small bowel affects dose distributions for conformal, IMRT, and proton therapy in the treatment of pancreatic cancer.

Materials and Methods: Treatment plans were developed for six post-operative pancreatic cancer patients using conformal, IMRT, and proton scattered beam planning. Plans were first calculated (using inhomogeneities) and normalized so that 95% of the volume received the prescription dose. The air in the small bowel was then contoured and given a Hounsfield unit of zero. The original plans were then recalculated on the edited CT set (again using inhomogeneities) with identical beam line parameters and monitor units. This case corresponds to the situation where the patient is planned with air in the small bowel but then treated with no air. In the second case, plans were generated on the CT sets with all air given a HU of zero and then recalculated on the original CT (containing air). Changes in dose homogeneity and coverage were compared for the two cases for each patient.

Results: When plans were recalculated on the CT set with no air, the protons plans saw a large decrease in dose homogeneity while photons plans changed very little. Dose coverage also decreased more for proton plans than for the photon plans. Proton plans were less sensitive in the case where plans were recalculated on the CT set containing air but still had worse coverage and generally a greater decrease in target homogeneity than did the photon plans.

Conclusions: Proton plans are greatly sensitive to changes in the content of air in the patient when treating pancreatic cancer while photon plans are minimally affected. Changes in the content of air may cause proton plans to under dose the target or overdose normal tissue.