AbstractID: 8985 Title: Prediction of Weight Loss, Tumor Response, and Set-up Errors For Head and Neck Patients

Purpose: The objective of this study was to develop a novel tool using Kernel Classification that can be used to automatically identify patients that have, or will have, setup issues requiring intervention such as re-simulation and/or re-planning.
Method and Materials: Inter-Fraction motion was retrospectively analyzed for 43 H&N patients that were treated on a helical tomotherapy system. For each patient, CT images were acquired and transferred to the tomotherapy database for treatment planning and image-guided patient setup. Both custom aquaplastic masks and a positioning mouthpiece were used in 10 of the 43 patients.
Results: Fifteen patients had greater than 10% weight loss during the course of treatment. Six patients had a visible reduction in GTV volume. Immobilization effectiveness decreased as the tumors regressed in size and/or the patients lost weight. If the tumor regression was occurred then time could be scheduled to periodically check the mask fit and to make a new mask if needed.
The kernel classification technique correctly identified all 43 H&N patients as either having normal or problematic setup using their respective shift data sets. Classifications were made using only the shift values from the first 14 treatments. The predictive performance seriously degraded when data from fewer than 14 treatments were used. However, adding more did little to improve the performance.
Conclusions: This study demonstrated that the kernel regression classification method was able to correctly identify the cause behind IGRT positioning problems for H&N patients. The study validated that IGRT positioning problems cause abnormal problem-specific distributions in the shift data without using statistical distribution tests. Since this technique is fully automated, it could potentially be used during IGRT sessions to help the therapists decipher the factors that hinder patient setup early in a patient's treatment so that the proper precautions can be in place.