AbstractID: 13401 Title: Evaluation of parotid density changes during IMRT of head-and-neck cancer

Purpose: To evaluate the change in parotid gland density over the course of treatment for patients who have undergone adaptive radiation therapy to the head-and-neck.

Method and Materials: Computed tomography (CT) images from sixteen patients were analyzed to assess the change in mean parotid density and parotid volume over the course of treatment. Daily CT images were acquired for a group of patients treated with adaptive radiation therapy using a CT-on-rails unit. A total of 529 CT scans (~33 fractions per patient) were analyzed. Parotid contours were deformed from the planning CT to each treatment day CT image using an in-house deformable image registration tool. The parotid volume, and average and standard deviation in CT number (HU) were obtained for each treatment fraction. Linear regression analysis was performed with a 95% confidence interval to determine the rate and trend of parotid density change. The Pearson correlation coefficient was used to evaluate possible correlations with parotid volume and function measurements.

Results: Eleven of the sixteen patients showed a steady decrease in density for both parotids over the course of treatment. Two patients showed a steady decrease only in their ipsilateral parotid. The linear regression analysis for this subset of patients (p-value <0.01) revealed an average rate of decrease of 0.30 HU/fraction (range 0.13-0.70 HU/fraction). The density reduction correlated well with parotid volume change (in 24/32 instances), and was moderately correlated with patient follow-up saliva-flow measurements (9 patients, correlation coefficient range 0.27-0.63) for the first two follow-up appointments.

Conclusion: The mean parotid density decreased steadily and correlated well with the volume shrinkage in most patients observed in this study. In the limited available data, the density change also correlated with saliva-flow, which warrants future studies with a larger patient population and additional treatment parameters.

Conflict of Interest: None