

AbstractID: 6686 Title: Characterization of parotid gland movement and deformation during IMRT treatment

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Purpose:

To quantify the pattern of internal parotid gland movement and shape variations in patients undergoing IMRT.

Methods & Materials:

Eleven head & neck patients' treatment planning CTs and repeat in-room CTs were acquired for this analysis. In-room treatment CTs were first registered to the reference planning CT by a rigid registration. The purpose of this bony registration was to remove un-interested daily setup errors so that the study was focused on soft tissue changes. A deformable image registration was then carried out for the region of interest to obtain the voxel-by-voxel displacement map of the parotid glands. We developed a metric, referred here as the shift profile, to quantify internal positional changes of the parotid. The shift profile was basically a displacement profile along the direction of interest for all points in a plane perpendicular to the direction. The shift profile can be used to quantify the rate of volume shrinkage or expansion as well as the location and time-trend of these volumetric internal changes.

Results:

About 82% of the patients show clear shrinkage along right-left direction (RL) for both parotids, and about 35% of the patients show either clear shrinkage or clear expansion along superior-inferior (SI) and anterior-posterior (AP) directions, respectively. The magnitude of the shift along SI and AP direction was much smaller than along the RL direction. Moreover, the shrinkage toward the center was found to be linear with the elapsed time in the first 3-4 weeks and became relative stable thereafter.

Conclusions:

We've found some interesting patterns to describe parotid gland variations during IMRT treatment, which shows the potential for organ specific modeling and prediction of anatomic changes.