Purpose: To examine submandibular gland volume changes by CT throughout the course of Intensity Modulated Radiation Therapy treatment for head and neck cancers.

Method and Materials: CT images from 15 patients were analyzed to evaluate the change in volume of the left and right submandibular glands over the course of treatment (30-35 fractions). Each patient had received daily CT imaging using a CT-on-rails unit. Eleven of these patients had pre- and post-treatment measurements of the stimulated and unstimulated saliva flow. Submandibular gland contours were drawn on the first fraction CT. The contours were then deformably mapped to the weekly CTs using an in-house deformable registration tool. The volume of each gland was extracted, and changes in volume assessed. The changes in gland volume were compared with saliva flow measurements using using the R2 value from a linear fit.

Results: All 15 patients showed decreases in gland volume over the course of treatment. The mean gland volume at the start of treatment was 10.6cc (range: 6.9-16.4cc). The mean volume reduction was 32.8% (range: 10.8 – 46.6%), 3.6cc (1.3 – 5.6cc). There was no clear statistical correlation between gland volume decrease and either stimulated or unstimulated salivary function.

Conclusions: This study shows a significant reduction in submandibular gland volume over the course of radiation therapy. A more thorough study should be conducted to try and link gland volume decrease with saliva production.