Introduction

- ~170,000 patients/year receive brain radiation therapy
- Chronic alterations in taste or smell can go unreported
- RT-induced dysfunction occurs at <60Gy
- No accurate predictive models for this late-effect
- 1st Order Estimation using DVH with taste and smell abnormality scores

Methodology

Taste & smell questionnaires and imaging scans were collected from 22 partial brain irradiation patients at baseline, and at 3, 6, 10, 18, and 30 weeks after RT. Smell and Taste data were reported as the worst score on each scale given at the 3rd or 6th week study visit. The smell complication scale has a max score of 6 with range of 0-6, and the taste complication score has a max score of 10 with range of 0-10. For comparison, the Taste score range was converted to a similar scale as Smell (i.e., 0-6). ROIs were selected based on their predicted role in taste and smell and were delineated on pre-treatment MRI. MRI images were fused to the archived treatment plan. Dose volume histograms were calculated at 5, 10, 20, 30, 40, 50, and 60 Gy for each ROI.

Illustration of ROI Delineation

ROI: No ROI predicted smell abnormalities. The %v10 of the nasopharynx was predictive of taste abnormalities

Tumor Location: A significant difference was seen for location of tumor for severity of taste F_{3,16}=4.18, p<0.03

- Temporal lobe predicted increased severity of taste toxicity.
- Temporal Lobe tumors showed a greater degree of taste toxicity when compared to other locations.
- No statistically significant location was found for tumor location and severity for abnormality of smell.

Discussion and Conclusions

The majority of data related to abnormalities in the sense of taste after radiation therapy is in the population of patients who received radiotherapy for cancers of the head and neck. With brain irradiation (unlike head and neck) there is a significantly lower dose delivered to regions within the tongue, and as such, the mechanisms of taste disturbances are likely centrally mediated.

Potential Impact/Future Directions

- Findings have important implications for determination and avoidance of novel targets of radiation injury, which can impact daily radiation treatment planning, and thus provide an opportunity to improve the quality of life of cancer survivors
- Future directions for this research may include the possibility of interventions to prevent toxicity whether it be with cytoprotective agents or the limiting of dose to target structures when feasible.