Volumetric change of selected organs at risk during IMRT for oropharyngeal cancer.

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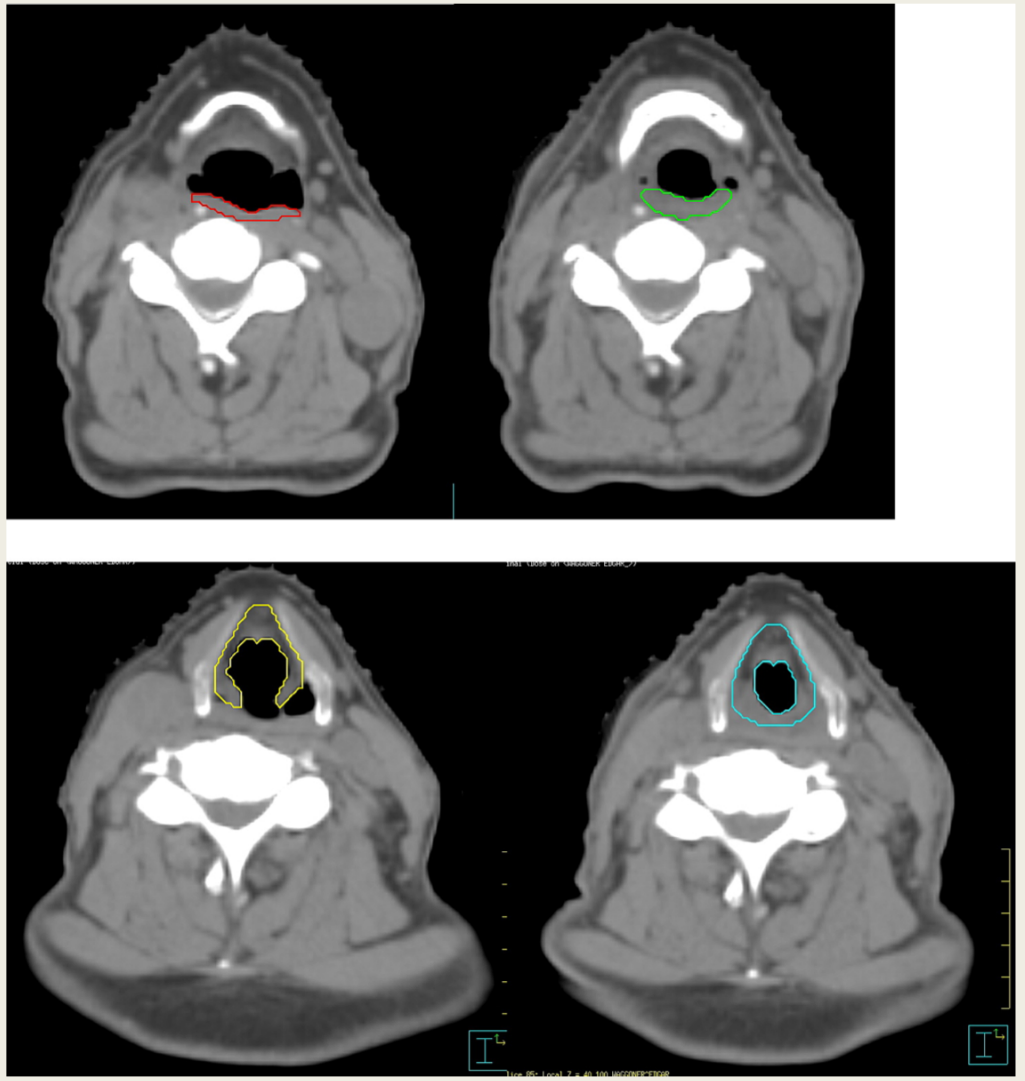
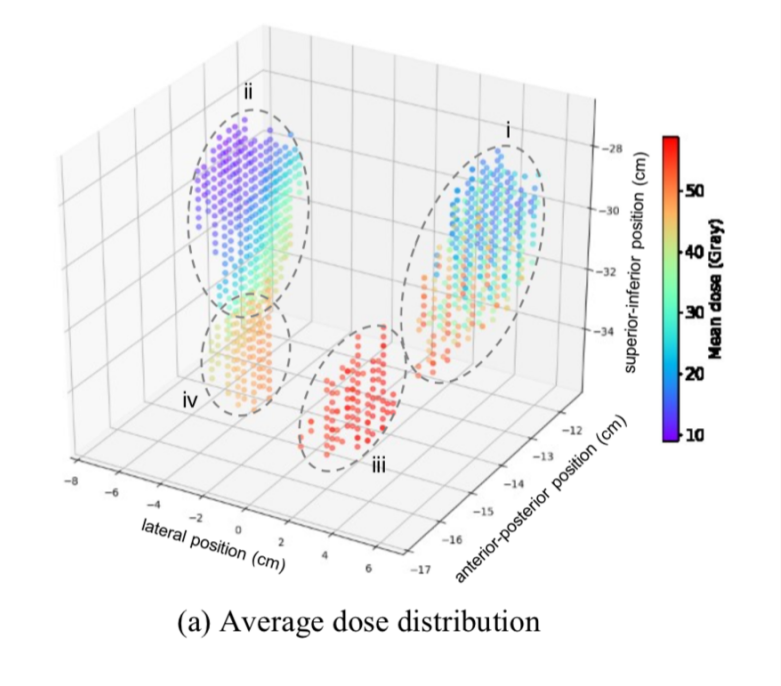
Paper Selection

- Volumetric change of selected organs at risk during IMRT for oropharyngeal cancer.
  - Shows one existing method of dose-toxicity analysis
  - Exemplifies the limited visual options to analyze the adverse effects of radiotherapy
  - Analyzes physiological effects of volume changes to organs at risk



Radiotherapy Dose-Toxicity Analysis User Interface

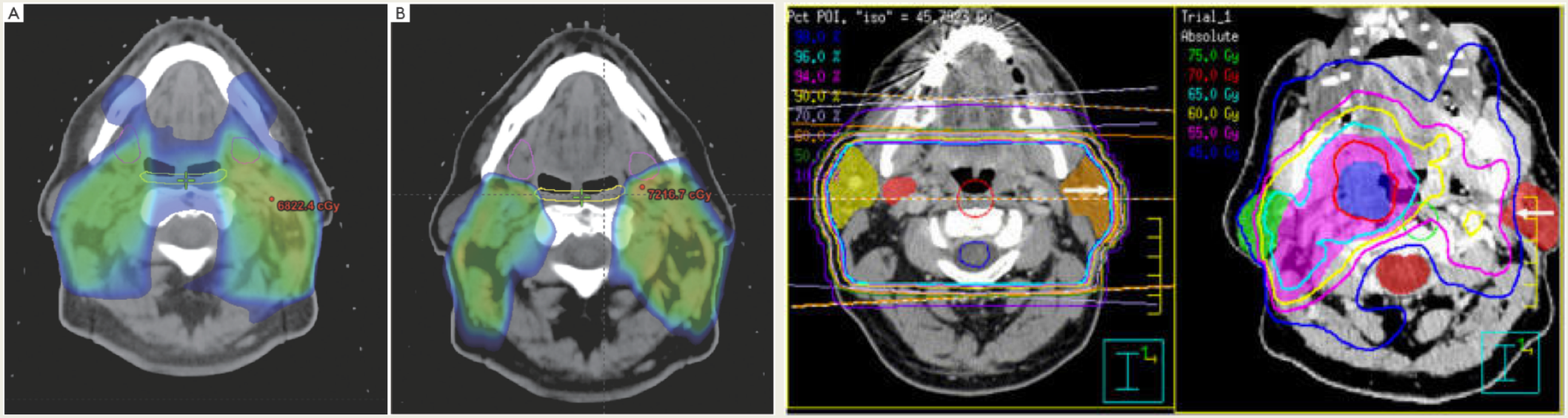
- Problem: Limited radiation therapy analysis options for oncologists and radiologists who are not experienced in programming
- Goal: Design a web-based user interface for:
  - *Rendering 3D representations of organs*
  - *Segmenting these organs*
  - *Performing Dose-Volume toxicity analysis on these segments*



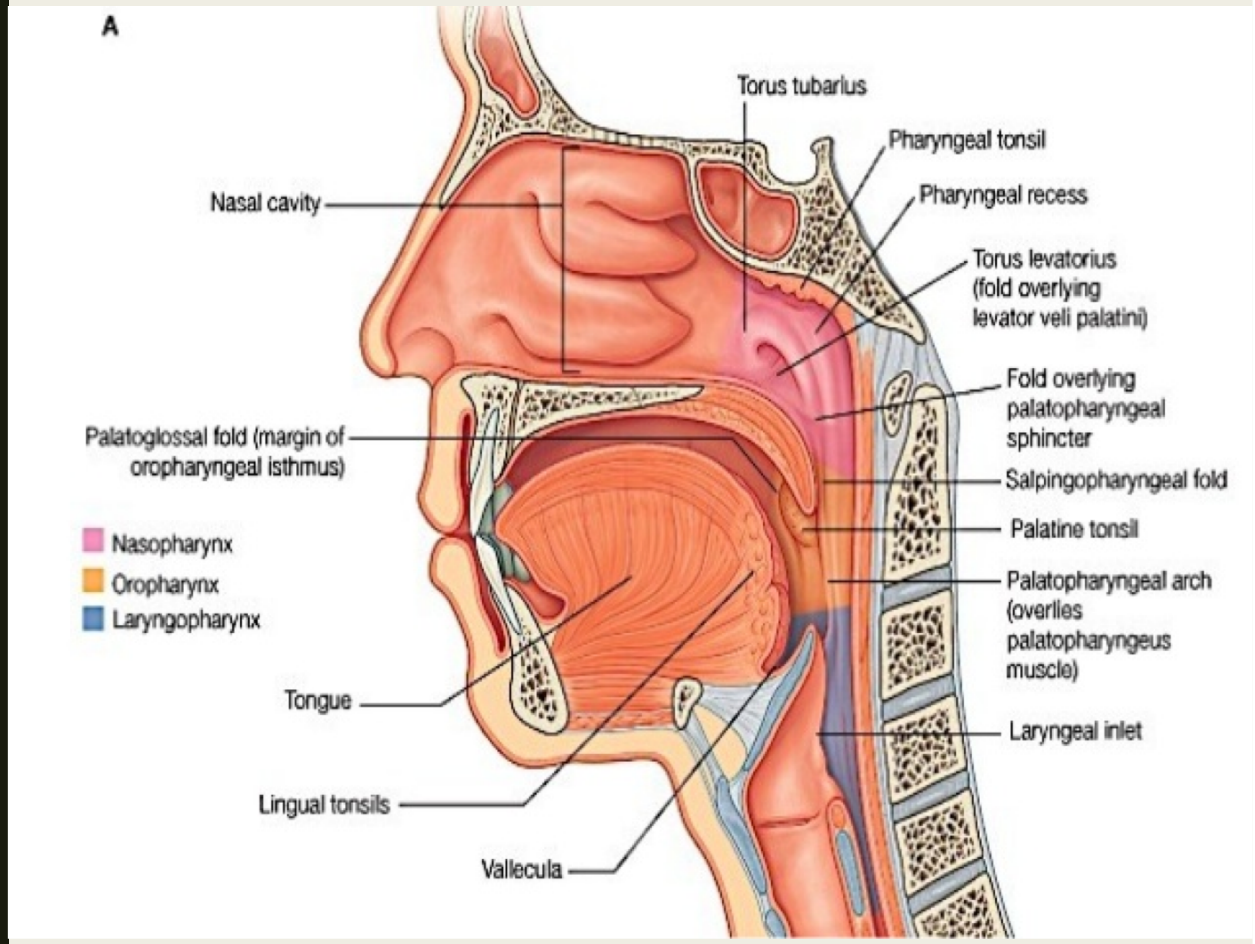
(a) Average dose distribution

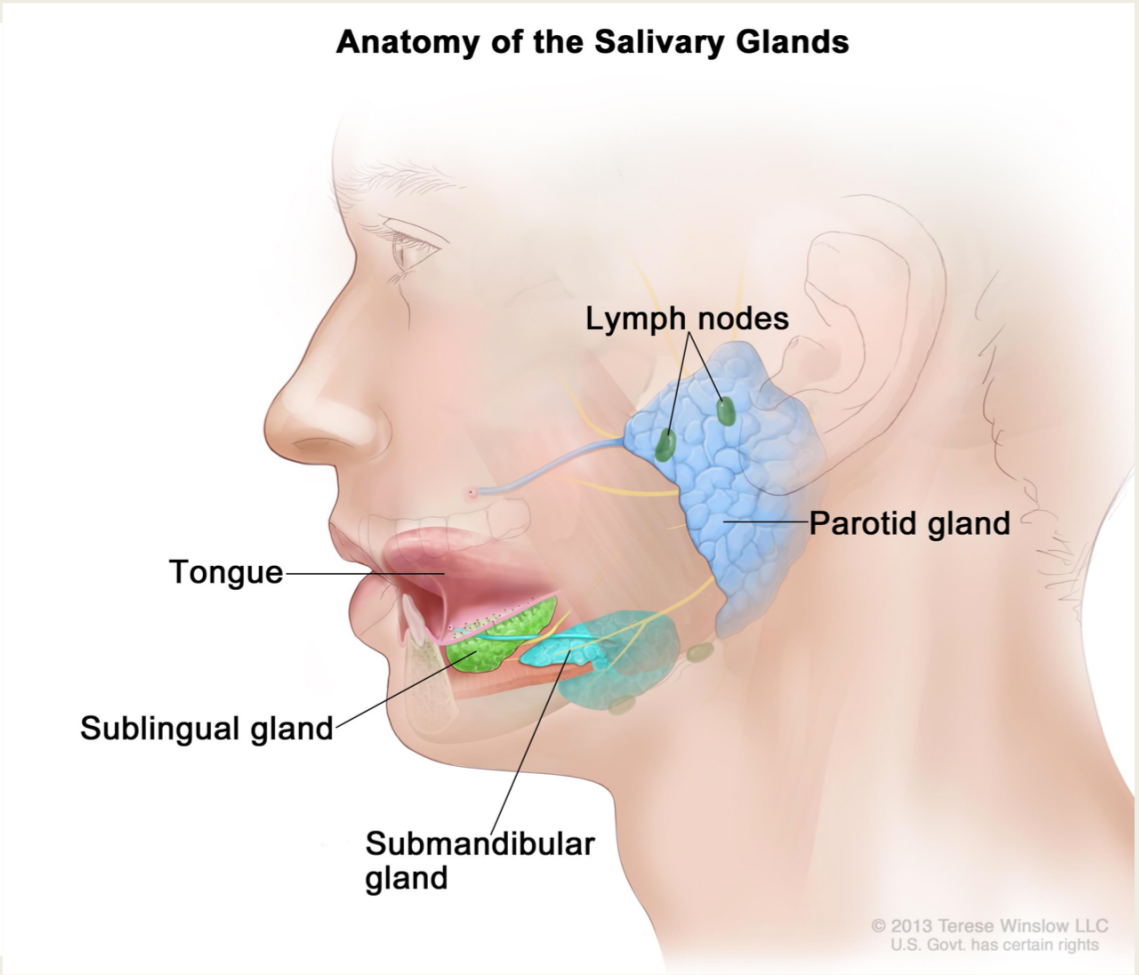
Problem Summary

- IMRT must be applied from a variety of angles in order to deliver radiation effectively throughout the tumor(s)
- Radiation has adverse anatomical/physiological effects on organs nearby
- Effects are particularly extensive in oropharyngeal cancer.
  - *Due to the variety of functions around mouth and upper neck*

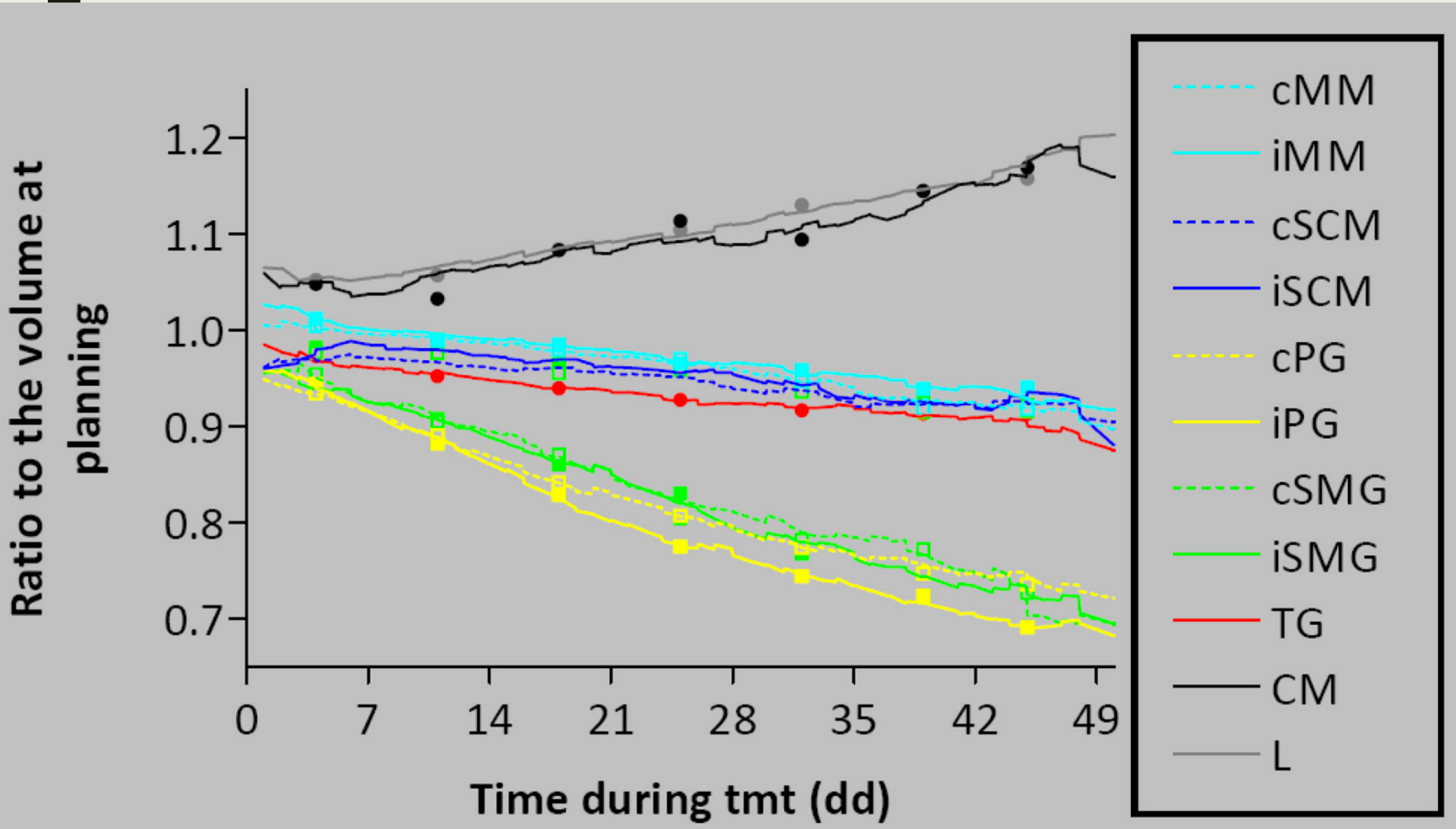


Background Information





Key Results and Significance



C - contralateral
I –ipsilateral

MM - masticatory muscle

SCM – sternocleidomastoid

PG- parotid gland

SMG – Submandibular Gland

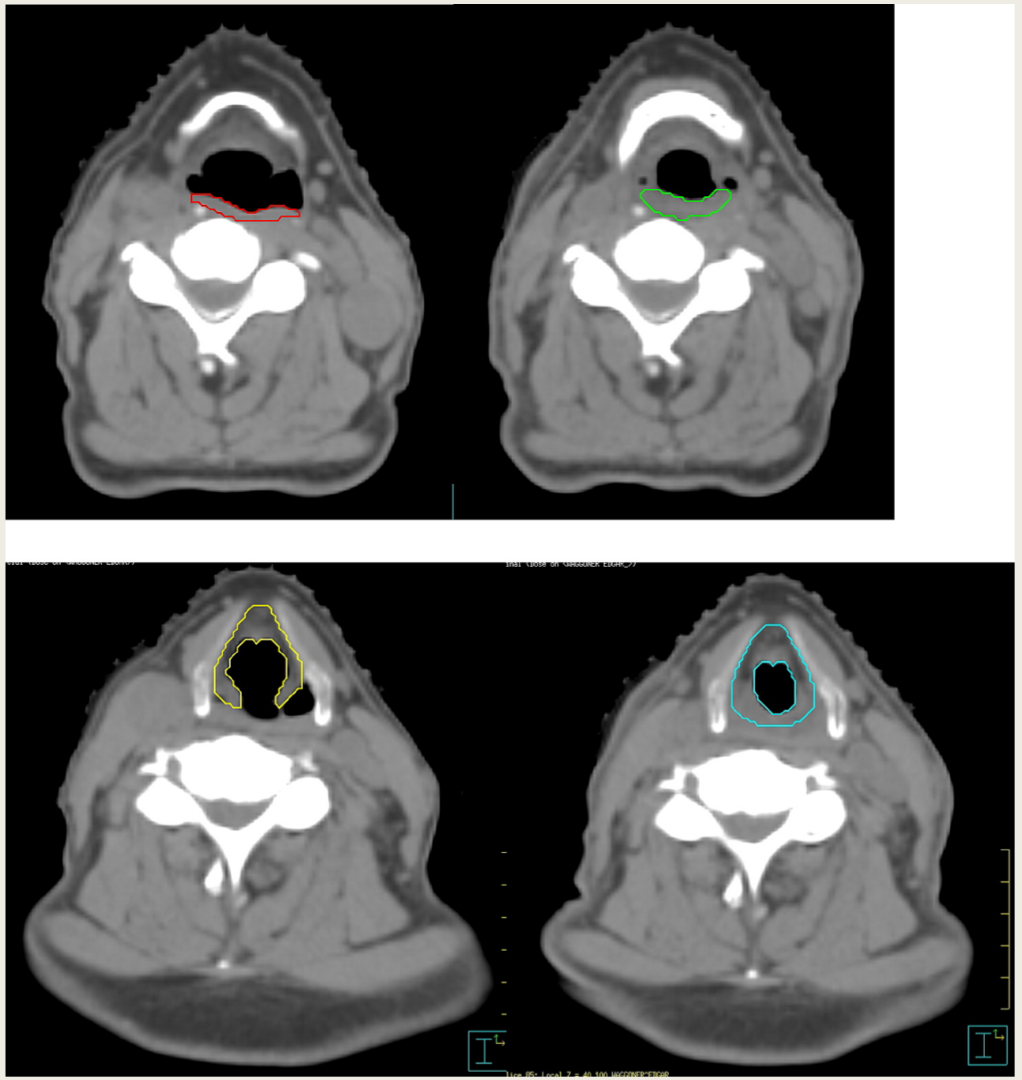
TG – thyroid glands

CM – Constrictor muscle

L - larynx

Experiment

- Patients underwent weekly CT scans during IMRT in addition to the planning CT scans
- Treatment consisted of weekly doses of IMRT for 7 weeks
- A single observer contoured each organ in CT scans
- Volumes were then computed using Phillips Radiation Oncology tools
  - *Also used to overlay previous contour to help facilitate following contours*



Paper Assessment

- Pros
  - *Extensive description of the workflow of the experiment*
  - *Provided insightful analysis on the effects of radiotherapy on head and neck organs from a volume perspective*
  - *Provided explanations for the different effects of IMRT on organs at risk*
- Cons
  - *Most of the segmentation and contouring had to be done manually*
  - *Volume computation is separate from dose distribution software*
  - *Analysis of these effects cannot be regionally analyzed for different dose distributions*

Conclusions

- Paper was successful in analyzing volume changes in response to IMRT for oropharyngeal cancer
- Demonstrated limitations of manual contouring/segmentation
- Next Steps
  - *Build a more automated tool to contour organs in a CT scan*
  - *Create a user interface to allow oncologists and radiologists to analyze organ volume or functional changes*
  - *Analyze how different dose applications affect organ functions*

Citation

- Ricchetti F, Wu B, McNutt T, Wong J, Forastiere A, Marur S, Starmer H, Sanguineti G. "Volumetric change of selected organs at risk during IMRT for oropharyngeal cancer." Int J Radiat Oncol Biol Phys. 2011 May 1;80(1):161-8. doi: 10.1016/j.ijrobp.2010.01.071. Epub 2010 Nov 19.

THANK YOU