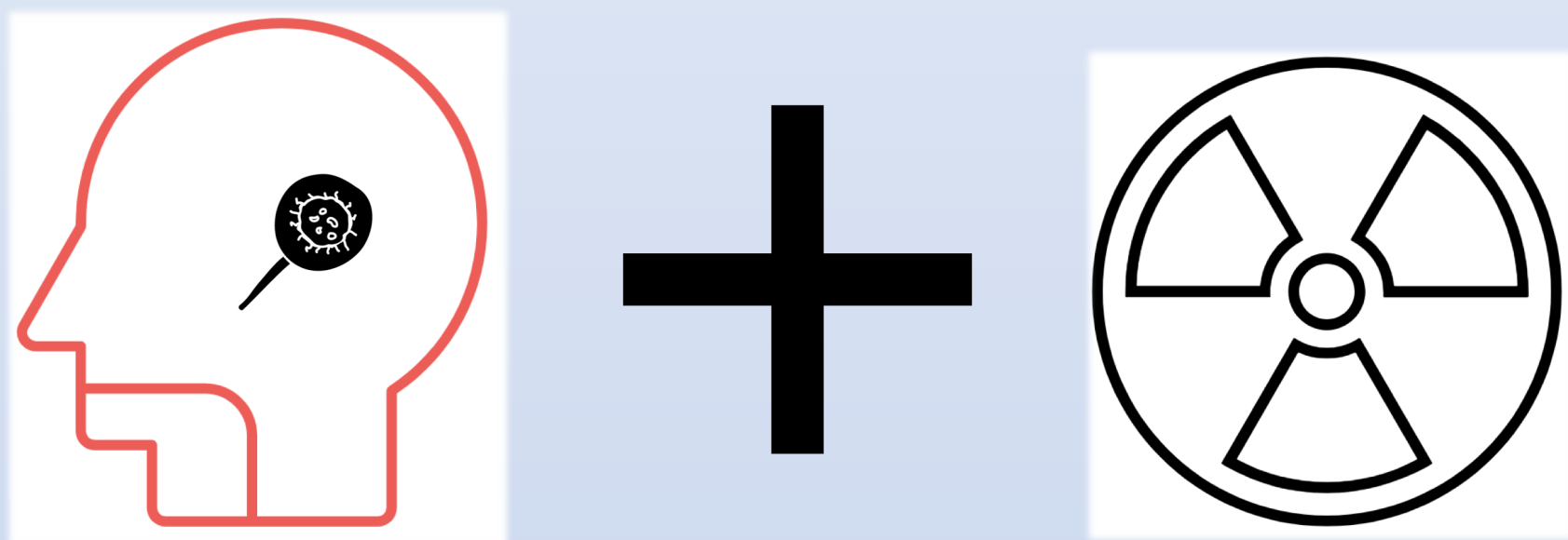


THE EFFECTS OF INTENSITY-MODULATED RADIATION THERAPY ON KINEMATIC MEASURES OF SWALLOWING IN NASOPHARYNGEAL CANCER SURVIVORS



Dai Pu PhD^{1,2}, Karen Chan PhD², Victor Lee MD³, Raymond Tsang MS¹.
Department of Surgery¹, Division of Speech and Hearing Sciences² and Department of Clinical Oncology³, The University of Hong Kong
Hong Kong SAR, China

Background



- Following radiation therapy:
- Up to 84% of nasopharyngeal cancer (NPC) survivors report subjective dysphagia
 - Endoscopy and fluoroscopy have found disordered swallowing in up to 93.5% of NPC survivors



The superior and inferior pharyngeal constrictors have been identified as NPC-specific structures that are associated with dysphagia (disordered swallowing).

Objective

Investigate the relationship between radiation dosimetry to known dysphagia/aspiration-related structures (DARS) and kinematic changes of key swallowing structures.

Methodology

- Participants
- N=39 NPC survivors
 - Treated with intensity-modulated radiation therapy (IMRT) >3 years prior, with/without simultaneous chemotherapy

- Swallowing Function
- Single session of videofluoroscopic swallowing study (VFSS)
 - 3 X 5-10mL swallows of 1) thin and 2) puree boluses
 - Coordinate mapping using ImageJ to measure swallow kinematics¹ (Figure 1)

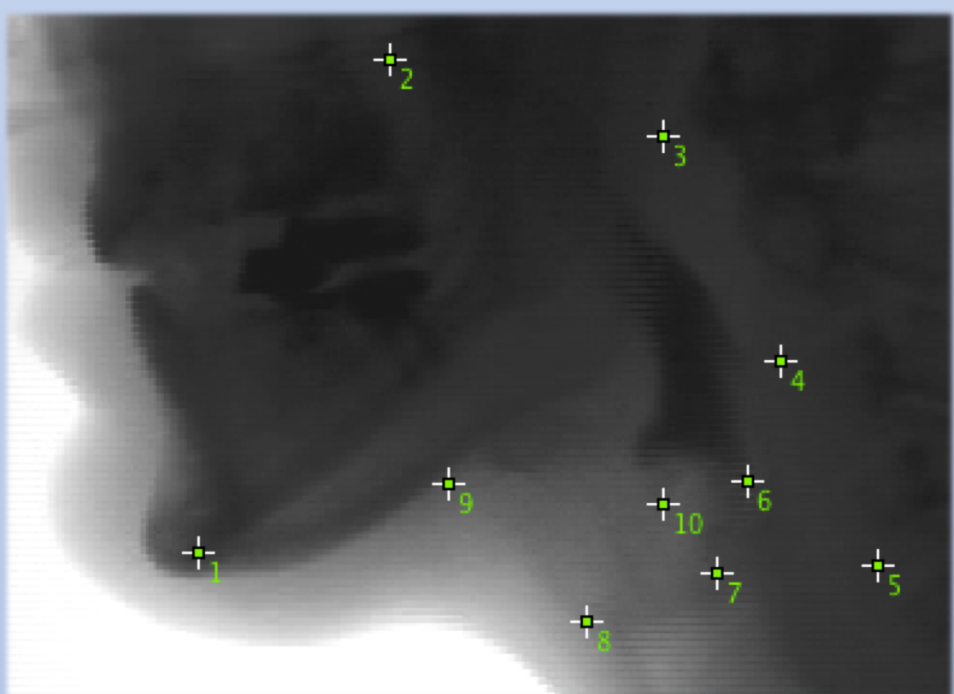


Figure 1. Example of using one frame in a VFSS video to identify key structure to track movement.

- | | |
|--------------------------------|---|
| Kinematic Measures | DARS |
| •Anterior hyoid movement | •Oral cavity |
| •Superior hyoid movement | •Parotid glands |
| •Superior laryngeal movement | •Base of tongue |
| •Hyolaryngeal approximation | •Pharyngeal constrictors (superior, middle, inferior) |
| •Tongue base retraction | •Cricopharyngeus |
| •Oral stage time | •Glottic larynx |
| •Pharyngeal stage time | •Supraglottic larynx |
| •Pharyngeal constriction ratio | |

Results

- Participants
- Age = 55.15 years (± 10.82)
 - 30 males, 9 females

Radiation to DARS	Kinematics
↗ radiation to inferior pharyngeal constrictor	↗ anterior and superior hyoid movement, tongue base retraction, and pharyngeal constriction
↗ radiation to glottic larynx	↘ anterior and superior hyoid movement
↗ radiation to cricopharyngeus	↘ superior laryngeal movement
↗ radiation to base of tongue	↘ tongue base retraction and pharyngeal constriction

Conclusions

- Higher doses of radiation to the glottic larynx, cricopharyngeus, and base of tongue are associated with reduced amplitude of DARS movement
- UNUSUALLY, higher dose of radiation to the inferior pharyngeal constrictor is associated with relatively higher amplitude of DARS movement
- Unusual findings may be related to holistic consideration on DARS and the morphology of the inferior pharyngeal constrictor²

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