

### Learning Objectives

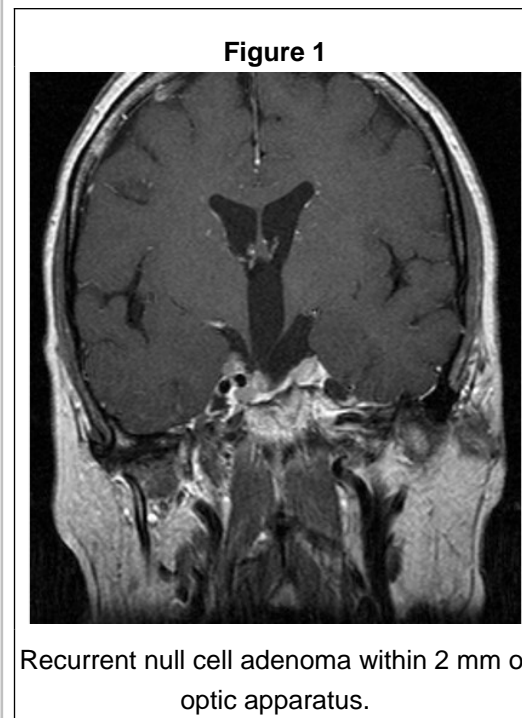
By the conclusion of this session, participants should be able to 1.) Describe the importance of fractionated radiotherapy for preservation of the optic apparatus, 2.) Understand the challenge of treating functional pituitary adenomas with radiotherapy, 3.) Identify a novel treatment paradigm for perioptic lesions.

### Introduction

Stereotactic radiosurgery with GammaKnife is the gold standard in radiotherapy for pituitary adenomas, but it is limited to lesions greater than 3 mm from the optic apparatus. Fractionated radiotherapy is typically employed for such perioptic tumors. Hypofractionated Cyberknife (i.e., 3-5 fractions) treatment schemes have been employed with success. The addition of a traditionally fractionated (i.e., 25-30 fractions) scheme to Cyberknife radiotherapy allows for a higher total dose to be delivered to the tumor with preservation of the surrounding critical structures. This series describes the tumor control rates as well as endocrine and vision outcomes for this novel approach.

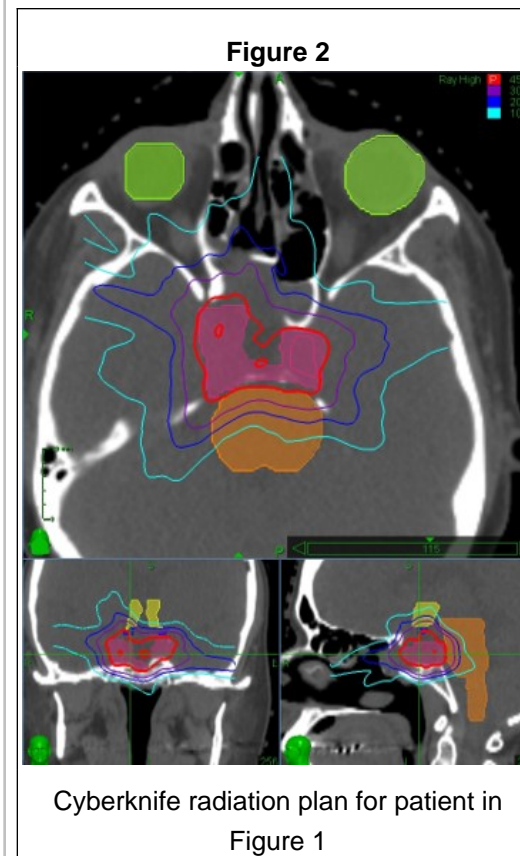
### Methods

Fifty-three patients were treated with traditionally fractionated Cyberknife radiotherapy (Accuray Inc, Sunnyvale, California) for pituitary adenomas within 3 mm of the optic apparatus. The primary end-point was tumor control with secondary end-points of vision and pituitary function preservation, as well as endocrine control in hormone-secreting tumors.



### Results

The tumor control rate was 98.1% (52/53) at a mean follow-up of 32.5 months (range 3 – 77 months). The mean total dose was 46.7 Gy (Range 45-50.4 Gy) delivered in 25 or 28 fractions (51 and 2 patients, respectively). There was 100% vision preservation. No change in pituitary function was noted in 98.1% (52/53). One patient experienced worsening of pituitary function secondary to pituitary apoplexy occurring 4 months after undergoing treatment. The endocrine control rate in hormone-secreting tumors was 75% (6/8).



### Conclusions

Fractionated Cyberknife radiotherapy demonstrates local tumor control and endocrine control rates similar to GammaKnife with superior vision and pituitary function preservation. It potentially has the benefit in endocrine control for hormone-secreting tumors over hypofractionated Cyberknife.

### References

- Killory BD, Kresl JJ, Wait SD, Ponce FA, Porter R, White WL. Hypofractionated CyberKnife radiosurgery for perichiasmatic pituitary adenomas: early results. *Neurosurgery* 2009; 64(2 Suppl): A19-25.
- Adler JR, Jr., Gibbs IC, Puataweepong P, Chang SD. Visual field preservation after multisession cyberknife radiosurgery for perioptic lesions. *Neurosurgery* 2006; 59(2): 244-54.
- Narayan V, Mohammed N, Bir SC, et al. Long-Term Outcome of Nonfunctioning and Hormonal Active Pituitary Adenoma After Gamma Knife Radiosurgery. *World neurosurgery* 2018; 114: e824-e32.